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Market Orientation, Creativity, and New Product Performance in High-Technology Firms

The ability to generate and market creative ideas in new products (NPs) and related marketing programs (MPs) in response to changing market needs is key to the success of a firm. This research examines the mediating role of NP and MP creativity between market orientation and NP success. The authors investigate (1) whether market orientation facilitates or inhibits creativity, (2) whether creativity influences NP performance, and (3) how to define and measure creativity in the NP development and launch contexts. They use a two-stage sampling frame to collect 312 sets of responses from managers and NP team leaders and thereby address the potential for common method bias in measures of creativity and NP performance. The findings indicate that NP and MP creativity mediates the relationship between market orientation and NP success. The authors also show that the meaningfulness dimension, rather than the novelty dimension, of creativity is of greater importance in explaining the link between market orientation and NP success. The empirical results provide significant theoretical and managerial implications for NP strategy.

An accumulating body of research has established that market orientation leads to better performance in organizations (e.g., Jaworski and Kohli 1993; Narver and Slater 1990). Despite recent efforts to examine the mediating role of innovation as the missing link between market orientation and performance (e.g., Deshpandé, Farley, and Webster 1993; Han, Kim, and Srivastava 1998; Hurley and Hult 1998), there is no clear understanding of this link. A problem is that prior research has focused on the broad construct of innovation (often using the amount of innovations or patents) and has taken the strategic business unit (SBU) as its level of analysis. As Wind and Mahajan (1997) note, research in this area is confounded because of the equivocal definitions and measurements of innovation. This limitation is especially prominent when innovation is linked to performance, because innovation often implies a successful new product (NP) introduced into the market as its outcome. Another limitation is that a common method bias exists when one informant measures both independent and dependent variables.

Following Day and Wensley's (1988) source–position–performance framework, we propose that creativity is a mediator between market orientation and NP success (see also Han, Kim, and Srivastava 1998; Song and Parry 1997a). We use creativity (rather than innovation) as the positional mediator because it is a more concrete construct and, in general, has been viewed as a construct that precedes innovation. Specifically, Amabile and colleagues (1996, p. 1154) state: "All innovation begins with creative ideas.… [C]reativity by individuals and teams is a starting point for innovation; the first is a necessary but not sufficient condition for the second." In addition, we use creativity in a more specified context (product development teams) and thus avoid overly general responses that can result when innovation is measured at the SBU level.

Compared with prior research on innovation and creativity, our research differs in four significant ways.[1] First, we examine market orientation as an antecedent of creativity, thereby providing empirical insight into the debate of whether market orientation facilitates or impedes innovation (e.g., Lukas and Ferrell 2000). Whereas the positive impact of market orientation on innovation is well documented (e.g., Han, Kim, and Srivastava 1998; Slater and Narver 1998, 1999), in Christensen's (1997) book, *The Innovator's Dilemma*, he argues that listening to customers may have a more negative effect on disruptive than sustaining technologies. Second, we examine the impact of creativity on NP performance at the team level. Although, in general, it has been supported that innovation is key to the growth and success of a firm (Andrews and Smith 1996; Sethi, Smith, and Park 2001), some researchers argue that imitation, rather than innovation, is more important (Nelson and Winter 1982; Schnaars 1994). Third, we develop a model that incorporates both NP and marketing program (MP) creativity as positional advantages. Fourth, we develop a measure of creativity that is specific to the new product development

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[1]Because of space constraints, this version of the article does not contain many details that were in a prior draft. For readers who are interested in these details, a longer version of the article is available on request from either author.

Journal of Marketing
Vol. 68 (April 2004), 114–132

(NPD) context. We use a two-stage sampling frame to collect 312 sets of responses from managers and NP team leaders, thus addressing the potential for common method bias in measures of creativity and NP performance.

Theoretical Framework

Conceptualization of NP and MP Creativity

The concept of creativity as a general construct has been researched widely in the fields of psychology and organizational behavior as well as in marketing (for a summary, see Table 1).

Drawing on research in the management and marketing literature (i.e., Amabile 1983, 1988; Andrews and Smith 1996; Sethi, Smith, and Park 2001), as well as on exploratory field interviews in 15 firms, we define *NP* and *MP program creativity* as the degree to which NPs and their associated MPs are perceived as representing unique differences from competitors' products and programs in ways that are meaningful to target customers. Consistent with Amabile (1983), we use the "output perspective" of creativity, which identifies two distinct dimensions of creativity: unique differences (i.e., the novelty dimension, defined as the degree to which NPs and MPs are perceived as representing unique differences from competitors) and meaningfulness to target customers (i.e., the meaningfulness dimension, defined as the extent to which NPs and MPs are perceived as appropriate and useful to target customers). Amabile argues that both dimensions must be included in the concept of creativity, because the target audience may perceive ideas as weird or bizarre if they are novel or unique but carry no meaning for the audience.

Augmented elements of the MP (e.g., packaging, warranties, pricing, promotion, distribution) represent efforts to differentiate and facilitate the selling of core products. In the launch of an NP, MPs must be creatively designed and managed to achieve rapid dissemination and maximum penetration of products (Robertson and Gatignon 1986). Our study combines the concept of NP creativity with that of MP creativity to provide a broader perspective of the role of creativity in the development and implementation of NPs. Our study thus conceptualizes four separate dimensions of creativity: NP novelty, NP meaningfulness, MP novelty, and MP meaningfulness.

Why Is Creativity Important in Marketing Strategy?

The creation and development of creative ideas and their manifestations as NPs and MPs are considered the core elements of an innovation strategy (Zaltman, Duncan, and Holbek 1973) for at least three reasons. First, creativity motivates the generation of new ideas, which is one of the key determinants of innovation (Amabile 1988; Amabile et al. 1996). Innovation is conceptualized as the successful development, adoption, and implementation of creative ideas (Rogers 1983; Scott and Bruce 1994; Van de Ven 1986). Thus, creativity, which involves the generation of novel and meaningful ideas, is a necessary though not sufficient antecedent of innovation (Amabile 1988; Amabile et al. 1996; Scott and Bruce 1994).

Second, creativity results in product differentiation, which is an important determinant of a firm's performance (Andrews and Smith 1996; Song and Montoya-Weiss 2001; Song and Parry 1997a, 1999). Product differentiation is viewed as the degree of an NP's superiority relative to competitive products in terms of uniqueness, quality, cost effectiveness, and technical performance (Cooper 1979; Song and Parry 1997a, b). Creativity that focuses on meaningful differentiation provides a competitive advantage because product differentiation improves the performance of a firm by enhancing its customer loyalty and satisfaction (e.g., Andrews and Smith 1996; Sethi, Smith, and Park 2001; Song and Montoya-Weiss 2001; Song and Parry 1997a, b, 1999).

Third, the resource-based theory of the firm suggests that creativity, which is an intangible resource embedded within the firm, can provide a competitive advantage (Barney 1991; Hunt and Morgan 1995). Creativity renders a sustainable competitive advantage to a firm because it is a strategic resource that is valuable, flexible, rare, and imperfectly imitable or substitutable.

In terms of empirical research on creativity in marketing, there have been three general approaches. The first approach has examined individual, group, and organizational characteristics that determine the creativity reflected in NPs (Sethi, Smith, and Park 2001) or MPs (Andrews and Smith 1996). Andrews and Smith (1996) examine determinants of MP creativity, such as individual problem-solving input, individual motivational factors, and situational factors, whereas Sethi, Smith, and Park (2001) focus on team characteristics and organizational contextual factors that influence NP creativity. The second approach defines creativity in terms of the degree of novelty and examines it as an outcome of the organizational learning process (Moorman 1995; Moorman and Miner 1997). The third approach finds that creativity enhances organizational performance at the SBU level when customer ratings of these factors are used but not when manager ratings of them are used (Deshpandé, Farley, and Webster 1993). Despite the presumed importance of creativity, there is no empirical research that examines its consequences at the NPD team level.

We thus have three open issues that we address in this article. First, does market orientation have a positive or negative impact on NP and MP creativity? Second, does creativity affect NP performance? Third, what is the relative importance of NP creativity versus MP creativity?

Proposed Model and Research Hypotheses

We develop a model in Figure 1 that adopts Day and Wensley's (1988) source–position–performance framework, in which market orientation is the source, creativity is the positional mediator, and NP success is the performance outcome at the team level (see also Han, Kim, and Srivastava 1998; Song and Parry 1997a).

Our model incorporates both product and program dimensions simultaneously. When NPs are introduced, customers evaluate creativity on the basis of not only the creative features of the products themselves but also the cre-

TABLE 1
Major Studies on Creativity

Authors	Primary Focus	Sample/Data	Measures/ Analysis Method	Definition of Creativity and Summary of Comments and Findings
Amabile (1983)	Organizational factors influencing individual creativity	120 research-and-development scientists from more than 20 corporations	Content analysis	The production of novel, useful ideas by an individual or small group of individuals working together; a model of individual creativity is integrated into a model of organizational innovation.
Amabile and colleagues (1996)	Development of the climate for creativity instrument	306 (main test) and 160 (validation test) team members	Measure development methods, LISREL, and multivariate analysis of variance	Five work environment dimensions (challenge, organizational encouragement, work group supports, supervisory encouragement, and organizational impediments) influence creative behavior in an organization.
Andrews and Smith (1996)	Determinants of MP creativity	193 product managers	Regression	Creativity is defined as the meaningful novelty of some output relative to conventional practice in the domain to which it belongs; MP creativity is influenced by individual problem-solving input, motivational factors, and situational factors.
Besemer and O'Quin (1986)	Development of a semantic scale of creativity	133 student subjects	CFA	Output perspective of creativity can be evaluated by three dimensions: novelty, resolution, and elaboration and synthesis.
Besemer and Treffinger (1981)	Development of criteria to explain creativity	90 sources of creativity study	Theory	Based on literature review, different criteria (e.g., novelty, resolution, and attractiveness) can be identified to measure creative output.
Deshpandé, Farley, and Webster (1993)	The impact of customer orientation, culture, and creativity on firm performance	50 sets of data (i.e., 50 quadrads) collected from Japanese managers	Regression	Business performance is positively influenced by the customer's evaluation of the supplier's customer orientation and organizational innovativeness. Business performance is not correlated with the supplier's own assessment of customer orientation.
Haberland and Dacin (1992)	Development of a measure of advertising creativity	102 students subjects	Factor analysis, correlation	Advertising creativity reflected in output is measured by Jackson and Messick's (1965) four dimensions from the viewers' judgments.
Jackson and Messick (1965)	Conceptualization of creative person, process, and output	N.A.	Theory	Creativity is composed of four dimensions that represent (1) original and unexpected, (2) appropriate and meaningful, (3) transformational, and (4) condensed and simple.

TABLE 1
Continued

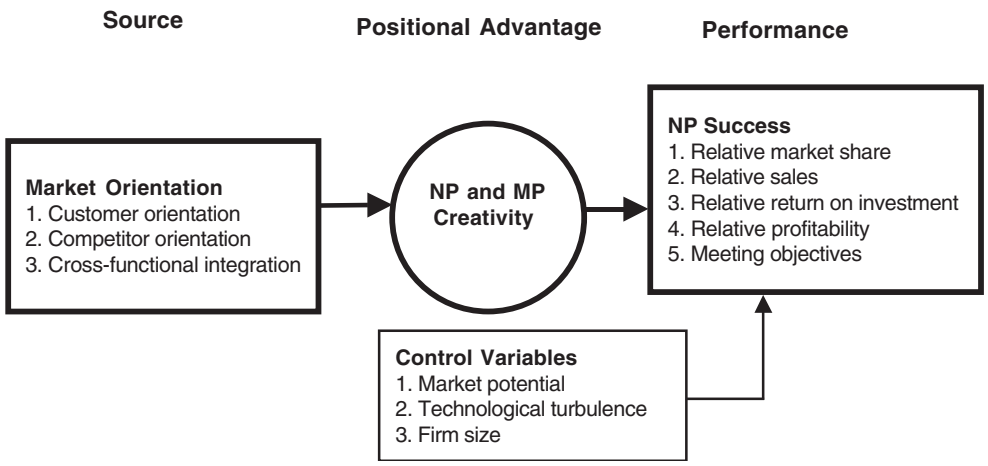
Authors	Primary Focus	Sample/Data	Measures/ Analysis Method	Definition of Creativity and Summary of Comments and Findings
Moorman and Miner (1997)	Organizational memory on NP performance and creativity	92 sets of data from mangers in advertising companies	Regression	Organizational memory levels improve short-term financial performance of NPs, whereas memory dispersion enhances both the financial performance and the creativity of NPs.
Mumford and Gustafson (1988)	The understanding of creative behavior	N.A.	Theory	Creativity is defined as production of novel, socially valued products. Creativity is best conceptualized as a syndrome involving (1) trait, (2) process, (3) environment, and (4) output.
Sethi, Smith, and Park (2001)	Determinants of NP creativity in NP team context	141 managers of NP teams	Regression	Creativity is defined as the extent to which the product differs from competing alternatives in a way that is meaningful to customers. New product creativity is related to team characteristics (e.g., superordinate identity) and contextual influence (e.g., encouragement to take risk and customers' influence).
Woodman, Sawyer, and Griffin (1993)	Conceptual links among creative persons, processes, and products	N.A.	Theory	Organizational creativity is defined as the creation of a valuable NP, service, idea, procedure, or process by persons working together in a complex social system. Individual, group, and organizational characteristics influence creative behavior, which determines organizational creativity in a firm.

Notes: N.A. = not applicable.

ative ideas reflected in the MPs associated with them. Our model also simultaneously explores market orientation as an antecedent and NP performance as a consequence of creativity. We draw our hypotheses from empirical research that has conceptualized creativity as the combined construct of novelty and meaningfulness (e.g., Amabile 1983; Andrews and Smith 1996). As such, we do not propose different hypotheses for the separate dimensions of creativity (i.e., novelty and meaningfulness) because of the lack of an empirical basis. However, we do empirically explore the dimensionality of NP and MP creativity to determine whether the combined model used in prior empirical research is appropriate for our data.

Our first set of hypotheses addresses the effects of market orientation on NP and MP creativity. Market orientation fosters creativity because it involves the generation and dissemination of and the reaction to market intelligence and knowledge in response to market needs (Kohli and Jaworski 1990; Slater and Narver 1995). Drawing on prior research (e.g., Deshpandé, Farley, and Webster 1993; Han, Kim, and Srivastava 1998; Slater and Narver 1995), we hypothesize that there is a positive impact of the three dimensions of market orientation on NP and MP creativity. In the NPD context, customer orientation relates to the collection of intelligence about customers to satisfy their needs and desires as they respond to novel and meaningful stimuli (Day 1994; Deshpandé, Farley, and Webster 1993; Hunt and Morgan 1995; Kohli and Jaworski 1990; Narver and Slater 1990). A customer-oriented firm that closely monitors customers' needs tends to improve creativity by producing novel and meaningful NPs and MPs that, in turn, enhance organizational innovations through the firm's entire business system (Deshpandé, Farley, and Webster 1993; Gatignon and Xuereb 1997; Han, Kim, and Srivastava 1998). Although the debate continues on whether being close to customers fosters or impedes innovation (e.g., Christensen

FIGURE 1
The Conceptual Model of NP and MP Creativity



1997; Christensen and Bower 1996; MacDonald 1995), we propose that the positive effect of customer orientation on creativity exceeds the negative effect:

H_1: Customer orientation positively influences (a) NP creativity and (b) MP creativity.

We hypothesize that competitor orientation positively influences creativity. Competitor orientation, viewed as a firm's capability to identify, analyze, and respond to competitors' weaknesses and strengths, enhances organizational intelligence (Day and Wensley 1988; Kohli and Jaworski 1990; Narver and Slater 1990). A competitor-oriented firm tends to monitor progress against rival firms continuously, which can lead to opportunities to create products or programs that are differentiated from those of competitors. It thus tends to facilitate innovations to stay ahead of competitors' innovations (Han, Kim, and Srivastava 1998). A competitor-oriented culture infused into an NP team tends to enhance NP and MP creativity because the team is keenly aware of the industry trends through the collection of intelligence from competitors, which can result in the generation of novel and meaningful NPs and MPs in response to competitors' actions. Thus:

H_2: Competitor orientation positively influences (a) NP creativity and (b) MP creativity.

Finally, we hypothesize that cross-functional integration (XFI) positively influences NP and MP creativity. The significance of XFI in generating superior values for target customers is well documented with respect to NPD (e.g., Ayers, Dahlstrom, and Skinner 1997; Griffin and Hauser 1996; Gupta, Raj, and Wilemon 1986; Ruekert and Walker 1987; Song and Parry 1992; Song, Xie, and Dyer 2000; Xie, Song, and Stringfellow 1998). In NPD, XFI can be represented by the level of interaction and communication, the level of information sharing and coordination, and the degree of joint involvement in conducting specific tasks involved in an NP's development and launch (Song and Parry 1997a). We hypothesize that XFI positively affects NP and MP creativity, because it facilitates the generation, collection, and dissemination of market intelligence about novel and meaningful stimuli across functional areas, thus encouraging creativity (Jaworski and Kohli 1993). In the NPD context, XFI enhances creativity because it involves open generation and sharing of new ideas, resolution of problems and disagreements by means of nonroutine methods and different frames of reference, and responsiveness to change in novel and meaningful ways (Andrews and Smith 1996; Gatignon and Xuereb 1997; Griffin and Hauser 1996; Han, Kim, and Srivastava 1998; Van de Ven 1986). Thus, an NP team that acquires and disseminates divergent ideas and information through close XFI is more likely to generate creative ideas for developing and marketing NPs. Thus:

H_3: Cross-functional integration positively affects (a) NP creativity and (b) MP creativity.

The Impact of NP and MP Creativity on NP Success

Studies on NP success and failure have suggested that NP creativity provides competitive product advantage by enhancing novel and useful perspectives of the product (e.g., Calantone and Cooper 1981; Cooper 1979; Kleinschmidt and Cooper 1991; Song and Montoya-Weiss 2001; Song and Parry 1997a, 1999).[2] A creative firm that provides unique and meaningful products and programs will meet the changing needs of consumers by generating highly innovative and superior products and programs in the market (Cooper 1979; Deshpandé, Farley, and Webster 1993). Thus, both NP and MP creativity and proactiveness are strong strategic determinants of NP success (Griffin and Page 1996). Despite the presumed impact of NP and MP creativity on NP performance, there is a lack of empirical study on their linkage.

[2]Using the data collected from the final field study (N = 206), we further find that NP novelty and meaningfulness influence product competitive advantage in terms of relative cost, quality, and differentiation ($p < .05$), whereas MP novelty and meaningfulness fail to affect it. We also find that product competitive advantage has a positive impact on market, financial, and qualitative performance outcomes ($p < .05$).

This study proposes a positive effect of both NP and MP creativity on NP success for three reasons. First, NP and MP creativity play a critical role in solving problems associated with NPD and launch by providing divergent ideas in a unique and meaningful way, which guarantees the successful implementation of NPs (Cooper 1979). Second, NP and MP creativity, which entail differentiation from competitors, provide superior products and programs that improve positional advantage over competitors (Andrews and Smith 1996; Calantone and Cooper 1981; Cooper 1979; Deshpandé, Farley, and Webster 1993; Kleinschmidt and Cooper 1991). Third, NP and MP creativity that are accumulated as organizational intelligence about novel and meaningful ideas can lead to competitive advantage by meeting unique market demands in meaningful ways, which in turn results in superior NP performance (Barney 1991; Hunt and Morgan 1995). Therefore, we propose the following:

H_4: Both NP and MP creativity, respectively, enhance NP success in terms of relative market share, sales, return on investment, profitability, and whether the NP meets objectives.

Methodology

Sample

We performed a series of pretests, including exploratory qualitative interviews (N = 15), survey pretests (N = 21), follow-up interviews (N = 21), a research panel review (N = 6), and a pilot study (N = 106), to validate the measurement instruments and to ensure the appropriateness of the survey administration. After the pretests, we collected the final data for the research using a cross-sectional survey of U.S. high-technology manufacturing firms.

In identifying key informants within the participating firms, we adopted a two-stage sampling frame in which a project manager from each firm evaluated the performance of a selected NP, and an NP team leader (designated by the project manager) evaluated NP and MP creativity, market orientation, and control variables. This sampling method, which separates informants for the measures of creativity and NP performance, is essential for this study because the causal attribution by a single informant for perceptually related constructs is considered a major source of common method bias (Ayers, Dahlstrom, and Skinner 1997; Olson, Walker, and Ruekert 1995).[3] Both project managers and NP team leaders are suitable as sources of NP and MP information because of their level of involvement in NPD activities (4.99 and 5.68 for managers' NP and MP involvement and 5.02 and 5.51 for team leaders' NP and MP involvement on a seven-point scale).

The sampling frame for the final field survey consisted of 1080 project managers drawn from the *CorpTech Directory of Technology Companies*. We collected a total of 222 sets of responses, for a 20.8% response rate. After we excluded 16 surveys because of incomplete responses, a total of 206 sets of responses remained.[4] For the final data analysis, we combined 106 sets of responses from a pilot study with 206 responses from the final field study, resulting in a total sample of 312. We pooled the two data sets because testing a complex model by means of a structural equation model requires a substantial amount of data.[5]

Another sampling issue relates to the choice of the specific NPs and MPs that the project managers selected for evaluation. Managers were asked to select and report on the most recently developed NP, regardless of its level of success, for which their SBU was responsible and that had been in the market for at least 6 months. Limiting the selection of NPs to those that were at least 6 months old helped informants avoid selection and social desirability biases toward more successful products (Montoya-Weiss and Calantone 1994; Olson, Walker, and Ruekert 1995; Sethi, Smith, and Park 2001). To address whether this short-term measure biases the results, a follow-up survey was mailed to the 312 managers in the final sample 12 months after the original survey. We collected a total of 143 sets of usable responses in this follow-up survey, for a 45.8% usable response rate. Measures of NP performance from the final field survey are significantly correlated with those from the follow-up survey at the .01 level, which confirms that short-term measures do not bias the estimation of the creativity–NP performance relationship.[6] The final field study confirmed that selection bias was not serious, and the overall measure of NP success had enough variance to be estimated (mean of overall NP success on a seven-point scale = 5.16, standard deviation = 1.43).

In addition, the nonsignificant t-test results on major constructs between early and late respondents confirm that there was no significant nonresponse bias (Armstrong and Overton 1977). We also tested whether biases existed from omitted independent variables, as Calantone, Schmidt, and Song (1996) suggest. We found that adding a correlation between measurement errors for any two independent variables does not significantly improve the fit of the model based on chi-square difference tests, thus confirming no bias from omitted variables. Finally, multicollinearity diagnostic tests (Belsley, Kuh, and Welsch 1980; Chatterjee and Price

[3]Although all interrater correlations for the four dimensions of NP and MP creativity between managers and NPD team leaders are significant at the .01 level, a substantial amount of variance is not commonly explained between the two respondents, thus confirming the distinctiveness of responses from the two types of respondents (highest interrater correlation = .72 for NP novelty, variance explained = $.72^2$ = .52, variance unexplained = .52). See Table 2, Panel A, for interrater correlations.

[4]The t-tests for major constructs collected by the first respondents (i.e., four dimensions of NP and MP creativity and three dimensions of NP success) indicate that there is no significant difference between complete (N = 206) and incomplete responses (N = 16) at the .05 level (all p values > .15).

[5]The t-tests on the major constructs show that there is no significant difference at the .05 level between the responses from the pilot study and those from the final field study. In addition, we find no significant difference at the .05 level between the correlation matrix from these two samples, confirming that the two data sets can be pooled.

[6]The correlations of NP performance measures between the final field survey and the follow-up survey are significant at the .01 level as follows: r = .54 for MPO, r = .57 for FPO, and r = .46 for QPO.

1991) confirmed that no serious multicollinearity exists for further analysis.[7]

Measures

We developed the NP and MP creativity measure by following the recommendations of Churchill (1979) and Gerbing and Anderson (1988), but we used existing measures for all other constructs. To finalize the measures that were to be included, 245 surveys were faxed to project managers in a pilot study. We collected 106 sets of responses from a project manager and an NP team leader in each company, yielding a 30.1% usable response rate. Appendix A summarizes the internal consistency of the measurement instruments for the main constructs from the pilot study.

Development of NP and MP creativity measures. Development of valid and reliable NP and MP creativity measures is a necessary first step in the validation of the concepts and structures of NP and MP creativity. Previous marketing literature has adopted either a semantic scale of creativity borrowed from the psychology literature (Andrews and Smith 1996; Sethi, Smith, and Park 2001) or an NP creativity measure that focuses on assessing the degree of the changes by NP ideas (Moorman 1995; Moorman and Miner 1997). We tailored our domain-specific measure of NP and MP creativity to assess creativity in both NPD and launch contexts.

We drew the initial 39 measurement items from an extensive literature review and from exploratory interviews with 15 project managers in high-technology firms. A total of 10 measurement items that exhibited desirable psychometric properties for assessing the creativity of both NPs and MPs remained after we conducted a series of pretests using the traditional measure-development methods that include coefficient alpha, item-to-total correlations, and exploratory factor analysis (for measure items, see Appendix A).

We used the pilot study (N = 106) as a basis for additional scale refinement of the NP and MP creativity measures. Using the sample of team leaders, we purified the remaining measure items in an iterative manner (Churchill 1979). We dropped two items in the measure ("is stimulating" and "reflects a customary perspective in this industry") because of the double-loading problem in the exploratory factor analysis, which deteriorates the internal validity. In addition, we performed a confirmatory factor analysis (CFA) on the remaining eight items using the sample of managers as the validation sample. All the factor loadings were significant and had high R^2 values, thus confirming convergent validity (Bagozzi and Yi 1988; Bagozzi, Yi, and Phillips 1991).

In the final field study (N = 206), we validated the NP and MP creativity measures using the team leaders' responses as the trigger sample and the managers' responses as the validation sample. In the final validation process (using correlations of related measures, interrater correlations, and test–retest reliabilities), we found that our measures have good discriminant validity and convergent validity as well as reliabilities (for correlations of related measures, see Table 2, Panel A).[8] We further collected data (N = 29) from customers, who are the ultimate judges of creativity. The significant correlations between managers' and customers' ratings on creativity (r = .49, $p < .01$ for NP creativity; r = .53, $p < .01$ for MP creativity) provide evidence that managers' responses can represent customers' perspectives.

Measures of other constructs. We tested the measure instruments for the other major constructs (i.e., market orientation and NP performance as well as the control variables) for their validity and reliability in two waves. First, in a pilot study, we revised and refined measurement items using traditional measure-development methods as recommended by Churchill (1979). After measure refinement, the results for Cronbach's alphas that are greater than .70 (Nunnally 1978) show that all measures of the major constructs exhibit good internal consistency (for measurement items and coefficient alphas, see Appendix A). Second, in the final field study, the results from the confirmatory measurement model suggest that all indicators are significantly loaded on the subjective latent constructs, thus confirming good convergent validity (Bagozzi and Yi 1988; Bagozzi, Yi, and Phillips 1991). In addition, the significant results from chi-square difference tests in favor of unrestricted models (i.e., correlations are freely estimated) over restricted models (i.e., correlations are fixed at 1) for all pairs of constructs in Table 2 confirmed discriminant validity for all constructs (Anderson and Gerbing 1988). Overall, all measures have good construct validities and desirable psychometric properties.

Market orientation. We adopted Narver and Slater's (1990) measure of market orientation to assess customer orientation, competitor orientation, and XFI. After we excluded 2 items that had low item-to-total correlations, the remaining 13 measurement items represented the three dimensions of market orientation well and had good reliabilities (see Cronbach's alpha, Appendix A).

NP success. As NP strategy researchers (e.g., Montoya-Weiss and Calantone 1994; Song and Parry 1997a, b) recommend, we used multiple measures of NP success to

[7]To address possible problems of multicollinearity from high correlations among independent variables, we regressed each of the four dimensions of NP and MP creativity on three factors of market orientation. All condition indexes (Belsley, Kuh, and Welsch 1980) were less than 30, and all variance inflation factors were much less than 10 (Chatterjee and Price 1991). Thus, multicollinearity is not a concern for further analysis.

[8]We examined correlations among three different measures: (1) a single-item global measure of creativity, (2) a ten-item semantic scale measure of creativity (adopted from Besemer and O'Quin 1986), and (3) an eight-item new measure of NP and MP creativity (for correlations and means, see Table 2, Panel A). Each of the four dimensions in the new measure of NP and MP creativity significantly correlates with the single-item and the ten-item measures at the .05 level, thus proving convergent validity. In addition, interrater correlations between a team leader in the trigger sample and a manager in the validation sample are all significant ($p < .01$), indicating good convergent validity (e.g., John and Reve 1982). The correlation analysis using the data collected from the follow-up survey, conducted 12 months after the final field survey, shows good test–retest reliabilities for all four dimensions ($p < .01$).

TABLE 2
Correlations and Descriptive Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean (s.d.)
A. Correlations Among Creativity Measures (N = 312)															
1. NP-novel$_{TL}$	1														18.69 (5.82)
2. NP-meaning$_{TL}$	.27**	1													23.56 (3.86)
3. MP-novel$_{TL}$	.48**	.24**	1												15.27 (5.46)
4. MP-meaning$_{TL}$	.18**	.46**	.70**	1											19.19 (4.41)
5. NP-novel$_{MGR}$	.72**	.15**	.32**	.12*	1										18.70 (5.81)
6. NP-meaning$_{MGR}$	.17**	.59**	.15**	.32**	.26**	1									24.01 (3.73)
7. MP-novel$_{MGR}$	.30**	.14**	.57**	.44**	.39**	.14*	1								14.95 (5.61)
8. MP-meaning$_{MGR}$	.06	.34**	.37**	.62**	.12*	.41**	.65**	1							18.91 (4.39)
9. NP-creat$_{GLO}$	.54**	.39**	.38**	.34**	.42**	.28**	.30**	.24**	1						5.25 (1.25)
10. MP-creat$_{GLO}$	.07	.24**	.50**	.55**	.08	.20**	.38**	.37**	.45**	1					4.38 (1.46)
11. NP-novel$_{SEM}$	.77**	.27**	.38**	.19**	.64**	.18**	.29**	.03	.63**	.13	1				31.73 (6.07)
12. NP-meaning$_{SEM}$	.13	.52**	.18*	.32**	.13	.37**	.12	.22**	.31**	.19**	.31**	1			24.03 (3.93)
13. MP-novel$_{SEM}$	.12	.25**	.67**	.60**	.07	.09	.43**	.37**	.30**	.73**	.19**	.24**	1		25.19 (7.56)
14. MP-meaning$_{SEM}$	–.01	.40**	.31**	.57**	–.01	.29**	.29**	.41**	.26**	.45**	.14*	.52**	.55**	1	21.43 (4.18)

TABLE 2
Continued

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean (s.d.)
B. Correlations Among Major Constructs (N = 312)															
1. NP-novel	1														18.69 (5.82)
2. NP-meaning	.27**	1													23.56 (3.86)
3. MP-novel	.48**	.24**	1												15.27 (5.46)
4. MP-meaning	.18**	.46**	.70**	1											19.20 (4.41)
5. Customer orientation	.05	.28**	.32**	.38**	1										23.61 (5.58)
6. Competitor orientation	.14**	.23**	.25**	.31**	.56**	1									19.61 (4.42)
7. XFI	.11	.30**	.26**	.32**	.51**	.51**	1								18.46 (4.92)
8. MPO	.14*	.38**	.18**	.32**	.11	.13*	.05	1							28.40 (8.82)
9. FPO	.11	.37**	.15*	.26**	.15**	.22**	.12*	.73**	1						27.83 (8.76)
10. QPO	.32**	.46**	.26**	.34**	.18**	.16**	.17**	.65**	.60**	1					15.54 (3.70)
11. Market potential	.10	.24**	.20**	.24**	.18**	.15*	.14*	.08	.17**	.23**	1				13.53 (4.42)
12. Technological turbulence	–.01	.17**	–.01	.08	.09	.11	.10	–.03	–.04	.04	.29**	1			19.30 (5.84)
13. Firm size	.06	–.09	–.07	–.11	–.09	–.13*	–.11*	–.04	–.05	.02	.01	.01	1		5218.58 (25641)

*$p < .05$ (two-tailed).
**$p < .01$ (two-tailed).
Notes: TL = team leader survey, MGR = manager survey, GLO = global measure, and SEM = semantic scale.

assess different perspectives of NP performance, including market measures (e.g., relative market share, relative sales), financial measures (e.g., relative return on investment, relative profitability), and overall assessment measures (e.g., meeting objectives for customer satisfaction and technological advancement). For the NP success measure, we adopted relative sales, return on investment, market share, and profitability from the work of Song and Parry (1997a), and we added a global measure adapted from the works of Kleinschmidt and Cooper (1991) and Page (1993). Consistent with Song and Parry (1997b), we used relative subjective measures (e.g., performance relative to a firm's other products and original objectives), because objective measures (e.g., financial data) are often inaccurate or unavailable for NPs (e.g., Han, Kim, and Srivastava 1998; Song and Parry 1997a, b).

In the pilot study, the exploratory factor analysis of the measurement items of NP success suggests that the original measurement model with five consequence constructs (Figure 1) can converge into a more parsimonious model with three consequence constructs. Consistent with the work of Lumpkin and Dess (1995), measurement items from relative sales and relative market share converge into one underlying dimension, designated as market performance outcome (MPO). Measurement items from relative return on investment and relative profitability also converge into another dimension, designated as financial performance outcome (FPO). The three items for a global measure constitute the final factor, which we renamed qualitative performance outcome (QPO). The three renamed constructs have good internal consistency, as reflected by their Cronbach's alphas (.91 for MPO, .91 for FPO, and .77 for QPO).

Control variables. We included three control variables that are commonly believed to influence the outcome of NP activities in the high-technology industry: market potential, technological turbulence, and firm size.[9] After we removed one item that had low item-to-total correlation from a pilot study, the measurement items for market potential and technological turbulence exhibited good reliabilities (see Appendix A). We used market potential, which is defined as the potential demand for the NP in the target market (Han, Kim, and Srivastava 1998; Narver and Slater 1990; Song and Parry 1997a), to control for the environmental impact on NP performance. Technological turbulence, defined as a rapid rate of technological change, is considered an important environmental factor that influences NP performance (Jaworski and Kohli 1993; Narver and Slater 1990; Song and Montoya-Weiss 2001). Finally, we included firm size, defined as the number of employees in a firm (Chandy and Tellis 2000; Narver and Slater 1990), to control for the impact of a firm's resources on NP success.

[9]We selected these three variables from the work of Narver and Slater (1990) because these characteristics strongly influence how creativity influences NP performance in NPD processes. We also tested whether these control variables moderate the creativity–NP performance relationships. In general, we found no moderating effects.

Model Estimation and Results

Before we tested the hypotheses, we examined a correlation matrix for the composite scales of the major constructs (see Table 2). The signs of the bivariate correlations appear to be consistent with the hypothesized relationships. There is also variability in the measures of the major constructs, as reflected by the means and standard deviations shown in Table 2 (Panel B).

Testing the Model of Creativity

We estimated path coefficients using maximum likelihood (ML) estimation in the structural equation modeling method (Bollen 1989).[10] In testing the main effects from market orientation to NP and MP creativity and to NP success, we followed Anderson and Gerbing's (1988) two-step approach in structural equation modeling, for which the estimation of a confirmatory measurement model must precede the simultaneous estimation of the measurement and structural submodels. The ML estimation results from a confirmatory measurement model show goodness-of-fit indexes that are greater than .95, significant loadings, and high squared multiple correlation (SMC) values (equivalent to R^2; lowest SMC = .28), thus confirming convergent validity (Bagozzi and Yi 1988). Because interpretational confounding from the measures was no longer an issue, we performed simultaneous estimation of the measurement and structural models to test the hypotheses. Following the general approach to combine novelty and meaningfulness into creativity (e.g., Amabile 1983; Andrews and Smith 1996; Sethi, Smith, and Park 2001), we tested a model that links three dimensions of market orientation to NP and MP creativity with three dimensions of NP success, as illustrated in Figure 2 (Panel A), with standardized coefficients and other fit statistics. To assess the differential effects, we report standardized coefficients as path coefficients.

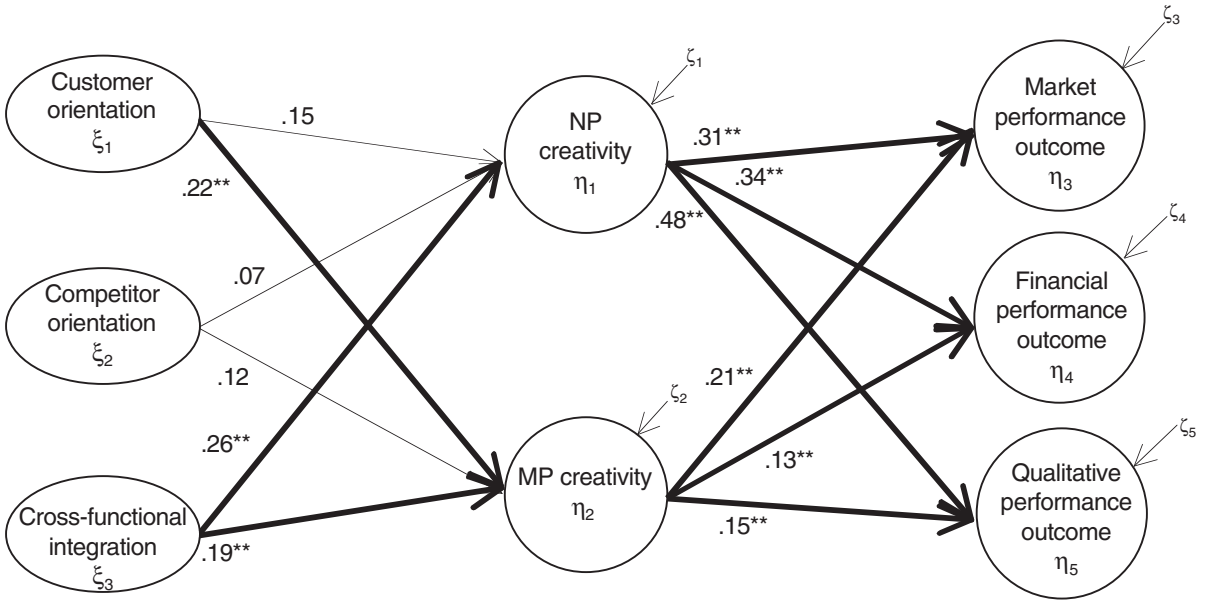
First, we examine the overall model fit. The chi-square statistic (χ^2 = 3442.42, degrees of freedom [d.f.] = 884) is significant because of the sensitivity of the sample size. However, all the baseline comparison indexes (normed fit index [NFI, Δ1], incremental fit index [IFI, Δ2], relative fit index [RFI, ρ1], and Tucker–Lewis index [TLI, ρ2]) greater than .92 and the root mean square error of approximation (RMSEA) value of .10 indicate an acceptable fit of the data, according to Browne and Cudeck's (1993) cutoff criteria.

Second, H_1–H_3 examine the impact of three dimensions of market orientation on both NP and MP creativity. The estimation results show that three paths are significant at the .05 level (γ = .22, standard error [s.e.] = .08 between customer orientation and MP creativity; γ = .26, s.e. = .05 between XFI and NP creativity; and γ = .19, s.e. = .08 between XFI and MP creativity). However, the other three paths (customer orientation and NP creativity, competitor

[10]Because we find a significant multivariate kurtosis that violates the multivariate normality assumption in the ML estimation, we use 1000 bootstrap samples, for which the means serve as a proxy for the sampling distribution of the population. The results show that the bootstrapping estimation is statistically equivalent to that using ML estimation, thus confirming that the ML estimation is robust, despite the presence of multivariate kurtosis

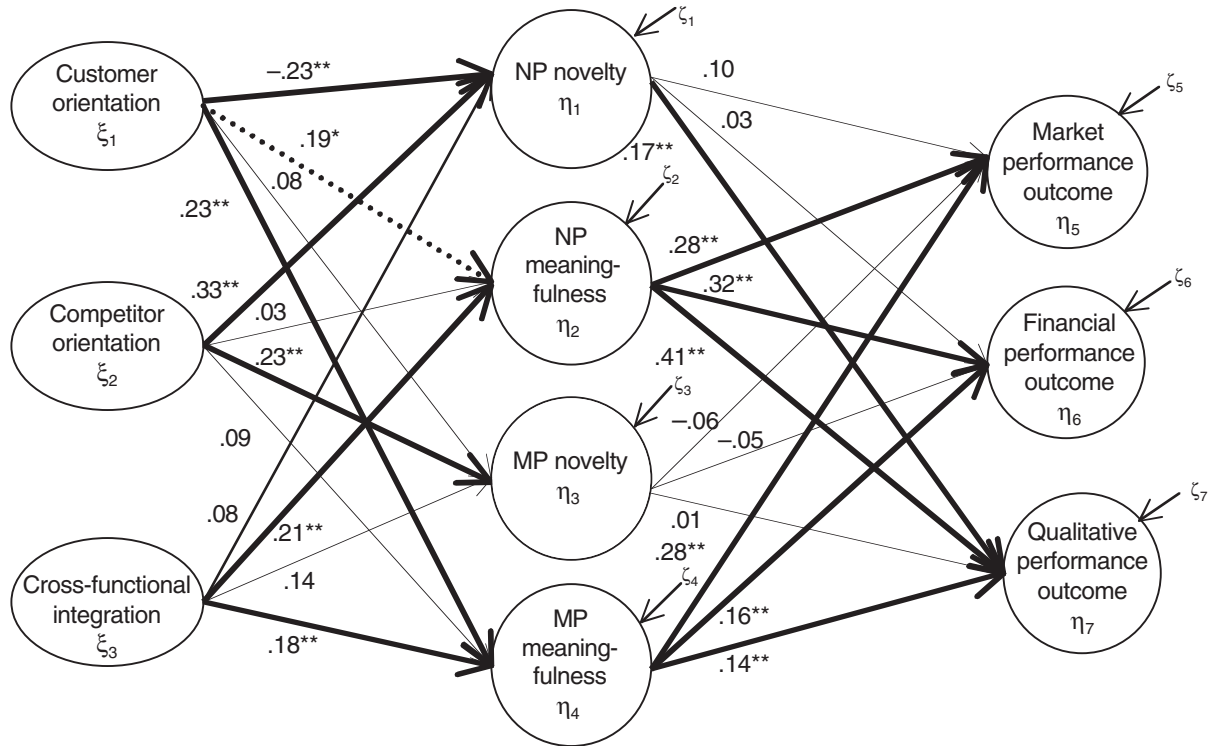
FIGURE 2
Structural Equation Model of NP and MP Creativity

A. Combined Model: Standardized Coefficients (N = 312)



**$p < .05$.
Notes: Fit statistics: χ^2 (d.f.) = 3442.42 (884), $p < .05$; NFI = .92; RFI = .92; IFI = .94; TLI = .94; and RMSEA = .10.

B. Component-wise Model: Standardized Coefficients (N = 312)



*$p < .10$.
**$p < .05$.
Notes: Fit statistics: χ^2 (d.f.) = 2044.09 (862), $p < .05$; NFI = .96; RFI = .95; IFI = .97; TLI = .97; and RMSEA = .07.

orientation and NP creativity, and competitor orientation and MP creativity) failed to reach the desired significance level. Overall, H_{1b}, H_{3a}, and H_{3b} are supported, whereas H_{1a}, H_{2a}, and H_{2b} are rejected.

Third, H_4 posits a positive influence of NP and MP creativity on three dimensions of NP success. Our estimation results show that all paths from NP creativity to the three outcome dimensions are significant at the .05 level (β = .31 [s.e. = .21], .34 [s.e. = .24], and .48 [s.e. = .25] for the links between NP creativity and MPO, FPO, and QPO, respectively). Similarly, all paths from MP creativity to the three dimensions of NP success (β = .21 [s.e. = .09], .13 [s.e. = .09], and .15 [s.e. = .08] for the links between MP creativity and MPO, FPO, and QPO, respectively) are significant at the .05 level. Therefore, H_4 is supported.

Fourth, we reassessed the model with the three control variables: market potential, technological turbulence, and firm size.[11] Overall, we find that, in general, the control variables do not influence the three dimensions of NP success at the .05 level (for details, see Appendix B). However, the results indicate that FPO is influenced positively by market potential (β = .10, s.e. = .06) and negatively by technological turbulence (β = –.10, s.e. = .06) at the .05 level.

Model Respecification

Although our ML estimation results indicate strong support for our hypotheses (9 of 12 hypotheses are supported at the .05 level), the lack of good fit reflected by the chi-square test and RMSEA led us to respecify the model further. As part of the measure-development process, we explored the dimensionality of the creativity measure using CFA to provide additional evidence of reliability and validity (Anderson and Gerbing 1988; Gerbing and Anderson 1988). To verify whether novelty and meaningfulness converge into the higher-order construct of creativity, we follow the method that Bollen and Grandjean (1981) recommend. They suggest that the chi-square difference between a measurement model with perfect correlation (for the unidimensional model) and another with freely estimated correlation (for the two-dimensional model) be examined to confirm the convergence of the two dimensions. The measurement models with two separate dimensions fit the data significantly better than do those with one dimension for both NP creativity and MP creativity ($\Delta\chi^2$ = 478.39 [d.f. = 1] for the two dimensions of NP creativity; $\Delta\chi^2$ = 366.60 [d.f. = 1] for the two dimensions of MP creativity). In addition, the ML estimation results (χ^2 = 38.85, d.f. = 19, $p < .05$; NFI = .99; IFI = .99; TLI = .99; CFI = .99; RMSEA = .07) show that all of the coefficient parameters (λs) in the two-dimensional model are statistically significant with high SMCs (i.e., SMC equivalent to R^2; lowest SMC = .54), thus ensuring the convergent validity of the measure (Bagozzi and Yi 1988; Bagozzi, Yi, and Phillips 1991). Thus, in contrast to previous creativity research that employs the average score of the combined dimensions of novelty and meaningfulness (Andrews and Smith 1996; Sethi, Smith, and Park 2001), our empirical results indicate that the two dimensions should be assessed distinctively.

We further examined whether the four dimensions of NP and MP creativity converge into one overarching dimension of creativity in order to explore the possibility of a more parsimonious model with a hierarchical structure. Chi-square difference tests confirm that the first-order condition model fits the data significantly better than does the second-order condition model ($\Delta\chi^2 = T_{\text{second order}} - T_{\text{first order}}$ = 83.41 with 2 d.f.), thus ensuring the discriminant validity of the NP and MP creativity measures (Bagozzi and Edwards 1998). Thus, we find that the measure of NP and MP creativity has better construct validity (Peter 1981) when the novelty and meaningfulness dimensions are separately estimated than when they are combined.

As a result of this testing of the dimensionality of creativity, we conclude that our combined model in Figure 2, Panel A, should be respecified with the four dimensions of NP and MP creativity. This is consistent with Han, Kim, and Srivastava's (1998) component-wise approach. Our CFA also confirms the use of separate dimensions of market orientation, creativity, and NP success. Because prior empirical research on creativity has never separated the effects of novelty and meaningfulness, we do not have an empirical basis for reformulating our hypotheses. In addition, theoretical work on creativity has not proposed differential effects for dimensions of creativity. We thus decided to examine the respecified component-wise model in an exploratory fashion, leaving our hypotheses unchanged.

Figure 2, Panel B, displays the respecified hypothesized links with significant paths and standardized coefficients in the component-wise model. First, all the baseline comparison indexes (NFI [Δ1], IFI [Δ2], RFI [ρ1], and TLI [ρ2]) that are greater than .95 indicate that the respecified model improved its fit to the data from the original model.[12] The chi-square difference test ($\Delta\chi^2$ = 1398.33, Δd.f. = 22) shows that the respecified model (χ^2 = 2044.09, d.f. = 862) in Figure 2, Panel B, fits the data significantly better than does the original model (χ^2 = 3444.42, d.f. = 884) in Figure 2, Panel A. The RMSEA value of .07 also indicates that the model fits the data reasonably well, according to Browne and Cudeck's (1993) cutoff criteria. In addition, reasonably high SMC values (.07 for NP novelty, .15 for NP meaningfulness, .16 for MP novelty, .19 for MP meaningfulness, .18 for MPO, .15 for FPO, and .30 for QPO) indicate that a reasonable amount of variance in the endogenous variables is accounted for by relevant constructs in the model.

H_1 proposes that customer orientation enhances the four dimensions of NP and MP creativity. In contrast to our expectation, the estimation results indicate that customer orientation influences NP novelty significantly but negatively at the .05 level (γ = –.23, s.e. = .13). Customer orientation has a positive relationship with NP meaningfulness at the .10 level (γ = .19, s.e. = .09). The path from customer

[11]Fit statistics for this model are as follows: χ^2 = 3541.88 (d.f. = 1239, $p < .05$), NFI = .93, IFI = .95, RFI = .92, TLI = .95, and RMSEA = .08.

[12]We compared the fit of this final model with correlated measurement and latent errors (χ^2 = 2044.09, d.f. = 862) with that of a baseline model without correlated errors (χ^2 = 2925.78, d.f. = 878). The chi-square difference test shows that this model fits the data significantly better than does the baseline model ($\Delta\chi^2$ = 88.69, Δd.f. = 16).

orientation to MP novelty is not significant (γ = .08, s.e. = .12), whereas customer orientation has a positive impact on MP meaningfulness (γ = .23, s.e. = .11).

H_2 predicts that competitor orientation positively influences NP and MP creativity. The results show that competitor orientation enhances both NP novelty (γ = .33, s.e. = .14) and MP novelty (γ = .23, s.e. = .13) at the .05 level. In contrast, competitor orientation has no impact on either NP meaningfulness (γ = .03, s.e. = .10) or MP meaningfulness (γ = .09, s.e. = .12).

H_3 posits that XFI has a positive impact on NP and MP creativity. The paths from XFI to NP novelty and MP novelty are not significant (γ = .08, s.e. = .12 for NP novelty; γ = .14, s.e. = .12 for MP novelty). However, XFI has a significant, positive impact on both NP meaningfulness (γ = .21, s.e. = .09) and MP meaningfulness (γ = .18, s.e. = .11) at the .05 level.

H_4 posits that both NP and MP creativity positively influence the three dimensions of NP success. The results regarding NP creativity reveal that NP novelty does not affect MPO (β = .10, s.e. = .06) or FPO (β = .03, s.e. = .07), though it does have a positive impact on QPO (β = .17, s.e. = .06) at the .05 level. The estimation results also confirm that NP meaningfulness has a positive impact on MPO (β = .28, s.e. = .08), FPO (β = .32, s.e. = .09), and QPO (β = .41, s.e. = .08). Furthermore, the results regarding MP creativity indicate that no dimension of NP success is influenced by MP novelty (β = –.06, s.e. = .07 for MPO; β = –.05, s.e. = .08 for FPO; β = .01, s.e. = .07 for QPO). The estimation results further confirm that MP meaningfulness has a positive impact on all three dimensions of NP success at the .05 level (β = .28, s.e. = .08 for MPO; β = .16, s.e. = .09 for FPO; β = .14, s.e. = .07 for QPO).

We reassessed the model after we added market potential, technological turbulence, and firm size as control variables (for details, see Appendix C). Fit statistics for this model are as follows: χ^2 = 2654.32 (d.f. = 1226, $p < .05$), NFI = .95, IFI = .97, RFI = .94, TLI = .97, and RMSEA = .06. When the three control variables are added, all the main effects remain the same, except for the path from MP meaningfulness to QPO. This path, which was significant at the .05 level in the initial model, becomes significant at the .10 level (β = .13, s.e. = .07, t = 1.86). We find that market potential does not influence either MPO (β = –.03, s.e. = .05) or FPO (β = .10, s.e. = .06), though it significantly influences QPO (β = .13, s.e. = .05). The significant result for QPO indicates that potential demand for the NP in the target market helps a firm achieve its objective with regard to customer satisfaction and technological advancement. In addition, our results indicate that technological turbulence has no impact on MPO (β = –.09, s.e. = .05) or QPO (β = –.06, s.e. = .05), but it marginally influences FPO at the .10 level (β = –.11, s.e. = .06). Finally, we find that firm size does not influence any of the three dimensions of NP success (β = .01, s.e. = .01 for MPO; β = –.02, s.e. = .01 for FPO; β = .05, s.e. = .01 for QPO).

Direct Effects of Market Orientation

To examine the mediating effects of the four dimensions of NP and MP creativity, we examine whether the direct effect from market orientation to NP success is greater than the mediating effect through NP and MP creativity. The direct impact of market orientation on NP performance is well documented (e.g., Ayers, Dahlstrom, and Skinner 1997; Song and Parry 1997a; Song, Xie, and Dyer 2000; Xie, Song, and Stringfellow 1998). To test the direct path from market orientation to NP success, we added a direct path from each dimension of market orientation to each dimension of NP success one at a time and compared the chi-square difference (with one d.f.) from the model proposed in Figure 2, Panel B (Bagozzi and Yi 1988). Chi-square difference tests show that, in general, the addition of a direct path does not improve the fit significantly at the .05 level (except for two cases, between competitor orientation and FPO and between XFI and MPO). In addition, we compared the magnitude of direct and indirect effects calculated from coefficients when each direct path is added to the restricted model. The results show that the indirect effects thorough NP and MP creativity are more dominant than the direct effect in explaining the total effect between market orientation and NP success (except for the two paths mentioned previously).

Discussion

Our respecified component-wise model in Figure 2, Panel B, shows interesting patterns of significant relationships among the dimensions of market orientation, NP and MP creativity, and NP performance. We find that customer orientation has a positive impact on both NP and MP meaningfulness, though the path from customer orientation to NP meaningfulness is not strong. This means that, in general, the enhancement of customer orientation results in more meaningful marketing programs (e.g., discounts) and new products (e.g., faster processing chips). A notable finding is the negative impact of customer orientation on NP novelty. It appears that enhancing customer orientation is less likely to help a firm create novel products, because current customers may not approve novel product ideas because of their inertia toward existing products in the market. However, the insignificant effect of customer orientation on MP novelty implies that a firm's effort to monitor customers' needs and expectations does not lead to the generation of novel MPs.

In relating competitor orientation to creativity, we find that enhancing competitor orientation results in improving novel dimensions of NPs and MPs but not meaningful dimensions of them. This indicates that a firm that carefully monitors competitors' activities tends to produce novel but not meaningful products and programs. We also find that XFI significantly influences meaningful dimensions of NPs and MPs but not novel dimensions of them. A firm that emphasizes the importance of interactions across different departments encourages NP team members to remove the sources of meaningless NPs and MPs and thus accumulate intelligence to enhance their value and usefulness. This result is consistent with previous findings that XFI results in providing creativity through problem solving in meaningful and efficient ways (e.g., Song and Parry 1997a; Van de Ven 1986; Zaltman, Duncan, and Holbek 1973).

In contrast, the insignificant effect of XFI on NP and MP novelty is an indication that NP teams' efforts to produce novel and radical NPs and MPs have been suppressed by

opinions from other functional groups. New product teams with high XFI are less motivated to take risks in generating novel and unique ideas, which other functional groups often consider "weird." Our interpretation is that they tend to indulge in groupthink or to exhibit a social loafing effect, which yields a poor search for alternatives and information on novel stimuli (Hogg 1992; Sethi, Smith, and Park 2001; Woodman, Sawyer, and Griffin 1993). In addition, our analysis of the relationship between market orientation and NP success shows that the indirect effect through creativity is more dominant than the direct effect, thus supporting our specification of creativity as a mediator.

We further examine empirical evidence on whether creativity enhances NP success at the NP team level. We also find differential effects between the dimensions of NP and MP creativity and NP performance. In linking novelty and NP performance, five of the six paths from NP and MP novelty to NP success are not significant. In general, these findings imply that an increase in novel features of NPs or MPs does not influence NP success in terms of market, financial, or qualitative performance. Finally, one of the more important results of this study is the finding that both NP and MP meaningfulness positively influence MPO, FPO, and QPO. These empirical findings suggest that the patterns of differential effects for NP success in terms of market, financial, and qualitative performance are driven by the increases in valuable and meaningful attributes of NPs and MPs, not by novel ones.

Theoretical Implications

First, our research demonstrates that novelty and meaningfulness should be examined separately rather than combined into a single creativity construct, as has been done in prior empirical research. Our component-wise model that separates novelty and meaningfulness (in Figure 2, Panel B) provides a clear theoretical explanation of the mediating role of the different dimensions of creativity with a significantly better fit to the data. Consistent with Amabile (1983, 1988), we find that meaningfulness and novelty are distinct, separate dimensions of creativity. We reached this finding through a rigorous measure-development and validation process. As a result, our research contributes to the conceptualization and measurement of creativity in the NPD and launch contexts by developing and validating NP and MP creativity measures.

Second, this study suggests that creativity of MPs should be considered in addition to the creativity of NPs themselves. By supporting the importance of MP creativity, our study implies the need to examine the influence of "augmented elements" of products on NP strategy (Levitt 1980). Creative MPs play a critical role in commercializing products in the implementation stage through meaningfully novel promotion, pricing, distribution, and services (Cooper 1979), whereas NP creativity plays a critical role in generating new ideas in the initiation stage of NPD.

Third, the methodological approaches used to test the model of creativity provide guidelines for further NPD research. We used the two-stage sampling frame with dual informants to avoid the common method bias and the causal attributions caused by measuring the two related constructs, such as creativity and NP success, by one respondent (e.g., Olson, Walker, and Ruekert 1995).

Managerial Implications

First, managers should evaluate the trade-offs between the positive and negative effects of market orientation on creativity instead of assuming that market orientation is a panacea for enhancing creativity. The inconsistent claims about the market orientation and innovation link from previous studies may be because novelty and meaningfulness as key determinants of innovation had not been examined separately in their relationships with dimensions of market orientation. When a firm works to listen and respond to the customer's voice and to interact closely in order to share information across functional groups, it tends to provide meaningful products and programs (though not novel ones). In contrast, a firm that works to monitor competitors' activities tends to provide novel products and programs because it focuses on more salient and novel features.

Second, NP success tends to be driven more by the meaningfulness dimensions of NPs and MPs than by their novelty dimensions. By examining the differential effects of NPs and MPs, we empirically find that meaningfulness is more important than novelty in helping a firm achieve its desired financial and market goals. From our respecified component-wise model, it is important to note that the significant relationship between creativity and NP success is driven by the strong effects from meaningfulness dimensions, not from novelty dimensions of NP and MP.

Third, consistent with Christensen's (1997) claim, we find that customer orientation can be detrimental to the generation of novel perspectives for NPs in high-technology firms. However, by and large, this does not matter, because novelty has little effect on NP outcomes. From a perceptual map perspective, a close focus on competitors may lead a firm to find a novel position in the market (a "hole" in the perceptual map), but such a novel position does not directly affect performance given that the hole may exist because products in this position do not provide meaningful benefits to customers, and thus there is no demand there.

Fourth, the creativity of NPs is more likely to influence NP success than is the creativity of MPs. When we compare standardized coefficients in Figure 2, Panel B, in general, NP novelty and meaningfulness provide a stronger impact on the three factors of NP success than do MP novelty and meaningfulness. To test the differential effects between NP creativity and MP creativity in explaining NP success, we further tested the two models: (1) one that includes the paths only from NP novelty and NP meaningfulness and (2) one that includes the paths only from MP novelty and MP meaningfulness. The SMC (R^2) values for in the first model (MPO = .17, FPO = .16, and QPO = .31) are all greater than those in the second model (MPO = .13, FPO = .09, and QPO = .14), thus supporting the claim that NP creativity explains variances of NP success better than MP creativity does. This implies that consumers tend to recognize novel and meaningful ideas for NPs more saliently than they do those for MPs.

Fifth, MP creativity is important for NP strategy in high-technology firms, as indicated by the significant impact on NP performance, though it is less influential than NP creativity. Despite the tendency to invest more money in NPs,

the importance of a firm's committing resources to creative MPs cannot be overstated. When NPs are introduced, customers evaluate creativity on the basis of not only the creative features of the products themselves but also the creative ideas used in the MPs associated with them. For example, the perceived creativity of the Apple iMac computer may stem as much from the way the product was marketed and launched.

In summary, our findings imply that customer orientation and XFI are the driving forces of NP success through the meaningfulness dimensions of NP and MP creativity, whereas competitor orientation fails to influence NP performance, despite its significant influence on novelty. We further find that the indirect effect through meaningfulness is more dominant than the direct effect from market orientation to NP success, thus providing evidence that the meaningfulness dimensions of creativity mediate the market orientation–NP performance relationship.

Limitations and Future Research Directions

As with any study, our results must be evaluated in light of certain key limitations. The first limitation is related to the choice of sample frame. The selection of firms in high-technology industries for the sampling frame excludes other segments that are involved in providing creative ideas in the NPD and launch processes. Thus, the study of creativity should be extended to other industries, such as consumer goods or services, to help generalize the findings.

Second, although this study provides evidence of how creativity as the necessary determinant of innovation influences performance, it does not examine the direct impact of innovation on performance or the impact of imitation on performance. Follow-up research should consider directly examining innovation and imitation as well as other intangible assets, such as entrepreneurship and "intrapreneurship."

Third, additional variables might be added to the model, such as group or organizational antecedents (e.g., group cohesion, formalization, risk taking, motivation), and other mediators might be included (e.g., product differentiation, competitive advantage, product radicalness). Future decisions about the inclusion of more variables must take into consideration the trade-offs between the need for a parsimonious model and the desire for a comprehensive one.

APPENDIX A
NP and MP Creativity Measure Items and Samples of Other Scale Items

A. NP and MP Creativity: New

NP and MP Novelty (seven-point, four-item scale, Cronbach's α = .89 for NP novelty and .90 for MP novelty)

Compared to your competitors, the new product you selected [or its associated marketing program][a]
- •Is really "out of the ordinary."
- •Can be considered as revolutionary.
- •Is stimulating.[b]
- •Reflects a customary perspective in this industry. (reverse coded)[b]
- •Provides radical differences from industry norms.
- •Shows an unconventional way of solving problems.

NP and MP Meaningfulness (seven-point, four-item scale, Cronbach's α = .91 for NP meaningfulness and .90 for MP 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. Market Orientation (Narver and Slater 1990)

Customer Orientation (seven-point, five-item scale, Cronbach's α = .85)

Our business objectives are driven primarily by customer satisfaction.
We constantly monitor our level of commitment and orientation to serving customers' needs.
Our strategy for competitive advantage is based on our understanding of customers' needs.
Our business strategies are driven by our beliefs about how we can create greater value for customers.
We measure customer satisfaction systematically and frequently.
We give close attention to after-sales service.[b]

Competitor Orientation (seven-point, four-item scale, Cronbach's α = .72)

Our salespeople regularly share information within our business concerning competitors' strategies.
We rapidly respond to competitive actions that threaten us.
Top management regularly discusses competitors' strengths and strategies.
We target customers where we have an opportunity for competitive advantage.

Cross-Functional Integration (seven-point, four-item scale, Cronbach's α = .86)

Our top managers from every function regularly visit our current and prospective customers.[b]
We freely communicate information about our successful and unsuccessful customer experiences across all business functions.
All of our business functions are integrated in serving the needs of our target markets.
All of our managers understand how everyone in our business can contribute to creating customer value.
All functional groups work hard to thoroughly and jointly solve problems.

C. NP Success

Relative sales, relative market share, relative return on investment, or relative profits (seven-point, three-item scale each, Song and Parry 1997a; Cronbach's αs = .89, .91, .91, .92, respectively)

Relative to your firm's other new products, this product is very successful in terms of [sales, market share, return on investment, or profits].[a]
Relative to competing products in the market, this product is very successful in terms of [sales, market share, return on investment, or profits].[a]
Relative to your firm's original objectives for this product, this product is very successful in terms of [sales, market share, return on investment, or profits].[a]

Meeting objectives (seven-point, three-item scale, adapted from Kleinschmidt and Cooper 1991 and Page 1993; Cronbach's α = .77)

Relative to your firm's original objectives for this product, this product is very successful in terms of customer satisfaction.

APPENDIX A
Continued

Relative to your firm's original objectives for this product, this product is very successful in terms of technological advancement.
Relative to your firm's original objectives for this product, this product is very successful in terms of overall performance.

D. Control Variables

Market Potential (seven-point, four-item scale, Song and Parry 1997a; Cronbach's α = .77)
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.[b]
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 (seven-point, three-item scale, Jaworski and Kohli 1993; Cronbach's α = .88)
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 development in our industry are rather minor. (reverse coded)

Firm Size (one-item scale)
The number of employees in a firm.

[a]We evaluated constructs in brackets separately.
[b]We removed these items from the final analysis because of the low item-to-total correlations.

APPENDIX B
Combined Model: Standardized Coefficients (s.e.)
(Estimation Results [N = 312])

		Endogenous Variables				
Structural Model		**NP Creativity**	**MP Creativity**	**MPO**	**FPO**	**QPO**
H_1: Customer orientation		.15 (.05)	.22** (.09)			
H_2: Competitor orientation		.07 (.05)	.12 (.09)			
H_3: XFI		.26** (.05)	.19**(.08)			
H_4: NP creativity				.31** (.21)	.34** (.24)	.48** (.25)
H_4: MP creativity				.21** (.09)	.13** (.09)	.15* (.08)
Control Variables						
Market potential				–.03 (.05)	.10* (.06)	.14** (.05)
Technological turbulence				–.08 (.05)	–.10 (.06)	–.05 (.05)
Firm size			.01 (.01)	–.01 (.01)	.01 (.01)	
SMC (R^2)		.15	.22	.17	.15	.28
Measurement Model						
Customer orientation	CustOri1	.75	MPO	Mpo1	.78	
	CustOri2	.79 (.08)		Mpo2	.87 (.07)	
	CustOri3	.82 (.07)		Mpo3	.86 (.07)	
	CustOri4	.68 (.07)		Mpo4	.85 (.07)	
	CustOri5	.61 (.09)		Mpo5	.84 (.07)	
				Mpo6	.89 (.07)	
Competitor orientation	CompOri1	.67	FPO	Fpo1	.84	
	CompOri2	.80 (.11)		Fpo2	.82 (.05)	
	CompOri3	.69 (.11)		Fpo3	.91 (.05)	
	CompOri4	.54 (.10)		Fpo4	.88 (.05)	
				Fpo5	.82 (.05)	
				Fpo6	.92 (.05)	
XFI	Xfi1	.66	QPO	Qpo1	.80	
	Xfi2	.80 (.10)		Qpo2	.65 (.07)	
	Xfi3	.86 (.11)		Qpo3	.85 (.07)	
	Xfi4	.80 (.10)				
NP creativity	Npn1	.33	Market potential	Mp1	.70	
	Npn2	.34 (.24)		Mp2	.84 (.09)	
	Npn3	.33 (.23)		Mp3	.73 (.08)	
	Npn4	.32 (.22)				
	Npm1	.88	Technological turbulence	Tt1	.77	
	Npm2	.84 (.27)		Tt2	.85 (.06)	
	Npm3	.88 (.28)		Tt3	.83 (.07)	
	Npm4	.79 (.29)		Tt4	.72 (.08)	

APPENDIX B
Continued

Measurement Model		
MP creativity	Mpn1	.61
	Mpn2	.59 (.10)
	Mpn3	.61 (.11)
	Mpn4	.59 (.10)
	Mpm1	.84
	Mpm2	.83 (.09)
	Mpm3	.83 (.09)
	Mpm4	.82 (.09)

*$p < .10$.
**$p < .05$.
Notes: For the measurement model, all standardized coefficients are significant at $p < .05$. Fit statistics: χ^2 (d.f.) = 3442.42 (884), NFI = .92, RFI = .92, IFI = .94, TLI = .94, and RMSEA = .10.

APPENDIX C
Component-wise Model: Standardized Coefficients (s.e.)
(Estimation Results [N = 312])

	Endogenous Variables						
Structural Model	**NP Novelty**	**NP Meaning**	**MP Novelty**	**MP Meaning**	**MPO**	**FPO**	**QPO**
Customer orientation	–.23** (.13)	.19* (.09)	.08 (.12)	.23** (.11)			
Competitor orientation	.33** (.14)	.03 (.10)	.23** (.13)	.09 (.12)			
XFI	.08 (.12)	.22** (.09)	.14 (.12)	.18** (.11)			
NP novelty					.10 (.06)	.03 (.07)	.17** (.06)
NP meaningfulness					.28** (.08)	.32** (.09)	.41** (.08)
MP novelty					–.06 (.07)	–.05 (.08)	.01 (.07)
MP meaningfulness					.28** (.08)	.16** (.09)	.14* (.07)
Control Variables							
Market potential					–.03 (.05)	.10 (.06)	.11** (.05)
Technological turbulence					–.08 (.05)	–.11* (.06)	–.04 (.05)
Firm size					–.01 (.01)	–.01 (.01)	.01 (.01)
SMC (R^2)	.07	.14	.16	.19	.20	.17	.31

Measurement Model						
Customer orientation	CustOri1	.75	MP meaning	Mpm1	.86
	CustOri2	.79 (.09)		Mpm2	.88 (.04)
	CustOri3	.81 (.08)		Mpm3	.84 (.05)
	CustOri4	.68 (.07)		Mpm4	.82 (.05)
	CustOri5	.61 (.09)			
Competitor orientation	CompOri1	.67	MPO	Mpo1	.78
	CompOri2	.80 (.11)		Mpo2	.86 (.07)
	CompOri3	.68 (.11)		Mpo3	.86 (.07)
	CompOri4	.53 (.08)		Mpo4	.85 (.07)
				Mpo5	.84 (.07)
				Mpo6	.89 (.07)
XFI	Xfi1	.65	FPO	Fpo1	.84
	Xfi2	.80 (.10)		Fpo2	.81 (.05)
	Xfi3	.86 (.11)		Fpo3	.91 (.05)
	Xfi4	.81 (.10)		Fpo4	.88 (.05)
				Fpo5	.82 (.05)
				Fpo6	.92 (.05)
NP novelty	Npn1	.75	QPO	Qpo1	.79
	Npn2	.88 (.08)		Qpo2	.66 (.73)
	Npn3	.85 (.08)		Qpo3	.84 (.73)
	Npn4	.76 (.08)			

APPENDIX C
Continued

Measurement Model					
NP meaning	Npm1	.89	Market potential	Mp1	.70
	Npm2	.85 (.05)		Mp2	.84 (.09)
	Npm3	.88 (.05)		Mp3	.73 (.08)
	Npm4	.79 (.05)			
MP novelty	Mpn1	.82	Technological	Tt1	.77
	Mpn2	.83 (.06)	turbulence	Tt2	.85 (.06)
	Mpn3	.84 (.06)		Tt3	.83 (.07)
	Mpn4	.80 (.06)		Tt4	.72 (.08)

*$p < .10$.
**$p < .05$.
Notes: For the measurement model, all standardized coefficients are significant at $p < .05$. Fit statistics: χ^2 (d.f.) = 2659.94 (1226), NFI ($\Delta 1$) = .95, RFI ($\rho 1$) = .94, IFI ($\Delta 2$) = .97, TLI ($\rho 2$) = .97, and RMSEA = .06.

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