

Antecedents and Consequences of Creativity in Product Innovation Teams*

Subin Im, Mitzi M. Montoya, and John P. Workman Jr.

The generation of creative ideas and their manifestation as new products (NPs) are fundamental innovation activities of product innovation teams. Despite the importance of generating creative ideas at the fuzzy front end of the product innovation process, our understanding of antecedents and consequences of creativity of product innovation teams is limited. Drawing on Shane and Ulrich's organization design perspective of innovation, this study aims at examining the intermediary role of creativity as a critical link between team dynamics and product competitive advantage. In this study, the authors focus on NP and marketing program (MP) creativity in product innovation teams. They develop and empirically test a model that examines how internal and external team dynamics influence NP and MP creativity, and how NP and MP creativity affect product competitive advantage as a strategic innovation outcome. The study uses 206 matched responses from senior managers and product team leaders in high-tech manufacturing firms in the United States to avoid common-method bias. The authors use maximum likelihood estimation in a structural equation model to empirically test the proposed model. They find that two separate dimensions of creativity—novelty and meaningfulness—are differentially affected by team dynamics. For example, NP novelty as a result of divergent process is predominantly influenced by external team factors such as market-based reward system and planning process formalization. On the other hand, NP meaningfulness as a result of convergent process is dominantly influenced by internal team factors such as social cohesion and superordinate identity. In addition, MP novelty is determined by social cohesion, superordinate identity, planning process formalization, and encouragement to take risks, while MP meaningfulness is influenced by social cohesion and planning process formalization. Our findings also suggest that NP novelty and meaningfulness, but not MP novelty and meaningfulness, play important intermediary roles in determining product competitive advantage. This study contributes to narrowing the important gap in the literature by examining the effect of team dynamics on creativity and by linking creativity to strategic innovation outcomes. Our study suggests that a firm's ability to manage team dynamics toward generating creative NPs and MPs constitutes a dynamic capability that can provide a competitive advantage over the competition.

Introduction

A firm's long-term viability in competitive markets depends on how well it embodies its creative ideas in products that fulfill customers' changing needs and expectations. Creative ideas and their manifestations as products and practices constitute the core of organizational innovation (Amabile, 1988; Van de Ven, 1986). Creativity motivates the generation of new ideas and is considered one of the necessary determinants of innovation (Amabile, 1988; Amabile, Conti, Coon,

Lazenby, and Herron, 1996). From a resource-based view perspective (Barney, 1991), one might say that creativity is a critical intangible resource for firms.

Despite the important role of teams in generating creative ideas at the fuzzy front end of the product innovation process, research on creativity at the team level remains limited (Amabile, 1983, 1988; Amabile et al., 1996). Although the innovation literature suggests that both individual qualities and environmental factors influence the level of creativity in teams (e.g., Amabile, 1988; Amabile et al., 1996; Hargadon and Sutton, 1997; Oldham and Cummings, 1996), there is little empirical evidence regarding how team-level factors determine creativity in innovation teams. Influenced by their basis in psychological theory, most creativity studies focus on how individuals generate, develop, and react to creative ideas in certain social and contextual environments (Amabile, 1988; Van de Ven, 1986; Woodman, Sawyer, and Griffin, 1993). To address this gap in the literature,

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our study examines the effect of team dynamics on creativity.

Prior research on creativity has generally treated creativity as the ultimate outcome variable (e.g., Amabile, 1983, 1988; Andrews and Smith, 1996; Oldham and Cummings, 1996; Sutton and Hargadon, 1996; Woodman et al., 1993). This suggests a need for further study of creativity as a predictor of strategic innovation outcomes.

BIOGRAPHICAL SKETCHES

Dr. Subin Im is an associate professor of marketing at Yonsei University in Korea while he is on leave at San Francisco State University. He received his Ph.D. in marketing from the University of North Carolina, Chapel Hill in 1999. He worked at San Francisco State University and the University of Washington, Tacoma before he joined Yonsei University in 2011. His primary scholarly interest includes the organizational aspects of innovation, creativity and innovation, new product development for marketing strategy, the consumer side of the innovation adoption process, and research methodology using multivariate statistical techniques including a structural equation model. Dr. Im's recent articles have appeared in *Journal of Marketing*, *Journal of the Academy of Marketing Science*, *JPIM*, *International Journal of Research in Marketing*, *Journal of International Marketing*, *Journal of Business Research*, and *Psychological Reports*, among others. Dr. Im worked professionally as a market researcher at the Hynix Semiconductor Inc. in Korea, and also as an international banking officer at California banks. He has been selected for inclusion in *Marquis' Who's Who in America* since 2006.

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In the context of new product (NP) development, innovation is the outcome of successful development, adoption, and implementation of creative ideas. Past research suggests that product competitive advantage (PCA) is an important predictor of NP success (Montoya-Weiss and Calantone, 1994). PCA has also been linked to firm growth and performance (e.g., Amabile, 1988). This study focuses on PCA as an important strategic outcome of creativity.

The overall objective of this study is to examine the intermediary role of creativity as a critical link between team dynamics and PCA. To develop our theoretical framework, our study draws on the organization design perspective of innovation (Shane and Ulrich, 2004), which focuses on examining the role of organizational structure, communication, and decision-making factors in innovation activities. This study empirically tests a model that explores the antecedents and consequences of creativity in teams using a large-scale, cross-sectional data set of 206 product innovation projects from high-tech manufacturing firms in the United States. In the following sections, our research model and hypotheses are presented. Then, our analysis and results are described, and the managerial implications of our findings are discussed.

Theoretical Background and Model Development

Defining Creativity

In this study, creativity is viewed as the gestalt of creative output reflected in the byproducts that emerge from the creative process conducted by individuals in product innovation teams (Woodman et al., 1993). Creativity research in management has tended to focus solely on the creativity of the NP itself (i.e., the physical product design and features) with no consideration of the role of creativity in associated marketing programs (MPs; i.e., price, packaging, or promotion elements required to launch and market the NP). Our study distinguishes the two types of creativity—NP and MP. NP creativity is considered in relation to the technical development of NPs, while MP creativity is viewed in relation to the commercialization of NPs.

This study contends that a broader perspective on the role of creativity in the NP development and launch processes is warranted. The augmented elements of a product, as reflected in its MP (e.g., packaging, warranties, pricing, promotion, distribution, and supply chain design), represent efforts to enhance the innovation

outcome by differentiating the core product (e.g., Krishnan and Ulrich, 2001). The MP must be creatively designed and managed to achieve rapid dissemination and maximum market penetration of NPs.

Consistent with Amabile (1983), our study adopts an output perspective of creativity, which identifies two distinct dimensions as outcome criteria—*novelty* (i.e., the degree to which outputs are perceived as new and different from those of competitors in a domain) and *meaningfulness* (i.e., the extent to which outputs are perceived as appropriate and useful by the targeted audience). Novelty and meaningfulness are the most commonly agreed upon dimensions of creativity in psychology, organizational behavior (Amabile, 1983), and marketing (Andrews and Smith, 1996; Im and Workman, 2004; Sethi, Smith, and Park, 2001).

Both novelty and meaningfulness are important and necessary conditions for successful innovation outcomes. New ideas may be perceived as simply weird or bizarre by the target audience if they are novel or unique but carry no meaning (Amabile, 1983; Oldham and Cummings, 1996; Van de Ven, 1986). In particular, Ford (1996) notes that novelty in and of itself may imply an unreliable or untrustworthy product. Therefore, in the NP development context, both dimensions must be considered to reflect the complementary motives between divergent thinking (which strives to generate new ideas, incentives, and stimuli to solve problems radically) and convergent thinking (which provides meaning, rationale, and logic to solve problems incrementally).

To summarize, our study conceptualizes four separate dimensions of creativity: NP novelty, NP meaningfulness, MP novelty, and MP meaningfulness. NP and MP creativity is defined as the degree to which NPs and their associated MPs reflect novel differences from competitors' products and programs in ways that are meaningful to the target audience (Im and Workman, 2004). This study extends Im and Workman (2004) by incorporating team design factors as antecedents and PCA as the consequence. Thus, this study focuses on helping product managers create the right conditions for teams to develop creative products and MPs.

Research Model

A product development team is composed of members who cooperate to design, develop, test, launch, and market a NP. A typical product development team is characterized by cross-functional membership, and its involvement in complex and varied tasks. Team dynamics and characteristics have been emphasized in creativity

research because they provide the environment that can enhance the creativity and innovation outcomes for an organization (e.g., Amabile et al., 1996; Krishnan and Ulrich, 2001). Drawing on the organization design perspective of product development (Shane and Ulrich, 2004), this study proposes a model wherein team dynamics influence creativity, which in turn affects strategic innovation outcomes (see Figure 1). Specifically, our model contends that internal and external factors govern team structure, communication dynamics, and team characteristics, which in turn influence PCA through the NP and MP creativity.

Antecedents to Creativity: Internal and External Team Dynamics

This study focuses on two internal team dynamic factors (social cohesion and superordinate identity) and three external team dynamic factors (market-based reward system, planning process formalization, and encouragement to take risks) as antecedents of NP and MP creativity for several reasons.

Consistent with Ford (1996) and Woodman et al. (1993), our study considers both social factors internal to teams and contextual situations external to teams as important determinants of creativity. First, social network theory suggests the importance of internal team dynamics, which are governed by individual actors who “know one another, are aware of the same kinds of opportunities, have access to the same kinds of resources, and share the same kinds of perceptions” (Burt, 1983, p. 180). Our model includes social cohesion to represent the emotional, affective perspective of internal team characteristics, and superordinate identity to reflect the cognitive perspective of individuals in relation to group beliefs (Ford, 1996).

Second, external team dynamics represent the contextual influence of the organization design and structure. Consistent with past research, our model includes incentive systems, formal structure, and senior management support that have also been shown to significantly influence creativity in teams (Brockman and Morgan, 2003; Brown and Eisenhardt, 1995; Ford, 1996; Hargadon and Sutton, 1997; Shane and Ulrich, 2004; Van de Ven, 1986).

Social cohesion. Social cohesion, defined as the degree to which product innovation teams maintain interpersonal attraction and collegiality among team members, determines the degree to which individuals can introduce their own ideas without personal censure or interruption from others (Scott and Bruce, 1994). Teams with high levels of social cohesion are characterized by a

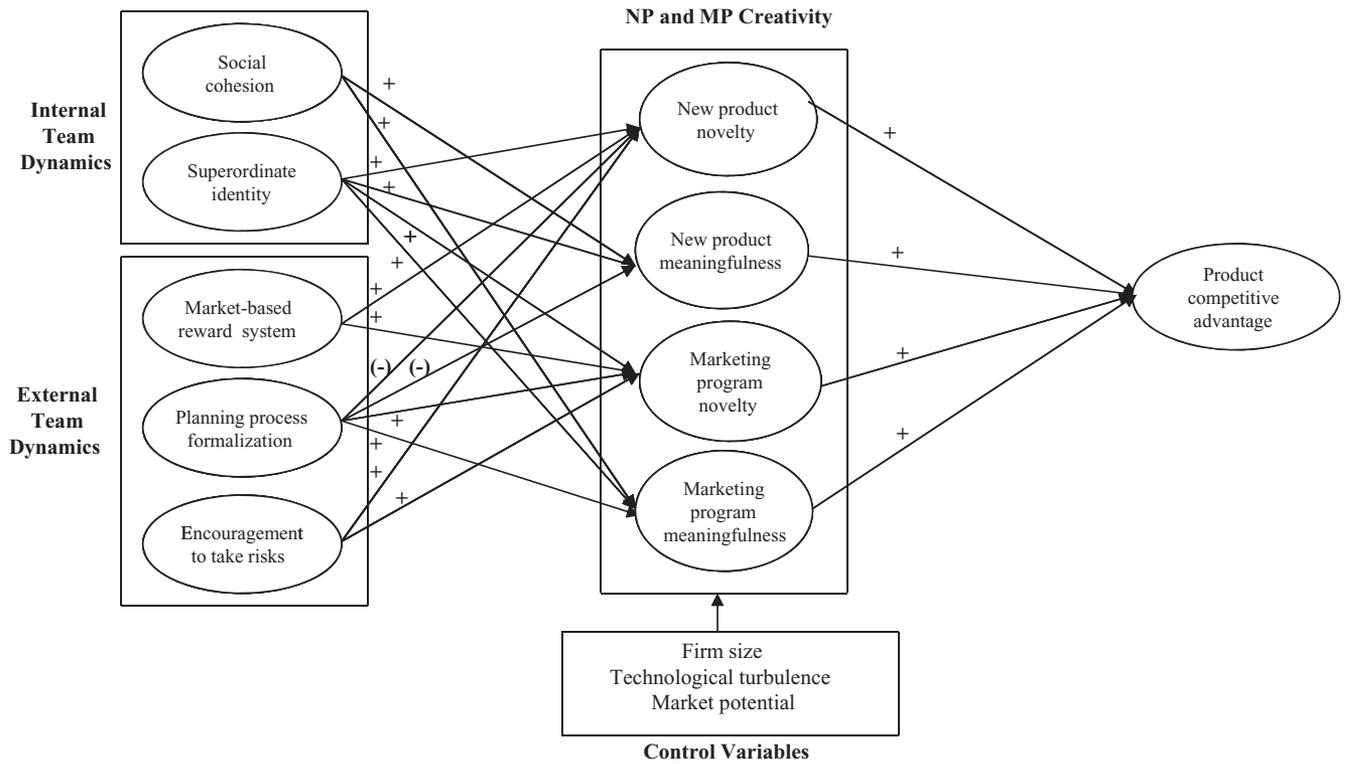


Figure 1. Conceptual Model of New Product (NP) and Marketing Program (MP) Creativity Hypothesized Relationships

high degree of affective interpersonal attraction, close interpersonal relationships, united teamwork, a sense of family, easy conflict resolution, and comfort with one another (Brockman and Morgan, 2003; Scott and Bruce, 1994; Sethi et al., 2001). In generally relating social cohesion and creativity in teams, one stream of research suggests that social cohesion—built through frequent and effective communication, interaction, and team citizenship and socialization—often breaks down communication barriers, resolves conflicts, and increases the amount of shared information through social ties, which results in the generation of a plethora of creative ideas (Brown and Eisenhardt, 1995; Ford, 1996; Scott and Bruce, 1994; Taggar, 2002). This stream of research suggests that collaborative team efforts that emphasize divergent thinking and broad social networks are critical for generating creative ideas in new product development (NPD; Hargadon and Sutton, 1997).

In contrast, another stream of research suggests that high levels of social cohesion are detrimental to creative ideas because cohesion promotes convergent thinking (Diehl and Stroebe, 1987; Sutton and Hargadon, 1996). Further, negative effects of cohesion may be caused by the development teams’ tendency toward social loafing (i.e., relying heavily on others to generate creative ideas), evaluation apprehension (i.e., lack of expression of new

ideas for fear of conflict with others), and production blocking (i.e., blocking one’s own creative ideas by listening to others’ thoughts; Diehl and Stroebe, 1987).

In relating social cohesion to two separate dimensions of creativity, our study proposes that social cohesion enhances the meaningfulness dimensions of NP and MP, but not the novelty counterparts. Comparing the two competing perspectives, our study expects the positive effect of social cohesion on NP and MP meaningfulness to exceed the negative effect, especially for complex NPD and launch tasks. Social networks formed through frequent communication and interactions help teams generate divergent alternatives by seeking and spreading information about meaningful stimuli. In addition, teams with the high levels of social cohesion tend to remove inefficiencies and inadequacies through their close interaction and collaboration (e.g., Hargadon and Sutton, 1997), which prevents them from generating inappropriate and irrelevant ideas for their target customers in search of meaningful stimuli. Therefore, close communication and coordination among team members in socially cohesive teams provide check points for screening out absurd, unfeasible ideas for developing meaningful rather than novel NPs or MPs. Thus, the high level of social cohesion achieved through interactions and interpersonal communication among peers provides diverse

problem-solving inputs, which in turn enhance NP and MP meaningfulness. Stated formally,

H1: High social cohesion in a product innovation team has a positive effect on (1) NP meaningfulness and (2) MP meaningfulness.

Superordinate identity. Superordinate identity is defined as the degree to which team members identify with the team to which they belong, are committed to its overarching goals, and feel a stake in its success and failure (Mackie and Goethals, 1987; Sethi et al., 2001). Superordinate identity that encourages cooperation and common objectives and discourages conflicts among group members through interpersonal relationships and collaboration often helps teams develop a holistic perspective that provides unity and direction for their projects. Recent research also suggests that superordinate goals that establish group norms and evaluative criteria and that elicit team commitment are crucial elements for increasing creativity among group members (Ford, 1996; Sethi et al., 2001; Taggar, 2002; Woodman et al., 1993).

In relating superordinate identity to the two dimensions of creativity, our study proposes that superordinate identity enhances both novelty and meaningfulness of NPs and MPs. Enhancing superordinate identity helps increase the perception of intra-team similarities and leads to the psychological acceptance of other team members and their work methods (Sethi et al., 2001). Team members with a high level of superordinate identity should be more inclined to integrate information and divergent ideas from other functional groups toward novel and meaningful ideas (Deshpandé and Zaltman, 1982). Finally, a high superordinate identity encourages team members to commit to the success of the innovation project and, in so doing, synergistically integrate different functional tasks (Van de Ven, 1986) to produce both unique and novel ideas and appropriate and useful ideas for NPs and MPs. Thus, superordinate identity should benefit novelty and meaningfulness dimensions of NPs and MPs. Stated formally,

H2: High superordinate identity in a product innovation team has a positive effect on (1) NP creativity and (2) MP creativity.

Market-based reward systems. Market-based reward systems are defined as incentive systems by which an organization evaluates and remunerates team members' performance according to factors that affect the market-based outcome of the organization in the long run. A reward system that recognizes creative work and the per-

formance of innovation-related activities promotes a team's intrinsic motivation, a major determinant of a creative climate (e.g., Amabile, 1983, 1988; Krishnan and Ulrich, 2001).

This study proposes that market-based reward systems influence the novelty dimension of NPs and MPs, but not the meaningfulness counterpart. In general, prior research supports that market-based reward systems that recognize the generation of diversified ideas result in greater tolerance for ambiguity and frame-breaking approaches, both of which are necessary for generating creative ideas (e.g., Cummings and Oldham, 1997). If the organizational incentive system rewards employees solely on the basis of short-term or transient outcomes (e.g., sales, profit), team members may not be intrinsically motivated to provide more divergent, novel ideas that are perceived as risky in the short term rather than meaningful ones. A reward system based on short-term financial outcomes that advocates extrinsic motivation might encourage employees to play safe by not generating new and unique ideas that involve inherent financial risk in the market (e.g., Amabile, 1988; Amabile et al., 1996).

In contrast, if an organization measures and rewards employees according to longer term, more durable market-based outcomes, such as the provision of market intelligence about competitors and customers or contributions to customer relationships and satisfaction, employees may be more intrinsically motivated to generate divergent and novel, but not necessarily meaningful, ideas for NPs and MPs (e.g., Amabile, 1988; Amabile et al., 1996; Jaworski and Kohli, 1993). Although market-based reward systems tend to reduce teams' risk perceptions about developing risky novel NPs and MPs, they do not influence the meaningfulness dimensions because developing useful and appropriate products and programs does not necessarily involve much financial risk. In addition, market-based reward systems also may motivate employees to communicate more with members of different functional groups to find new ways to explore novel ideas and advance technology and thus to enhance their novelty. Thus, our study expects market-based reward systems to benefit NP and MP novelty only, while it presumes the lack of significant relationship between market-based reward systems and NP and MP meaningfulness. Stated formally,

H3: A market-based reward system in a product innovation team has a positive effect on (1) NP novelty and (2) MP novelty.

Planning process formalization. Planning process formalization is defined as the degree to which activities

and relationships in teams are governed by rules, procedures, and contracts during the planning process (Andrews and Smith, 1996). Empirical findings regarding the impact of planning process formalization on creativity are mixed. On the one hand, formalization appears detrimental to creativity. The institutional theory perspective (DiMaggio and Powell, 1983) suggests that a high level of planning process formalization lessens incentives to proliferate creative ideas and increases convergent thinking because it imposes rules, norms, and regulations to encourage legitimacy through logistic solutions to innovation-related problems. High formalization also can hamper creativity because rigid rules and procedures restrict creative processes and informal communications during the development of novel and meaningful ideas (Amabile, 1988; Amabile et al., 1996; Brockman and Morgan, 2003).

Alternatively, some research suggests that planning process formalization has a positive effect on creativity, especially for complex tasks (Andrews and Smith, 1996). According to this competing perspective, higher levels of formalization help a firm structure organizational systems, procedures, and processes that signal the importance of certain innovation activities, which gives individuals responsibilities and a sense of ownership (Brockman and Morgan, 2003). Thus, when tasks are very complex, higher levels of structure may enhance creativity (Amabile, 1988). A high level of formalization helps members of different functional groups coordinate their efforts and communicate with one another by specifying their roles and responsibilities, identifying acceptable risk levels, and developing mechanisms for conflict management (Moenaert, Souder, De Meyer, and Deschoolmeester, 1994). A high level of planning process formalization thus may create an environment in which different functional groups tend to share necessary information to generate creative ideas for complex tasks.

Our study proposes differential hypotheses regarding the effects of planning process formalization on NP creativity versus MP creativity. Consistent with Amabile (1983), this study expects that high formalization makes it hard to break away from the sequential rules and procedures that the firm considers necessary to proliferate novel and meaningful ideas for NPs. It is believed that formalized planning processes prevent teams from thinking tangentially to generate novel and diverse ideas for NPs by forcing convergent thinking. As such, our study expects a negative effect of planning process formalization on NP novelty and meaningfulness. However, it expects a positive relationship between formalization and MP novelty and meaningfulness. MPs require well-

organized and structured coordination to implement the diverse activities involved in promotion, pricing, and distribution. Because complex activities related to product marketing and launch require considerable coordination with and cooperation from multiple departments (e.g., design, engineering, and marketing), a firm's effort to formalize this planning process will help innovation teams communicate the novel and meaningful information for MPs (e.g., Moenaert et al., 1994). Stated formally,

H4: A high level of planning process formalization among a product innovation team has (1) a negative effect on NP novelty and meaningfulness, and (2) a positive effect on MP novelty and meaningfulness.

Encouragement to take risks. Encouragement to take risks is defined as the degree to which top management understands the risk and uncertainty associated with innovation and expects and encourages employees to take risks in the development of NPs (Amabile, 1983, 1988). Top management contributes to a firm's innovation practices by directing the innovation strategy and by providing resources. Senior management support for risky innovation projects is critical to innovation success because it provides autonomy to generate creative NPs and MPs (Amabile, 1983, 1988; Brown and Eisenhardt, 1995; Scott and Bruce, 1994).

Our study proposes that encouragement to take risks will have a positive impact on the novelty dimension of NPs and MPs, but this study expects it to have no impact on the meaningfulness dimensions. The risk-taking propensity of top managers encourages employees to generate unique and novel ideas for NPs and MPs in innovation teams (Amabile, 1983, 1988; Amabile et al., 1996; Cummings and Oldham, 1997; Woodman et al., 1993). If top management is willing to take risks and accept occasional failures as a part of normal business practice, employees tend to get involved and think tangentially to come up with unique, outside-the-box ideas for NPs and MPs that are considered novel. In contrast, if top management is risk averse and intolerant of failure, employees are less likely to generate new and distinct ideas that involve any appreciable financial risks. In addition encouragement to take risks motivates divergent thinking, which helps employees generate novel ideas for NPs and MPs. However, such encouragement is irrelevant to meaningful ideas because meaningful products and programs are less likely to involve financial risks. Stated formally,

H5: Management encouragement of a product innovation team to take risks has a positive effect on (1) NP novelty and (2) MP novelty.

Outcomes of Creativity: PCA

Our model postulates that both NP and MP creativity directly enhance PCA. Achieving PCA means that customers perceive greater value in a firm's products and services, and they are willing to shift their purchases away from rivals (Song and Montoya-Weiss, 2001; Song and Parry, 1997). Previous research on innovation suggests that PCA is hard to duplicate and imitate. It ultimately drives a firm's long-term survival and sustainable growth (Amabile, 1988; Barney, 1991). In addition, meta-analyses of the determinants of NP success found that PCA is one of its most important predictors (Henard and Szymanski, 2001; Montoya-Weiss and Calantone, 1994).

Recent studies consider creativity as an intangible resource that affects organizational performance (Bharadwaj and Menon, 2000) and financial and market performance (Im and Workman, 2004). In relating creativity to innovation efforts, the ideal outcomes are products that are better received in the marketplace and that result in higher financial performance (e.g., market share, profitability, and return on investment [ROI]). This study proposes that creativity can enhance PCA by providing NPs and MPs that are superior in quality, cost effectiveness, and differentiation relative to competitors.

A resource-based view suggests that a firm's ability to accumulate creative ideas as intangible assets enhances its PCA by providing superior value to customers. The creativity accumulated as organizational intelligence should enhance a firm's PCA by building core competencies that spawn exciting, unexpected products and programs (Hargadon and Sutton, 1997). Therefore, our study expects that NP creativity plays a critical role in improving PCA by generating innovative ideas that represent unique and desirable combinations of benefits relative to their costs for customers. It is expected that MP creativity helps enhance the value of those innovative NPs through novel and meaningful promotion, pricing, distribution, and services (Cooper, 1979). Thus, stated formally,

H6: All four dimensions of NP and MP creativity have positive effects on PCA.

Methods

Sample

Cross-sectional survey data were collected from high-tech manufacturing industries in the United

States.¹ High-tech companies were chosen because they exhibit a propensity to engage in intense product innovation activities to enhance creativity, in that the industry is characterized by high uncertainty, rapid changes in industry standards, short technology lifecycles, and faster development cycle times (Ettlie and Pavlou, 2006; Song and Montoya-Weiss, 2001).

Our study used a two-stage sampling method in which 1080 project managers were first identified from the CorpTech Directory of Technology Companies and were sent the survey package. In the first stage, the project managers selected an NP and evaluated its relative competitive advantage. In the second stage, these managers identified the project team leaders who could evaluate NP and MP creativity, as well as the team dynamics factors. The matched sample method is necessary to eliminate potential common method bias across two subjectively measured constructs of creativity and PCA. In total, matched responses for 222 product innovation projects were received with a 20.8% response rate. A total of 206 sets of responses were retained for further analysis after 16 incomplete surveys were removed. It is confirmed that all respondents—project managers and team leaders—were appropriate for this study based on their high level of involvement in NP and MP development (all average levels of NP and MP involvement were greater than 5.0 on a 7-point scale). The participating firms were relatively large with an average of 4562 employees and average annual sales of \$853 million.

The unit of analysis in our study is the innovation project launched by a product innovation team. The respondents were asked to report on the most recently developed and launched NP for which their business unit was responsible and with which they were familiar. It is required that the product be in the market for at least six months, regardless of its level of performance, not only to enhance the internal validity by maximizing the variance of the measures but also to avoid selection bias toward more successful products (e.g., Montoya-Weiss and Calantone, 1994). Nonresponse bias was also checked. *T*-test results for the major constructs confirm that there were no significant differences between early and late respondents, indicating that nonresponse bias does not exist. In addition, multicollinearity diagnostic tests confirm that no serious multicollinearity exists for the analyses (all condition indexes < 30; all variance inflation factors < 10). Finally, based on diagnostic tests and a

¹ The industries include computer software and hardware, automation, telecommunications, medical products, biotechnology, subassembly, photonics, advanced materials, energy and environmental products, and tests and measurements.

scatterplot analysis of residuals, it is found that no violations of the regression assumptions occurred (i.e., normality, linearity, and homoscedasticity).

Measures

All measurement items are reported in Appendix A. We used an 8-item Likert-type scale to assess NP and MP creativity (Im and Workman, 2004). As a check on the managers' evaluations of NP and MP creativity, we collected data from a small sample of customers ($n = 29$), the ultimate judges of creativity. The significant correlations ($p < .01$) between managers' and customers' ratings of both NP and MP creativity provide supporting evidence that managers provide valid judgments of creativity. We measured social cohesion using a 4-item Likert-type scale (Sethi et al., 2001; Zaccaro and McCoy, 1988). For superordinate identity, we employed a 5-item Likert-type scale (Mackie and Goethals, 1987; Sethi et al., 2001). Market-based reward system was assessed by a 5-item Likert-type scale (Jaworski and Kohli, 1993), and planning process formalization was measured by a 4-item Likert-type scale (Andrews and Smith, 1996). To measure management's encouragement to take risks, a 3-item Likert-type scale was adopted from Jaworski and Kohli (1993). Finally, PCA was measured by a 3-item semantic-differential scale drawn from Cooper (1979). All measurement items employed a 7-point scale except firm size.

All measurement scales were tested for validity and reliability in two waves. First, pilot study data ($n = 106$) were used to revise and refine the measurement items. Cronbach's alphas greater than .70 suggested that all measures of the major constructs exhibited good internal consistency. Second, in the final field study ($n = 206$), we conducted confirmatory factor analysis to evaluate the measurement model. The results suggest good convergent and discriminant validities for all measurement instruments (Bagozzi, Yi, and Phillips, 1991). All positive and significant factor loadings of indicators support good convergent validity ($\chi^2 = 2416.23$, degrees of freedom [d.f.] = 1081; all goodness-of-fit indices greater than .90; Bagozzi et al., 1991). All pairs of constructs exhibit significant chi-square differences in favor of unrestricted models (i.e., correlations freely estimated) over restricted models (i.e., correlations fixed at 1) at the .05 level, which confirms the discriminant validity of all constructs (Anderson and Gerbing, 1988). The unidimensionality of all major constructs was confirmed by exploratory factor analysis using the pilot test data and the confirmatory factor analysis using the final field study

data. In concert, these results lead us to conclude that all measures have good convergent and discriminant validity, reliability, and unidimensionality.

The final model includes three control variables that are believed to affect PCA: firm size, technological turbulence, and market potential (for measurement items and Cronbach's alphas, see Appendix A). Accounting for firm size (total number of employees) allowed us to control for the impact of a firm's resources on innovation outcomes. Inclusion of the two environmental variables accounts for external influences on innovation outcomes (Brown and Eisenhardt, 1995; Krishnan and Ulrich, 2001). Technological turbulence is defined as a rapid rate of technological change (Song and Montoya-Weiss, 2001), and market potential is defined as the potential demand for the NP in the target market (Song and Parry, 1997).

Analysis and Results

The correlation matrix, Cronbach's alphas, and descriptive statistics for all constructs are reported in Table 1. In general, the signs in the correlation matrix are consistent with the hypothesized relationships, and the descriptive statistics of the composite scales of the major constructs indicate enough variability in the measures of the constructs.

To test the hypothesized relationships, maximum likelihood (ML) estimation was used in a structural equation model. Our study followed Anderson and Gerbing's (1988) two-step approach, in which the estimation of a confirmatory measurement model precedes the simultaneous estimation of the measurement and structural submodels. The results from a confirmatory measurement model show goodness-of-fit indices (normed fit index [NFI; $\Delta 1$], incremental fit index [IFI; $\Delta 2$], relative fit index [RFI; $\rho 1$], Tucker–Lewis index [TLI; $\rho 2$], and comparative fit index [CFI]) greater than .95, along with significant loadings, which confirm that there is no interpretational confounding from the measures. Our study performed a simultaneous estimation of the measurement and structural models to test the hypotheses.

The dimensionality of the creativity construct was explored using confirmatory factor analysis (Anderson and Gerbing, 1988). To verify whether novelty and meaningfulness converge into a higher order construct of creativity, we used the chi-square difference between a measurement model with perfect correlation and another with freely estimated correlation to confirm the convergence of the two dimensions. The measurement models with two separate dimensions for novelty and meaning-

Table 1. Correlations Among Major Constructs ($n = 206$)

	1	2	3	4	5	6	7	8	9	10	11	12	13	Cronbach's α	Mean ^a (s.d)
1. Social cohesion	1													.90	5.14 (1.16)
2. Superordinate identity	.72**	1												.93	4.88 (1.13)
3. Market-based reward system	.34**	.39**	1											.79	3.35 (1.17)
4. Formalization	.19**	.29**	.47**	1										.85	3.15 (1.41)
5. Risk taking	.33**	.43**	.39**	.21**	1									.76	4.23 (1.24)
6. NP novelty	.15*	.16*	.17*	-.04	.15*	1								.89	4.74 (1.45)
7. NP meaningfulness	.38**	.39**	.17*	.13	.16*	.25**	1							.90	5.96 (.85)
8. Marketing program novelty	.21**	.29**	.36**	.32**	.32**	.47**	.29**	1						.91	3.86 (1.41)
9. Marketing program meaningfulness	.30**	.33**	.29**	.39**	.32**	.14*	.53**	.72**	1					.90	4.84 (1.07)
10. Product competitive advantage	.14*	.16*	.04	-.01	.08	.36**	.30**	.27**	.23**	1				.72	5.51 (1.15)
11. Firm size	-.08	-.08	-.11	-.11	-.07	.09	-.18**	-.10	-.17*	-.01	1			–	4561 (2840)
12. Technological turbulence	.19**	.19**	.18*	.11	.09	-.01	.12	-.01	.05	.02	.01	1		.68	3.55 (1.04)
13. Market potential	.15*	.16*	.22**	.04	.11	.13	.19**	.29**	.27**	.10	-.03	.24**	1	.77	3.55 (1.04)

* $p < .05$, ** $p < .01$. ^a Average mean scores for composite scales. All items are measured by 7-point scales, except for firm size. NP, new product; s.d., standard deviation.

fulness fit the data significantly better than does the model with one dimension ($\Delta\chi^2 = 478.39$ [d.f. = 1] for NP creativity; $\Delta\chi^2 = 366.60$ [d.f. = 1] for MP creativity). The results indicate that the two dimensions of creativity should be assessed separately.

Our study further examined whether the four dimensions of NP and MP creativity converge into one overarching dimension to explore the possibility of a hierarchical structure. Chi-square difference tests confirmed that the first-order condition model fit the data significantly better than the second-order hierarchical condition model ($\Delta\chi^2 = 83.41$ with 2 d.f.), thus confirming the discriminant validity of the four dimensions of NP and MP creativity.

In contrast with previous research that employs the average score of the combined dimensions of novelty and meaningfulness, our empirical results indicate that NP and MP creativity have better construct validity when the four dimensions of NP and MP creativity are estimated separately (i.e., component-wise model) than when they are combined (i.e., combined model). The chi-square difference test confirms that the model with two dimensions of novelty and meaningfulness fits the data significantly better than the model with one dimension ($\Delta\chi^2 = 2706.11 - 2001.07 = 705.04$ [Δ d.f. = 1053 - 1033 = 20]). For the component-wise model in Figure 2, the chi-square statistic ($\chi^2 = 2001.67$, d.f. = 1033) is significant due to model sensitivity to sample size. Overall, the baseline comparison indices (NFI [Δ 1], IFI [Δ 2], RFI [ρ 1], TLI [ρ 2], and CFI) are greater than .93, which

suggests that the model fits the data well. The root mean square error of approximation value of .066 also indicates that the model fits the data reasonably well.

Using the component-wise model with the four distinct dimensions of NP and MP creativity, our empirical study tested the hypothesized structural relationships. In Figure 2, the ML estimation results are reported for the structural model, with significant paths and standardized coefficients.

The results from hypothesis testing are summarized as the following. It is found that social cohesion positively influences the meaningfulness dimensions of both NP and MP but has no impact on their novelty dimensions in support of H1. For H2, our study found that superordinate identity enhances both NP meaningfulness and MP novelty at the .05 level, but it does not influence NP novelty or MP meaningfulness. H2 is partially supported. In testing H3, it is found that the paths from the market-based reward system to the novelty dimensions of NP and MP were significant, whereas those to the meaningfulness dimensions of NP and MP were not in support of H3. For H4, our study found that formalization is detrimental to NP novelty but facilitates MP novelty and meaningfulness. However, it is found that no significant effect of planning process formalization on NP meaningfulness exists, thus partially supporting H4. In examining H5, it is found that top management's encouragement to take risks positively influences MP novelty, although it had no effect on NP novelty and meaningfulness or MP meaningfulness. H5 is also partially supported. Finally, for H6,

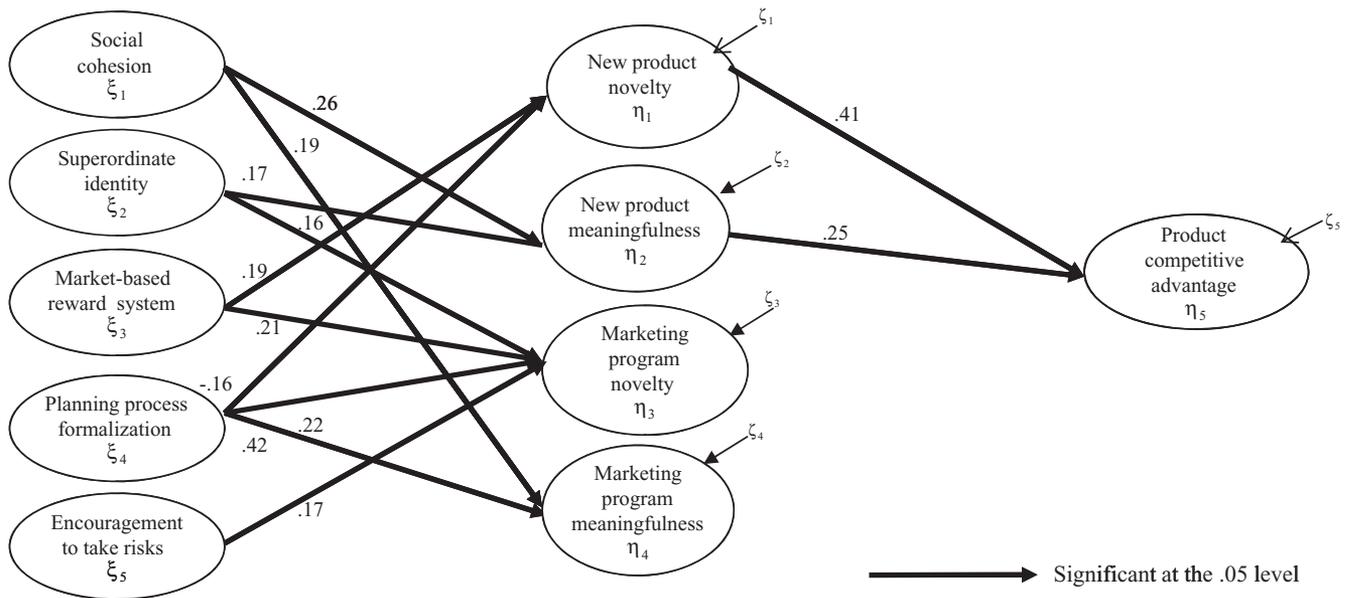


Figure 2. Maximum Likelihood Estimation Results Standardized Coefficients
Fit statistics: χ^2 (degrees of freedom) = 2001.67 (1033) ** Normed fit index = .94; relative fit index = .93; incremental fit index = .97; Tucker–Lewis index = .96; root mean square error of approximation = .07.

the results confirmed that both NP novelty and meaningfulness have a strong, positive effect on PCA, while MP novelty and meaningfulness have no impact on PCA in support of H6.

Our study further assessed the effects of the three control variables on the four dimensions of NP and MP creativity and found that firm size negatively influences NP and MP meaningfulness (standard [std.] γ s = $-.15$ and $-.13$), whereas it weakly enhances NP novelty (std. $\gamma = .13$) at the .10 level. However, firm size had no effect on MP novelty (std. $\gamma = -.05$). Bigger firms thus appear less likely to produce meaningful NPs and MPs, although they tend to produce more novel NPs. Technological turbulence negatively influences MP novelty (std. $\gamma = -.20$) but had no effect on the other dimensions, which indicates that technological turbulence is only harmful to the development of novel MPs. Finally, it is found that market potential enhances all four dimensions of NP and MP creativity (std. γ s = .16 for NP novelty, .23 for NP meaningfulness, .34 for MP novelty, and .27 for MP meaningfulness). These results suggest that a high level of market potential significantly contributes to the development of novel and meaningful aspects of NPs and MPs.

To examine whether the indirect model structure in Figure 2 is appropriate, our study applied Baron and Kenny’s (1986) test of mediation, which is appropriate for a path model. To apply Baron and Kenny’s (1986) test, our study followed the procedure detailed in Kenny, Kashy, and Bolger (1998). When PCA was regressed on

the five key antecedents, none of antecedents were directly related to PCA ($p > .05$). Upon entering the four dimensions of NP and MP creativity into the regression model, the direct effects of five antecedents on PCA diminished further, thus supporting partial mediation effects. In addition, our study further tested the mediation effects in the structural equation model as proposed by Iacobucci, Saldanha, and Deng (2007). First, after the direct and indirect paths were fit simultaneously in one structure equation model, it was found that some mediation effects existed. Second, Sobel’s z -tests were additionally performed. As the majority of z -statistics² for the direct paths from independent variables (i.e., 5 antecedents) to the dependent variable (i.e., PCA) were not significant in addition to the substantial direct effects compared with total effects, the partial mediation is confirmed based on Iacobucci et al.’s test of mediation procedure.

Discussion and Managerial Implications

Our study developed and empirically tested a model to explore how internal and external team dynamics influ-

² The Sobel’s z -tests showed that only 5 of 20 mediating effects (five antecedents \times four dimensions of NP and MP creativity) were significant at the .05 level as follows: social cohesion via NP meaningfulness and other four antecedents via MP novelty. Given that the paths from the MP novelty and PCA were not significant, the significant z -statistics for mediating effects of MP novelty in particular were attributed to the significant links from antecedents to creativity dimensions in support of partial mediation.

ence NP and MP creativity, and how creativity affects PCA as a strategic innovation outcome. Whereas most prior studies have addressed creativity as the focal outcome at the individual level, our study provides empirical evidence that team-level NP and MP creativity are important intangible resources that provide competitive advantage through product development (Brown and Eisenhardt, 1995; Hargadon and Sutton, 1997; Taggar, 2002). A firm's ability to generate creative NPs and MPs constitutes a dynamic capability that can provide a competitive edge over the competition (Ettlie and Pavlou, 2006; Leonard-Barton, 1992). In addition, our results suggest that managing internal and external team dynamics through effective support, control, and organizational structures can differentially enhance the dimensions of NP and MP creativity.

The results in Figure 2 provide important insights into the mechanisms underlying the relationships among internal and external team dynamics, NP and MP creativity, and PCA. In particular, empirical testing of the differential effects of the distinct dimensions of creativity contributes to the clarification and establishment of a theory of creativity in the context of innovation teams as follows. First, our results on the creativity–PCA relationship further provide an alternative explanation for the unresolved debate on whether and how creativity really matters for the firm performance. The dominant paradigm suggests that creativity, which leads to innovation, determines the growth and financial success of a firm (Andrews and Smith, 1996; Sethi et al., 2001), while it is counter-argued that imitation that lacks creativity may provide a viable path for the success of a firm (Nelson and Winter, 1982; Schnaars, 1994). Our understanding on the creativity–NP outcome relationship is limited because creativity has often been tested as the outcome of NP development activities (Amabile, 1988; Moorman and Miner, 1997). Im and Workman's (2004) research is one of the first studies in marketing that examines how creativity influences NP success and firm performance. They find that meaningfulness dimensions of NP and MP, but not novelty counterparts, enhance NP performance reflected by financial (i.e., profit and ROI) and market (i.e., sales and market share) performance outcomes. If so, there remains a question on whether and how novelty matters for the firm and its performance.

In comparison with Im and Workman (2004), our results indicate that NP novelty and meaningfulness improve PCA, while MP counterparts do not. That means NP novelty, although it fails to improve NP performance directly, still contributes to the NP outcome of PCA, the important driver of NP success (Henard and Szymanski,

2001). Our additional analysis confirms that PCA directly and positively relates to NP performance, supporting that NP novelty as well as NP meaningfulness indirectly influence NP performance via PCA. This finding provides an interesting insight on the questionable role of NP novelty, while confirming the positive role of NP meaningfulness on firm performance. Our results imply that managers have to understand that NP novelty, although it does not influence NP performance directly, should be managed as an intangible asset to influence PCA, through which NP success can be achieved indirectly. In sum, our study suggests that the debate on creativity–new firm performance relationship can be resolved by examining the questionable role of NP novelty in influencing NP performance indirectly through PCA, although no direct link exists.

Second, considering the significant impact of NP novelty and meaningfulness on PCA, our study contributes to the understanding of how to manage controllable, internal or external team dynamics that determines NP novelty and meaningfulness. NP novelty—as a result of the divergent process of gathering new and unique ideas for NPs—is predominantly influenced by external team factors such as market-based reward system and planning process formalization. This finding is attributed to the fact that enhancing novel ideas for NPs involves an inherent risk that needs to be supported by the organizational structure through market-based reward systems and less formalized planning process for NPD activities. On the other hand, NP meaningfulness—as a result of the convergent process of integrating suitable and appropriate ideas—is dominantly influenced by internal team factors such as social cohesion and superordinate identity. This suggests that the cognitive and emotional bond within the team (through high levels of social cohesion and superordinate identity) is essential to developing appropriate and suitable NPs for the target market. In summary, managers need to understand the differential mediating effects of NP novelty and meaningfulness between internal and external team dynamics and PCA. Improving external team dynamics through market-based reward systems and planning process formalization helps NP teams achieve PCA, only mediated through NP novelty, while enhancing internal team dynamics through social cohesion and superordinate identity improves PCA, only mediated through NP meaningfulness. As our mediating effects tests show, managers need to understand the importance of differential, mediating roles of NP novelty and meaningfulness in linking external and internal team dynamics and PCA. Given that no direct links between these team factors and PCA are established, it is very

important for managers to understand that NP novelty and meaningfulness play critical intermediary roles in converting such team dynamics into PCA. For example, NPD teams' efforts to generate novel ideas for NPs toward competitive advantage must be supported by the structure external to the teams through the high level of market-based reward systems and the low level of planning process formalization. In contrast, their efforts to create meaningful ideas for NPs toward competitive advantage can be enhanced by the dynamics inside the teams through high levels of social cohesion and superordinate identity.

The Effects of Team Dynamics on Creativity

Our results indicate that social cohesion is an emotional element of internal team dynamics that does not contribute to the novelty dimensions of NP and MP. However, social cohesion does contribute to the meaningfulness dimensions of NP and MP. This suggests that teams with higher levels of social cohesion provide more valuable and useful (i.e., meaningful) ideas for NPs (e.g., faster processing chips for computers) and MPs (e.g., better promotion with discount) because they remove inefficiencies and inadequacies through their close interaction and collaboration (e.g., Hargadon and Sutton, 1997). However, as it is expected, social cohesion does not influence the process of generating novel ideas for NPs and MPs. It is conjectured that teams with high levels of social cohesion may fail to generate novel ideas for NPs and MPs as they potentially suffer from social loafing, evaluation apprehension, and production blocking (Diehl and Stroebe, 1987), which offset the positive effect of social cohesion on enhancing novel ideas for NPs and programs.

These findings suggest a counterintuitive tension that managers need to balance in terms of the effects of team cohesion on dimensions of creativity. Managers must simultaneously create the conditions for cohesion while allowing for abrasion in teams. It may be that the key management task is to identify and remove communication barriers and unproductive conflicts through the high level of social cohesion, which will result in generating meaningful new initiatives for products and programs through effective communication, social ties, and team citizenship (Brockman and Morgan, 2003; Scott and Bruce, 1994; Sethi et al., 2001).

It is found that a cognitive element of internal team dynamics—superordinate identity—enhances NP meaningfulness and MP novelty. Our results suggest that product innovation teams with high levels of superordi-

nate identity tend to develop more valuable and useful product offerings (e.g., high-capacity, smaller computer hard drives) and more novel and distinct MPs (e.g., new eye-catching packages and unique sales promotions). The high level of commitment to the team's identity and its overarching goals may drive cross-functional teams to coordinate in such a way that market needs are incorporated more faithfully into meaningful NP designs and novel MP packages (Deshpandé and Zaltman, 1982; Van de Ven, 1986). This result is consistent with organizational level research on change where clarity of and commitment to a common purpose and vision have shown to be key determinants of success. An important management task for NP teams is to help establish a sense of urgency and clear ownership by the team for the outcomes of the project. This suggests that project kickoffs may be especially important so that development teams can coalesce and develop a team identity.

It is found that market-based reward systems have a positive effect on NP and MP novelty, but it does not influence NP and MP meaningfulness. Our findings may suggest an additional team-level and creativity-based perspective on the widely accepted concept of the firm-level "innovator's dilemma" (Christensen, 1997). According to Christensen, successful companies with established products are susceptible to failure in spite of their attention to customers. However, at the innovation team level, our results suggest that market intimacy can, in fact, have beneficial effects for some aspects of creativity (MP and NP novelty), which in turn leads to PCA.

Our results confirmed that planning process formalization has a negative effect on NP novelty but no significant effect on NP meaningfulness, whereas it enhances both MP novelty and meaningfulness. From a project management perspective, formalized planning is important, but our results suggest that rules and procedures should not be uniformly applied to all aspects of the innovation activities. The negative impact on NP novelty supports the institutional theory perspective (DiMaggio and Powell, 1983; Ford, 1996) that rule-like routines, norms, and procedures of a formal planning process enhance inertial forces against novel ideas for NPs. This suggests that managers should encourage and support an experiential approach to the front end of the innovation process to help create new ideas for products without overbearing concern about conformance to norms and regulations. On the other hand, formalization contributes directly to the improvement of novel and meaningful perspectives of MPs. It may be that the marketing activities are, on average, more diversely distributed functions and activities in an organization relative to NP development

activities. Our results suggest that managers need to have mechanisms in place to coordinate the interdependencies and complexities of the different functions involved in MP design and development.

Finally, one of the most surprising findings is that encouragement to take risks by top management has no effect on NP novelty, NP meaningfulness, or MP meaningfulness, although it has a positive effect on MP novelty. This finding runs counter to prior research, which has demonstrated a positive relationship between such encouragement and creativity (Amabile, 1983, 1988; Andrews and Smith, 1996). This nonsignificant result may indicate that the encouragement to take risks by top management is not always clearly conveyed to product innovation teams. For example, the project team leaders in our study may not have been influenced by top management's encouragement because they were less likely to communicate directly with these top managers. If project managers instead of team leaders evaluated the level of risk-taking encouragement, the results might differ. This explanation underscores the important role that project managers play as mediators of top management's directions for innovation.

The Effects of Creativity on PCA

One of our key findings is that only NP novelty and meaningfulness contribute to PCA, whereas MP novelty and meaningfulness have no significant effects on PCA. In answering the question of whether creativity really matters for PCA, our study helps managers understand that PCA is mainly driven by NP novelty and meaningfulness, rather than by MP counterparts. This finding supports Im and Workman's (2004) claim that "the creativity of NPs is relatively more important than the creativity of marketing programs. . . . in high tech firms." This result implies that the creativity of the core physical product contributes more to the perceived PCA in the marketplace than does the creativity of the MPs. This suggests that the creativity of the core product is the primary source of salience and value to customers. Thus, enhancements in cost effectiveness, quality, and product differentiation should increase customer receptivity to the innovation and results in higher PCA more so than investment in creative MPs.

Contrary to our expectation, creativity of MPs does not have direct impact on PCA, even though the role of MPs has been emphasized as the source of the competitive advantage. This surprising result may be attributed to the fact that PCA, which is specific to the outcome of a NP, is driven by product-based creativity, but not by MP-based

creativity in the high-tech industry setting. Thus, managers need to be aware of the fact that the role of NP creativity is more prominent in improving PCA during the NPD process than that of MP creativity is. Accordingly, managers should understand that MPs through creative advertising, promotion, packaging, pricing, and channel strategies in the high-tech industries do not provide immediate impact on PCA, which specifically addresses product differentiation, quality superiority, and cost efficiency of an NP.

Limitations and Conclusions

Our results must be interpreted in light of certain limitations. One set of limitations is related to the sample frame that was chosen for this study. For example, our finding that MP creativity is relatively less important than NP creativity may be a result of sampling only high-tech firms. MP creativity may play a more central role in enhancing PCA for lower tech products such as consumer-packaged goods. Additional research is needed to assess the stability of our findings across different contexts. Another sampling limitation arises from the selection of products that had been in the market for at least six months. Whereas this selection criterion helps avoid possible bias related to memory failure, it might force respondents to guess or speculate about future outcomes. In an effort to assess the potential impact of this limitation, a follow-up survey was conducted 12 months after the final field survey. The results show good test-retest reliabilities for the dimensions of creativity ($p < .01$). However, more research is needed to explore the long-term effects of creativity on project and firm-level innovation outcomes.

Another possible limitation pertains to the level of analysis. Our empirical study was operationalized at the team level. However, some constructs (e.g., encouragement to take risks by top management) may occur at the organizational level as well. Further research is needed to parse out the effects of multilevel data to avoid possible confounds. Finally, a critical decision was made in developing our model of creativity with regard to our variable selection. Future research should examine additional factors that may be relevant to creativity among product innovation teams. For example, research might include additional group or organizational antecedents such as strategic orientation or other mediators such as organizational learning and capabilities.

Overall, our research addresses an important gap in the literature by examining the effect of team dynamics on creativity and by linking creativity to strategic innovation

outcomes. Our findings indicate that team dynamics are an important predictor of creativity. Much has been written about team design and managing teams effectively, but prior research has not carefully examined the relationship between team dynamics and creativity. The results suggest that internal and external team dynamics have differential effects on the components of creativity, and that these relationships should be actively and carefully managed in innovation teams. Importantly, our study highlights the importance of distinguishing between NP and MP creativity and disentangling the two facets of creativity—novelty and meaningfulness. The four types of creativity have differential effects on PCA. Thus, it is important in future research to clearly specify which dimensions of creativity are the focus of the study.

Our study confirms that a firm's ability to accumulate creative ideas as intangible assets, successfully convert those ideas into innovations, and to launch those innovations into the marketplace constitutes a dynamic capability, which results in a competitive edge over other products in the market (Ettlie and Pavlou, 2006; Leonard-Barton, 1992). Our study found that creativity plays an important intermediary role in explaining the relationships between internal and external team characteristics and PCA. Thus, firms should actively manage team dynamics to benefit creativity and to drive a positive strategic innovation outcome.

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Appendix A. New Product and Marketing Program Creativity Measure Items and Samples of Other Scale Items^a

A. New product and marketing program creativity (NP and marketing program creativity): New

NP and marketing program novelty (4-item scale, Cronbach's $\alpha = .89$ for NP novelty and .90 for marketing program novelty)

Compared to your competitors, the new product you selected [or its associated marketing program]^b

is really “out of the ordinary.”

can be considered as revolutionary.

is stimulating.

shows an unconventional way of solving problems.

NP and marketing program meaningfulness (4-item scale, Cronbach's $\alpha = .91$ for NP meaningfulness and .90 for marketing program meaningfulness)

Compared to your competitors, the new product you selected [or its associated marketing program]

is relevant to customers' needs and expectations.

is considered suitable for customers' desires.

is appropriate for customers' needs and expectations.

is useful for customers.

B. Antecedents: Team dynamics and characteristics

Social cohesion (4-item scale, Cronbach's $\alpha = .90$; Sethi et al., 2001; Zaccaro and McCoy, 1988)

Members of the new product team are very comfortable with each other.

Members of the new product team are very friendly with each other.

Our new product team has a very pleasant working atmosphere.

Members of the new product team are committed to maintaining close interpersonal relationships.

Superordinate identity (5-item scale, Cronbach's $\alpha = .93$; Mackie and Goethals, 1987; Sethi et al., 2001)

Members of the new product team are committed to common project objectives.

Members of the new product team feel strong ties to the team.

Members of the new product team behave like a unified team.

Members of the new product team behaved like departmental representatives who were driven by their respective departmental agendas.^c

Members of the new product team value their membership in the team.

Members of the new product team feel that they have a personal stake in the success of the team.

Market-based reward system (5-item scale, Cronbach's $\alpha = .79$; Jaworski and Kohli, 1993)

No matter which group we are in, we get recognized for being sensitive to competitive moves in the market.

Customer satisfaction assessments influence senior managers' pay in this organization.

Formal rewards (i.e., pay raises, promotions) are forthcoming to anyone who consistently provides good market intelligence.

Salespeople's performance in this business unit is measured by the strength of the relationships they build with customers.

We use customer polls for evaluating our salespeople.

Planning process formalization (4-item scale, Cronbach's $\alpha = .85$; Andrews and Smith, 1996)

In our company, plans have a specific format that is used by everyone.

We have clearly defined procedures for completing each section of plan.

We are told exactly which information sources must be used to develop the plan.

We have a precise timetable for completing plans.

Appendix A. Continued

Encouragement to take risks by top management (3-item scale, Cronbach's $\alpha = .76$; adapted from Jaworski and Kohli, 1993)

Top management encourages new product teams to play it safe in their new product projects.[®]

Top management expects employees to take risks when they propose new ideas for new products.

Top management believes that the higher financial risks involved in new product projects are worth taking for higher rewards.

Top management encourages the development of innovative marketing strategies, knowing well that some will fail.

C. Control variables

Firm size: *The total number of employees in a firm.*

Market potential (4-item scale, Cronbach's $\alpha = .77$; adapted from Song and Parry, 1997)

There are many potential customers for this product to provide a mass-marketing opportunity.

Potential customers have a great need for this class of product.[°]

The dollar size of the market (either existing or potential) for this product is very large.

The market for this product is growing very quickly.

Technological turbulence (3-item scale, Cronbach's $\alpha = .88$; Jaworski and Kohli, 1993)

The technology in our industry is changing rapidly.

Technological changes provide big opportunities in our industry.

A large number of new product ideas have been made possible through technological breakthroughs in our industry.

Technological developments in our industry are rather minor.[®]

D. Product competitive advantage (PCA)

Product competitive advantage (3-item semantic-differential scale, Cronbach's $\alpha = .72$; Cooper, 1979)

Relative to *competing products in the market*, this product . . .

is not at all cost effective/is highly cost effective.

has inferior quality/has superior quality.

is not at all differentiated/is highly differentiated.

^a All items are measured by 7-point Likert-type scales, except for firm size.

^b Construct(s) in this bracket is (are) evaluated separately.

^c These items were removed from the final analysis due to their low item-to-total correlations.

[®], reverse-coded items.