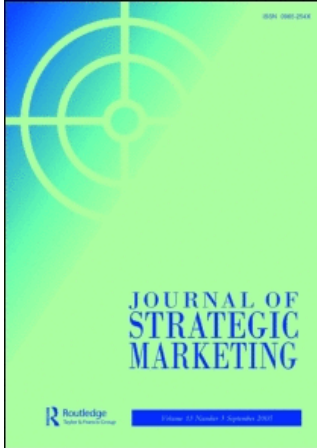


This article was downloaded by:[Swets Content Distribution]  
On: 20 September 2007  
Access Details: [subscription number 768307933]  
Publisher: Routledge  
Informa Ltd Registered in England and Wales Registered Number: 1072954  
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



## Journal of Strategic Marketing

Publication details, including instructions for authors and subscription information:  
<http://www.informaworld.com/smpp/title~content=t713705279>

### The mediating role of new product development in the link between market orientation and organizational performance

Fred Langerak <sup>a</sup>, Erik Jan Hultink <sup>b</sup>; Henry S. J. Robben <sup>c</sup>

<sup>a</sup> Rotterdam School of Management, Erasmus University, Department of Marketing Management, Office T10-16, NL-3000 DR Rotterdam, The Netherlands

<sup>b</sup> Faculty of Industrial Design Engineering, Delft University of Technology, The Netherlands

<sup>c</sup> Center for Supply Chain Management, Nyenrode Business University, The Netherlands

Online Publication Date: 01 September 2007

To cite this Article: Langerak, Fred, Hultink, Erik Jan and Robben, Henry S. J.

(2007) 'The mediating role of new product development in the link between market orientation and organizational performance', Journal of Strategic Marketing, 15:4, 281 - 305

To link to this article: DOI: 10.1080/09652540701525948

URL: <http://dx.doi.org/10.1080/09652540701525948>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article maybe used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

# The mediating role of new product development in the link between market orientation and organizational performance

**FRED LANGERAK\***

Rotterdam School of Management, Erasmus University, Department of Marketing Management, Office T10-16, P.O. Box 1738, NL-3000 DR Rotterdam, The Netherlands

**ERIK JAN HULTINK**

Faculty of Industrial Design Engineering, Delft University of Technology, The Netherlands

**HENRY S. J. ROBBEN**

Center for Supply Chain Management, Nyenrode Business University, The Netherlands

---

**The proficiency in new product development activities may be the key to the conversion of a market-oriented culture into superior organizational performance through better new product performance. To examine this conjecture our study tests hypotheses on the mediating effects of the proficiency in new product development activities and new product performance on the relationship between market orientation and organizational performance. The results from a sample of 126 manufacturing firms present evidence for the mediating roles of the proficiency in commercialization activities and new product performance. These mediating roles are consistent for three moderator variables: technological turbulence, market turbulence and innovation strategy. Together our findings provide a better understanding of how a market-oriented culture leads to superior organizational performance.**

KEYWORDS: Market orientation; innovation; performance

## INTRODUCTION

Market orientation is a business culture that: (1) places the highest priority on the profitable creation and maintenance of superior value for customers while considering the interest of other stakeholders; and (2) provides norms for behaviors regarding the organizational generation of, dissemination of, and responsiveness to market information (Deshpandé, Farley and Webster,

---

\* Corresponding author: Email: flangerak@rsm.nl

1993; Kohli and Jaworski, 1990; Slater and Narver, 2000). Moreover, Hunt and Morgan (1995) state that a market-oriented culture produces a sustainable competitive advantage, and thus, superior long-run organizational performance.

Recently, Kirca, Jayachandran and Bearden (2005) have suggested that a market-oriented culture leads to superior performance, at least in part, because of the new products that are developed and brought to market. They maintain that having a market-oriented culture may lead to general benefits of the firm's marketing activities, but that the ability to develop and market new products, which present the characteristics necessary to be successful, may be critical. Han, Kim and Srivastava (1998) and Baker and Sinkula (1999b) have reinforced this wisdom by revealing that a market-oriented culture enhances organizational innovativeness and new product success, both of which, in turn improve organizational performance. These studies do not reveal through which new product development (NPD) activities a market-oriented culture is converted into superior performance. This is important, however, because it would inform managers about organizational traits through which they can influence new product performance, and hence organizational performance.

To emphasize this importance, our objective is to determine how critical proficiency in NPD is for a market-oriented firm to achieve superior organizational performance through better new product performance. Therefore, our study investigates whether the proficiency in NPD activities and new product performance mediate the relationship between market orientation and organizational performance. We do this by simultaneously investigating the interrelationships among market orientation, the proficiency in NPD activities, new product performance, and organizational performance.

The remainder of this article is structured as follows. Firstly, we review the literature on market orientation and NPD. Then, we present our conceptual model and the hypothesized relationships. Next, we explain the research methodology and review the findings from a sample of 126 manufacturing firms. Finally, we explore managerial implications, limitations and suggestions for further research.

## MARKET ORIENTATION

Homburg and Pflesser (2000) distinguish two complementary perspectives on market orientation: behavioral and cultural. The behavioral stream of market orientation research describes market orientation in terms of specific behaviors related to the generation and dissemination of market intelligence and the firm's responsiveness to it (Kohli and Jaworski, 1990). The cultural stream describes market orientation as a culture that creates an environment that maximizes opportunities for learning about markets, for sharing information among functions in the organization that allows for common interpretations, and for taking coordinated actions (Deshpandé *et al.*, 1993; Slater and Narver, 1994a). The result is an integrated effort on the part of employees and across departments in an organization to create superior value for customers, which, in turn, gives rise to superior organizational performance (Jaworski and Kohli, 1993).

Narver and Slater (1998: 235) emphasize the importance of the cultural perspective in comparison to the behavioral approach: 'If a market orientation were simply a set of activities completely disassociated from the underlying belief system of an organization, then whatever an organization's culture, a market orientation could easily be implanted by the organization any time. But such is not what one observes'. Homburg and Pflesser (2000) emphasize, however, that research within the cultural perspective, although based on a cultural definition of market orientation, typically has conceptualized and measured market orientation in terms of behaviors

related to organization-wide information processing (cf. Deshpandé *et al.*, 1993; Narver and Slater, 1990).

Against this background, we adopt the cultural perspective on market orientation and define it as the organizational culture that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and, thus, superior organizational performance (Narver and Slater, 1990). The basic assumption is that these market-oriented behaviors reflect an underlying organizational culture that creates a setting conducive for effective and efficient organizational activities that lead to the creation of superior value for customers, which in turn results in superior organizational performance.

## MARKET ORIENTATION AND NPD

From a strategic viewpoint a market orientation remains incomplete if we do not understand through which activities a market-oriented culture is transformed into superior value for customers (Han *et al.*, 1998). Unfortunately, these activities have only received scant scholarly consideration. A noteworthy exception is Slater and Narver's (1994b) conceptual study in which they identify NPD as one of the core capabilities that converts a market-oriented culture into superior organizational performance. Their proposition is consistent with literature assuming that culture gives rise to specific organizational structures and processes, which in turn affect the nature and effectiveness of NPD activities and outcomes (Moorman, 1995). Slater and Narver (1994b) selected NPD as the mediating variable for two reasons. Firstly, NPD has emerged as one of the critical strategic concerns of firms in the past decades, as is evidenced by reports of returns on new products accounting for 50% or more of corporate revenues (Han *et al.*, 1998). Second, prior research has indicated that NPD activities and outcomes are strongly influenced by the firm's capability to generate, disseminate and use market information (Griffin and Hauser, 1992). The rationale is that a market-oriented culture, and the associated information processing behaviors, reduces many risks associated with NPD. Not surprisingly, prior research reveals that market orientation is positively related to the number of new products introduced in the market place (Lukas and Ferrell, 2000) and to new product performance (e.g., Pelham and Wilson, 1996).

The empirical support for the mediating role of NPD in the relationship between a market orientation and organizational performance is however limited. Baker and Sinkula (1999b) reveal that a market-oriented culture leads to new product success, which, in turn, leads to superior organizational performance. Likewise, Han *et al.* (1998) show that market orientation enhances both technical and administrative innovations, which in turn improve organizational performance. Although both studies provide support that a market-oriented culture is transformed into superior organizational performance through NPD, they do not reveal through which NPD activities this culture is converted into superior performance. This is important to know because firms typically recognize 14 NPD activities distributed over three stages within the NPD process (see Appendix A).

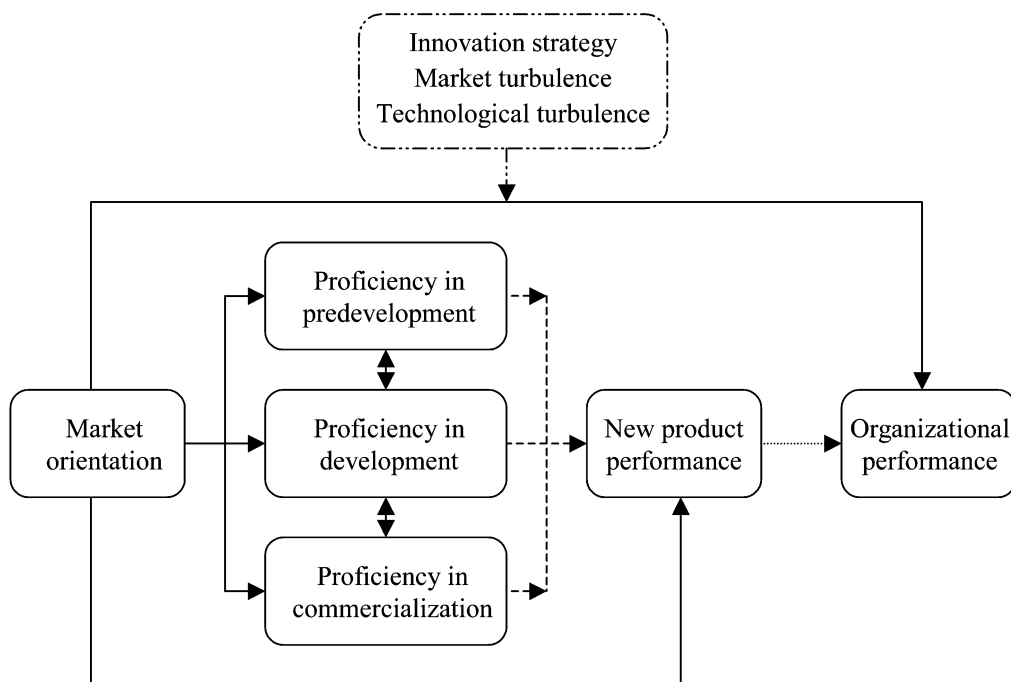
Atuahene-Gima (1996) sheds some light on the role of NPD activities by demonstrating that interfunctional coordination mediates the relationship between market orientation and new product performance. This finding suggests that a market-oriented culture provides a unifying focus for the proficiency in at least one NPD activity within the organization to create superior value for customers and improve new product performance. Gatignon and Xuereb (1997) elaborate on this view by showing that the strategic orientation of the firm, which includes market orientation, leads to superior new product performance, because of the characteristics of

the new product that is brought to market. The definition of these characteristics should be decided within the NPD process (Cooper, 1988).

Although fragmented and inconclusive, the empirical results provided by Atuahene-Gima (1995), Baker and Sinkula (1999b), Gatignon and Xuereb (1997) and Han *et al.* (1998) suggest that the relationship between market orientation and organizational performance depends, at least partly, on the extent to which a market-oriented culture affects the proficiency in NPD activities and new product performance.

**CONCEPTUAL MODEL AND HYPOTHESES**

The review of the literature has led to the development of a conceptual model, shown in Fig. 1, which reveals that proficiency in NPD activities (i.e., predevelopment, development and commercialization) and new product performance mediate the link between market orientation



- Paths estimated in model 1
- Additional paths estimated in model 2 in comparison to model 1
- ..... Additional path estimated in model 3 in comparison to model 2
- .-.-.- Test for moderating effects in model 3

**Figure 1. Testing for the mediating role of NPD in the link between market orientation and organizational performance.**

and organizational performance. The model also proposes that market turbulence, technological turbulence and innovation strategy moderate the relationship between market orientation and organizational performance. We will develop our hypotheses below.

### The mediating role of NPD proficiency

Baker and Sinkula (1999a), Pelham and Wilson (1996) and Slater and Narver (1994a) have shown that market orientation positively affects new product performance. By stating that a market-oriented culture embodies values and beliefs that guide organizational activities enhancing new product performance, these authors implicitly acknowledge the influence of market orientation on NPD activities. For example, Baker and Sinkula (1999a) assert that a market-oriented culture provides a unifying focus for the efforts and projects of individuals and departments in organizations. Similarly, Slater and Narver (1994a) note that market orientation creates the necessary behaviors for creating value for buyers, and thus continuous superior performance. Likewise, Pelham and Wilson (1996) assert that market orientation provides a unifying focus for the efforts and projects of individuals and departments in organizations, thereby leading to superior performance. Such a focus on teamwork is likely to take much of the fuzziness out of NPD, thereby improving the proficiency in NPD activities. Moreover, a market-oriented culture helps to achieve a holistic approach to NPD practices, thereby increasing the likelihood of new product success.

Atuahene-Gima (1995) provides some empirical support for the proposition that a market-oriented culture guides NPD activities by showing that market orientation positively influences the proficiency in idea screening, the training of sales and frontline personnel, post launch evaluation and market testing. Likewise, Troy, Szymanski and Varadarajan (2001) show that a market-oriented culture is positively related to idea generation, because more market information, which typically accrues to the market-oriented firm, is critical for recognizing new market opportunities and initiating creative output.

These results suggest that a market-oriented culture provides a unifying focus for the proficiency in a number of NPD activities within the organization to create superior value for customers through new products. This is important because proficiency in NPD activities is a fundamental requirement for new product performance. For example, Cooper (1979) reports a relationship between new product success and measures of proficiency in screening, preliminary market research, test marketing and launch proficiency. Likewise, Maidique and Zirger (1984: 201) conclude that NPD success is more likely when 'the R&D process is well planned and executed' and when 'the developing organization is proficient in marketing and commits a significant amount of its resources to selling and promoting the product'. Song and Parry (1996) also link measures of new product success to proficiencies in market research and launch. More evidence for the positive impact of proficiency in NPD on new product performance has been provided by, for example, Green, Barclay and Ryan (1995) and Hultink *et al.* (1998).

Based on the conceptual evidence and empirical findings that a market-oriented culture impacts the proficiency in NPD activities, and that proficiency in NPD is a fundamental requirement for new product success, there is no compelling argument as to why market orientation should have a direct effect on new product performance after controlling for its influence on new product performance through proficiency in NPD activities. Thus we hypothesize that:

H<sub>1</sub>: Proficiency in (a) predevelopment, (b) development, and (c) commercialization completely mediates the (positive) relationship between market orientation and new product performance.

### The mediating role of new product performance

To date research has demonstrated that market orientation has a positive effect on organizational performance (e.g., Deshpandé and Farley, 1998; Jaworski and Kohli, 1993; Narver and Slater, 1990; Pelham and Wilson, 1996). Again, the rationale is that a market-oriented culture provides a unifying focus of organizational efforts in the delivery of value to customers while also providing a comparative impetus with competitors' activities (Jaworski and Kohli, 1993). For example, according to Deshpandé and Farley (1998), market orientation represents the set of cross-functional processes and activities directed at creating and satisfying customers through continuous needs-assessment. Likewise, Ruekert (1992) asserts that market orientation provides a unifying focus for the efforts and projects of individuals and departments in organizations, thereby leading to superior performance.

These scholars implicitly acknowledge that market orientation leads to general benefits in the proficiency of all organizational activities and not only the NPD activities. This implies that market orientation should have a direct effect on organizational performance after controlling for market orientation's influence on organizational performance through the proficiency in NPD and new product performance. However, Han *et al.* (1998) and Baker and Sinkula (1999b) have shown that market orientation has no effect on organizational performance after controlling for organizational innovativeness and new product success respectively. This is remarkable because Griffin (1997), for example, reports that new product performance accounts for only one fourth of the variability in organizational performance. Similarly, Terwiesh, Loch and Niederkofler (1998) report that new product performance explains, depending upon the market context, between 30% and 70% of organizational profitability variance. This implies that market orientation should still have an effect on organizational performance after controlling for the proficiency in NPD and new product performance. Thus we hypothesize that:

H<sub>2</sub>: Proficiency in (a) predevelopment, (b) development, and (c) commercialization and new product performance partially mediates the (positive) relationship between market orientation and organizational performance.

### The moderating effects of environmental characteristics and innovation strategy

An important aspect in mediating role of proficiency in NPD and new product performance in the link between market orientation and organizational performance is the consideration of variables that potentially moderate the latter relationship. Following previous studies we concentrate on technological turbulence, market turbulence, and innovation strategy as moderators of the link between market orientation and organizational performance (Jaworski and Kohli, 1993; Slater and Narver, 1994a; Matsuno and Mentzer, 2000).

In a relatively stable market responding to evolving customers wants and focusing on customer satisfaction is likely to have little effect on organizational performance because little adjustments are necessary to cater effectively customer's preferences (Jaworski and Kohli, 1993). In a more turbulent market though, the more enduring organizational performance is maintained by anticipating customers' expressed and latent needs and developing superior solutions to those changing needs. This suggests that in more turbulent markets there is a greater need to be market-oriented (i.e., to track and anticipate to evolving customer preferences) to obtain superior organizational performance than in more stable markets (Slater and Narver, 1994a). Thus we hypothesize that:

H<sub>3a</sub>: Market turbulence strengthens the (positive) relationship between market orientation and organizational performance.

Organizations with nascent technologies that are undergoing rapid change may obtain a competitive advantage through technological innovation, thereby diminishing the importance of a market orientation (*ibid.*). By contrast, organizations with mature technologies are poorly positioned to leverage technology for gaining a competitive advantage and must rely on a market orientation to a greater extent (Jaworski and Kohli, 1993). Therefore:

H<sub>3b</sub>: Technological turbulence weakens the (positive) relationship market orientation and organizational performance.

Matsuno and Mentzer (2000) found Miles and Snow's strategy types to moderate the relationship between market orientation and organizational performance. The underlying logic is that implementing a particular strategy is essentially a process of organizational adaptation to the environment in which market orientation should play a fundamental role. Lambkin's (1988) strategy types of technological innovator and technological imitator are also planned patterns of adaptation with a particular set of organizational performance goals and a perceived market environment in mind. The influence of market orientation on organizational performance should therefore also vary across these strategy types, because a comprehensive analysis of Lambkin's (*ibid.*) strategic types reveals that imitators develop relatively more enduring patterns of behaviors that actively co-align the organization with its changing business environment than innovators. Thus we hypothesize:

H<sub>3c</sub>: The (positive) effect of market orientation on organizational performance is greater for technological imitators than for technological innovators.

## METHODOLOGY

A qualitative research phase preceded the quantitative scale development, data collection and scale validation.

### External validation of the NPD activities

Firms typically recognize 14 NPD activities from idea generation to commercialization. Cooper and Kleinschmidt (1986) investigated 203 NPD projects and found considerable variance across NPD projects in terms of the proficiency in each NPD activity. They discovered that the skeleton of the NPD process was however essentially the same in each project (cf. Crawford and Di Benedetto, 2002). This skeleton consists of three stages: predevelopment, development and commercialization that each consists of a number of NPD activities. We tested the appropriateness of the grouping of the NPD activities in three stages (as shown in Appendix A) by asking eight academic NPD experts to individually perform a sorting task. The experts received fourteen cards representing the different NPD activities that firms employ in developing and commercializing new products. They classified each NPD activity into one of these three stages (see Appendix B). To assess the reliability of the experts' judgments we used the proportional reduction in loss (PRL) approach, the proportion of interjudge agreement, and Cohen's Kappa. The PRL-reliability measure is 0.99, indicating high agreement among the judges (Rust and Cooil, 1994). The proportion of interjudge agreement (0.73) and Cohen's Kappa (0.61) also indicate a high level of agreement among the experts (Fleiss, 1981). Thus the



experts agreed that predevelopment consists of the activities of strategic planning, idea generation, idea screening, and business analysis. Development comprises the activities of concept development, concept testing, prototype development, prototype testing, product development, and product testing. Finally, commercialization involves the activities related to market testing, launch budgeting, launch strategy, and launch tactics. Our classification is consistent with models of NPD found in the literature (cf. Zirger and Maidique, 1990).

### Sample and data collection

The sample consisted of 475 Dutch firms with independent R&D, production and marketing/sales departments in the primary metal, fabricated metal, machinery equipment, electrical equipment, transportation equipment and measuring instruments industries (SIC codes 33 to 38). Through a telephone pre-survey we identified 315 firms. To be eligible, the firms must have had a new product in the market for more than 12 months to ensure that they had sufficient data on the resulting performance data. We specifically targeted products that were representative of the firm's product development program. We defined a new product as a product that was 'new to the firm, but familiar to the market'. This category of new products accounts for between 38% (Kleinschmidt and Cooper, 1991) and 70% (Griffin, 1997) of all new products introduced in the market.

A total of 211 (67.0%) knowledgeable informants willing to cooperate with our research project received a letter explaining the purpose of the study, a questionnaire, and a pre-addressed, postage paid envelope. Non-respondents received a reminder letter and a second questionnaire. These efforts yielded 126 responses, for a final usable response rate of 40.0% (59.7% of those who received a questionnaire). We used a seven-point rating scale (1=not very representative and 7=very representative) to measure the representativeness of the new product for the firm's NPD program. The mean response was 5.10 (s.d.=1.44), thus showing the representativeness of the new product selected by the respondents. A routine check for respondent bias and industry bias indicated no significant differences in the mean responses on any construct across respondents with different functional backgrounds and across firms from different industries. Using a time-trend extrapolation to test for non-response bias, no significant differences were found between early (1st quartile) and late (4th quartile) respondents. Table 1 shows the sample characteristics.

**Table 1. Sample characteristics**

SIC-code:	No. of employees:	Sales in euros ( $\times 10^6$ ):	Respondents:
33	4.8% 26-50	8.7% <7,5	17.5% Marketing/sales manager 21.4%
34	33.3% 51-75	21.4% 7,5-12,5	22.2% R&D manager 19.8%
35	27.8% 76-100	20.6% 12,5-25,0	20.6% Engineering 11.1%
36	13.5% 101-150	8.7% 25,0-37,5	13.5% General manager 11.1%
37	12.7% 151-200	10.3% 37,5-50,0	8.7% New business manager 8.7%
38	7.9% 201-300	11.9% 50,0-75,0	2.4% Product manager 7.1%
	>301	18.3% 75,0-100,0	11.1% Production manager 4.0%
		>100,0	4.0% Others 16.7%

### Level of analysis

This study responds to a call by Drazin and Schoonhoven (1996) for cross-level research. These scholars argue that the strategic orientation of the firm, which includes market orientation, has a vital role to play in the NPD process, and that examining NPD from a cross-level perspective leads to an enhanced understanding of the factors leading to new product performance, and hence organizational performance. Therefore, we examine market orientation and organizational performance at the organizational level, and the proficiency in NPD and new product performance at the project level.

### Measures and pretesting

We generated a pool of items for measuring each of the constructs using literature search and interviews with academics and practitioners. Pretests of these items occurred in two phases: (1) face-to-face interviews with three academics; and (2) face-to-face interviews with five R&D managers and three marketing managers. At each stage, participants identified items that were confusing, tasks that were difficult to respond to, and any other problems they encountered. We revised or eliminated problematic items, and developed new ones. By the end of the second phase of pre-testing the practitioners reported no concerns, and the questionnaire was ready for administration.

We measured the constructs using seven-point multi-item scales drawn from prior studies. Market orientation is a second-order scale that consists of three subscales reflecting the behavioral components of customer orientation, competitor orientation and inter-functional coordination. To measure market orientation we used 22-items adapted from Langerak (2001). The proficiency in predevelopment is a higher order scale consisting of four subscales reflecting the proficiency in strategic planning, idea generation, idea screening, and business analysis. We adapted 19 items from Atuahene-Gima (1995, 1996), Song and Montoya-Weiss (1998), Song and Parry (1997a, 1997b) and Song, Souder and Dyer (1997) to measure the proficiency in predevelopment. The proficiency in development is a higher order scale consisting of six subscales reflecting the proficiency in concept development and testing, prototype development and testing, and product development and testing. We measured the proficiency in development using 23 items adapted from Atuahene-Gima (1995, 1996), Song and Montoya-Weiss (1998), Song and Parry (1997a, 1997b), and Song *et al.* (1997). The proficiency in commercialization is a higher order scale consisting of four subscales reflecting the proficiency in market testing, launch budgeting, launch strategy, and launch tactics. To measure the proficiency in commercialization we adapted 20 items from Hultink *et al.* (1998). NPD performance is a second-order scale consisting of five subscales reflecting the dimensions of market level, financial, customer acceptance, product level and timing measures of NPD success. The 17 items adapted from Griffin and Page (1996) measured new product performance. We measured organizational performance using 6 indicators adapted from Naman and Slevin (1993) and Slater and Narver (1994a). The performance variables were measured relative to those of the firm's relevant competitors. Subjective measures were used because: (1) objective measures were virtually impossible to obtain; (2) subjective measures have been shown to be correlated to objective measures of performance (Dess and Robinson, 1984); and (3) subjective measures have been used in prior market orientation research (Narver and Slater, 1990). We measured technological and market turbulence using three items respectively from Jaworski and Kohli (1993). Finally, we used a self-typing measure

asking respondents to evaluate the NPD strategy of their organization using Lambkin's (1988) distinction between technological innovator and technological imitator. Appendix C contains the scale items.

### Unidimensionality, reliability and validity

To obtain unidimensionality, we calculated the inter-item correlations and corrected item-to-total correlations for each item, taking one scale at a time. We eliminated items for which these correlations were not significant ( $p < 0.01$ ). Principal axis factoring explored the unidimensionality of each purified scale using an eigenvalue of 1.0 and factor loadings of 0.25 as the cut-off points (Steenkamp and Van Trijp, 1991). Computing reliability coefficients explored the reliability of each purified, unidimensional scale. We investigated the convergent validity of the scales by performing a series of confirmatory factor analyses at the first-order and second-order level. Convergent validity was indicated by the fact that in each model the items loaded significantly on the corresponding latent construct, with the first-order factors originating significantly from the second-order factor in the higher-order factor structures. Discriminant validity was obtained because none of the 95% confidence intervals ( $\pm 1.96 \times \text{standard errors}$ ) around all pair-wise correlations encompassed the value of 1.0 (Bagozzi, Yi and Phillips, 1991). Table 2 shows the means, standard deviations, reliability coefficients, average extracted variances and inter-construct correlations.

Together these results indicated a sufficient degree of unidimensionality, reliability and validity. Based on this evidence, we formed the constructs at the first-order level by averaging the responses to each item in a particular scale. Averaging each of the first-order construct scores created the constructs at the second-order level.

## RESULTS AND DISCUSSION

To test hypotheses 1 and 2 we followed Baron and Kenny's (1986) procedure by estimating three models using causal modeling through LISREL 8.3 (see Fig. 1). We used the constructs created

**Table 2. Means, standard deviations, reliability coefficients and correlations**

	Mean:	SD:	1.	2.	3.	4.	5.	6.	7.	8.
1. Market orientation (MO)	5.23	0.66	<i>0.84</i>	–	–	–	–	–	–	–
2. Proficiency predevelopment (PROPRE)	4.51	0.92	0.47	<i>0.87</i>	–	–	–	–	–	–
3. Proficiency development (PRODEV)	5.10	0.95	0.55	0.81	<i>0.94</i>	–	–	–	–	–
4. Proficiency commercialization (PROCOM)	4.54	1.08	0.47	0.67	0.66	<i>0.92</i>	–	–	–	–
5. New product performance (NPD-PERF)	4.91	0.83	0.31	0.46	0.47	0.53	<i>0.88</i>	–	–	–
6. Organizational performance (ORG-PERF)	4.93	0.99	0.28	0.35	0.27	0.38	0.63	<i>0.88</i>	–	–
7. Market turbulence (MKT-TURB)	3.77	1.21	-0.20	0.03	0.03	-0.04	-0.05	-0.28	<i>0.82</i>	–
8. Technological turbulence (TECH-TURB)	3.76	1.48	-0.01	-0.01	-0.00	0.01	0.09	0.12	0.25	<i>0.79</i>

Note: Reliability coefficients *in italics* on the diagonal

for the estimation of the models to obtain a favorable ratio between our sample size and the number of parameters to be estimated. In estimating the models we allowed the proficiency in the predevelopment, development and commercialization to freely covary. This approach is consistent with the stage gate approach to NPD (Cooper, 1994).

In the *first* model we estimated the direct effect of market orientation on the proficiency in predevelopment, development and commercialization, the direct effect of market orientation on new product performance and the direct effect of market orientation on organizational performance. Table 3 presents the estimates and the t-values associated with the estimates. The model resulted in a poor fit to the data ( $\chi^2=86.62$  (df=7); GFI=0.81; NFI=0.76; NNFI=0.50; CFI=0.77; IFI=0.77; RMSEA=0.30). The results reveal that market orientation has a direct positive significant effect on predevelopment proficiency ( $\gamma=0.66$ ,  $p<0.01$ ), development proficiency ( $\gamma=0.80$ ,  $p<0.01$ ), commercialization proficiency ( $\gamma=0.77$ ,  $p<0.01$ ), new product performance ( $\gamma=0.39$ ,  $p<0.01$ ) and organizational performance ( $\gamma=0.43$ ,  $p<0.01$ ). The results also show that proficiency in predevelopment significantly co-varies with proficiency in development ( $\varphi=0.51$ ,  $p<0.01$ ) and commercialization ( $\varphi=0.44$ ,  $p<0.01$ ), and that the proficiency in development co-varies significantly with the proficiency in commercialization ( $\varphi=0.40$ ,  $p<0.01$ ).

The *second* model additionally estimated the direct effect of the proficiency in predevelopment, development and commercialization activities on new product performance. The second model resulted in a moderate, but significantly better ( $\Delta\chi^2_{(3)}=39.5$ ; critical  $\chi^2_{(3)}$  value=16.3) fit to the data ( $\chi^2=47.11$  (df=4); GFI=0.89; NFI=0.84; NNFI=0.43; CFI=0.85; IFI=0.85; RMSEA=0.29) than the first model. The results reveal that market orientation still has a direct positive significant effect on proficiency in predevelopment ( $\gamma=0.66$ ,  $p<0.01$ ), proficiency in development ( $\gamma=0.80$ ,  $p<0.01$ ), proficiency in commercialization ( $\gamma=0.77$ ,  $p<0.01$ ) and organizational performance ( $\gamma=0.43$ ,  $p<0.01$ ), but no significant direct effect on new product performance. Market orientation has, however, an indirect positive significant ( $\beta=0.37$ ,  $p<0.01$ ) effect on new product performance through the positive significant ( $\beta=0.29$ ,  $p<0.01$ ) direct effect of the proficiency in commercialization on new product performance. Thus, we conclude that our results provide support for H<sub>1</sub>. The results also show that proficiency in predevelopment significantly still co-varies significantly with proficiency in the development ( $\varphi=0.51$ ,  $p<0.01$ ) and commercialization ( $\varphi=0.44$ ,  $p<0.01$ ), and that proficiency in the development co-varies significantly with proficiency in commercialization ( $\varphi=0.40$ ,  $p<0.01$ ).

The *third* model additionally estimated the direct effect of NPD performance on organizational performance. This model resulted in a good and significantly better ( $\Delta\chi^2_{(1)}=42.2$ ; critical  $\chi^2_{(1)}$  value=10.8) fit to the data than the second model ( $\chi^2=4.95$  (df=3); GFI=0.99; NFI=0.99; NNFI=0.97; CFI=0.99; IFI=0.99; RMSEA=0.07). The results reveal that market orientation still has a direct positive significant effect on proficiency in predevelopment ( $\gamma=0.66$ ,  $p<0.01$ ), proficiency in development ( $\gamma=0.80$ ,  $p<0.01$ ) and proficiency in commercialization ( $\gamma=0.77$ ,  $p<0.01$ ), but no significant direct effect on new product performance and organizational performance. Market orientation has however an indirect positive significant ( $\beta=0.37$ ,  $p<0.01$ ) effect on new product performance through the direct positive significant ( $\beta=0.29$ ,  $p<0.01$ ) effect of proficiency in commercialization on new product performance. Market orientation also has an indirect positive significant ( $\beta=0.28$ ,  $p<0.01$ ) effect on organizational performance through the direct positive significant effect ( $\beta=0.71$ ,  $p<0.01$ ) of new product performance on organizational performance. Thus, we conclude that our results provide no support for H<sub>2</sub>. The results further show that proficiency in predevelopment still co-varies significantly with proficiency in development ( $\varphi=0.51$ ,  $p<0.01$ ) and commercialization ( $\varphi=0.44$ ,  $p<0.01$ ), and

**Table 3. Results test for mediation**

Model 1:	Direct effect of X on Y:	Indirect effect of X on Y:	Total effect of X on Y:	Covariates and direct effect of Y on Y:*				Indirect effect of Y on Y:			Total effect of Y on Y:			
	MO	MO	MO	PROPRE	PRODEV	PROCOM	NPD-PERF	PROPRE	PRODEV	PROCOM	PROPRE	PRODEV	PROCOM	NPD-PERF
PROPRE	0.66 (5.98)	–	0.66 (5.98)	–	–	–	–	–	–	–	–	–	–	–
PRODEV	0.80 (7.36)	–	0.80 (7.36)	0.51 (6.70)	–	–	–	–	–	–	–	–	–	–
PROCOM	0.77 (5.85)	–	0.77 (5.85)	0.44 (5.34)	0.40 (4.98)	–	–	–	–	–	–	–	–	–
NPD-PERF	0.39 (3.61)	–	0.39 (3.61)	–	–	–	–	–	–	–	–	–	–	–
ORG-PERF	0.43 (3.27)	–	0.43 (3.27)	–	–	–	–	–	–	–	–	–	–	–

Evaluation model 1:  $\chi^2=66.62$  (df=7); GFI=0.81; NFI=0.76; NNFI=0.50; CFI=0.77; IFI=0.77; RMSEA=0.30

Model 2:	Direct effect of X on Y:	Indirect effect of X on Y:	Total effect of X on Y:	Covariates and direct effect of Y on Y:*				Indirect effect of Y on Y:			Total effect of Y on Y:			
	MO	MO	MO	PROPRE	PRODEV	PROCOM	NPDPERF	PROPRE	PRODEV	PROCOM	PROPRE	PRODEV	PROCOM	NPD-PERF
PROPRE	0.66 (5.98)	–	0.66 (5.98)	–	–	–	–	–	–	–	–	–	–	–
PRODEV	0.80 (7.36)	–	0.80 (7.36)	0.51 (6.70)	–	–	–	–	–	–	–	–	–	–
PROCOM	0.77 (5.85)	–	0.77 (5.85)	0.44 (5.34)	0.40 (4.98)	–	–	–	–	–	–	–	–	–
NPD-PERF	0.02 (0.17)	0.37 (4.43)	0.39 (3.61)	0.07 (0.57)	0.13 (1.10)	0.29 (3.53)	–	–	–	–	0.07 (0.57)	0.13 (1.10)	0.29 (3.53)	–
ORG-PERF	0.43 (3.27)	–	0.43 (3.27)	–	–	–	–	–	–	–	–	–	–	–

Evaluation model 2:  $\chi^2=47.11$  (df=4); GFI=0.89; NFI=0.84; NNFI=0.43; CFI=0.85; IFI=0.85; RMSEA=0.29

Notes: The cells contain unstandardized estimates with the t-values between brackets  
 \*PROFPRE, PROFDEV and PROFCOM were allowed to co-vary

Table 3. continued

Model 3:	Direct effect of X on Y:	Indirect effect of X on Y:	Total effect of X on Y:	Covariates and direct effect of Y on Y:*				Indirect effect of Y on Y:			Total effect of Y on Y:			
	MO	MO	MO	PROPRE	PRODEV	PROCOM	NPD-PERF	PROPRE	PRODEV	PROCOM	PROPRE	PRODEV	PROCOM	NPD-PERF
PROPRE	0.66 (5.98)	–	0.66 (5.98)	–	–	–	–	–	–	–	–	–	–	–
PRODEV	0.80 (7.36)	–	0.80 (7.36)	0.51 (6.70)	–	–	–	–	–	–	–	–	–	–
PROCOM	0.77 (5.85)	–	0.77 (5.85)	0.44 (5.34)	0.40 (4.98)	–	–	–	–	–	–	–	–	–
NPD-PERF	0.02 (0.17)	0.37 (4.43)	0.39 (3.61)	0.07 (0.57)	0.13 (1.10)	0.29 (3.53)	–	–	–	–	0.07 (0.57)	0.13 (1.10)	0.29 (3.53)	–
ORG-PERF	0.15 (1.33)	0.28 (3.30)	0.43 (3.27)	–	–	–	0.71 (8.19)	0.05 (0.57)	0.09 (1.09)	0.21 (3.24)	0.05 (0.57)	0.09 (1.09)	0.21 (3.24)	0.71 (8.19)

Evaluation model 3:  $\chi^2=4.95$  (df=3); GFI=0.99; NFI=0.99; NNFI=0.97; CFI=0.99; IFI=0.99; RMSEA=0.07

Notes: The cells contain unstandardized estimates with the t-values between brackets

\*PROFPRE, PROFDEV and PROFCOM were allowed to co-vary

that proficiency in development co-varies significantly with proficiency in commercialization ( $\rho=0.40$ ,  $p<0.01$ ).

To test hypothesis 3 we used multi-group analysis. We split the sample into two groups for the moderating variables using the median for market turbulence and technological turbulence and the categories for the innovation strategies. We estimated an equality constraint model (i.e., the parameters were constrained to be equal across subgroups) and a free model (i.e., the parameters indicative of the links between market orientation and new product performance and between market orientation and organizational performance were allowed to be different across subgroups). We conducted a pair wise comparison between these models using the significance of the  $\Delta\chi^2$  as a test for the equality of the parameters, that is, whether the equality-constrained model produced a better fit than the free model. Table 4 shows the  $\Delta\chi^2$  statistics for both models and the estimates of the performance effects of market orientation for both groups in the free model.

The first pair-wise comparison was between low (group 1) and high (group 2) technological turbulence. The  $\chi^2$  was 80.40 for the equal- $\gamma$  model and 78.71 for the free- $\gamma$  model. The  $\Delta\chi^2_{(1)}$  was 1.99 and thus not significant. Moreover, the analysis of the free model with separate estimation of the market orientation-organizational performance effects results in two non-significant estimates. Thus  $H_{3a}$  is not supported. The second pair-wise comparison was between low (group 1) and high (group 2) market turbulence. The  $\chi^2$  was 116.35 for the equal- $\gamma$  model and 104.69 for the free- $\gamma$  model. The  $\Delta\chi^2_{(1)}$  was 11.16, and thus significant. However, the analysis of the free model results in two non-significant estimates:  $\gamma=0.10$  (group 1) and  $\gamma=0.05$  (group 2). Thus we find no support for  $H_{3b}$ . The third pair-wise comparison was between technological innovators (group 1) and technological followers (group 2). The  $\chi^2$  was 35.86 for the equal- $\gamma$  model and 34.91 for the free- $\gamma$  model. Thus the  $\Delta\chi^2_{(1)}$  of 0.95 was not significantly different. Again the separate estimation of the market orientation-organizational performance effects results in two non-significant estimates. Thus  $H_{3c}$  is not supported by our findings. The absence of moderating effects is, on the one hand, surprising because executive judgments suggest that market characteristics and innovation strategies are likely to moderate this relationship. On the other hand our results are not entirely unexpected in light of the non-significant and mixed findings in prior market orientation research (e.g., Jaworski and Kohli, 1993; Slater and Narver, 1994a; Subramanian and Gopalakrishna, 2001).

**Table 4. Results test for moderation**

Moderator:	Equality constraint model:	Free model:	Chi-square difference:*	Unstandardized estimates and t-values between brackets of free model:
Technological turbulence	$\chi^2=80.40$ df=28	$\chi^2=78.71$ df=27	$\Delta\chi^2=1.99$ $\Delta df=1$	Group 1: 0.12 (1.62) Group 2: 0.05 (0.72)
Market turbulence	$\chi^2=116.35$ df=28	$\chi^2=104.69$ df=27	$\Delta\chi^2=11.66$ $\Delta df=1$	Group 1: 0.10 (1.35) Group 2: 0.05 (0.58)
Innovation strategy	$\chi^2=35.86$ df=28	$\chi^2=34.91$ df=27	$\Delta\chi^2=0.95$ $\Delta df=1$	Group 1: 0.14 (1.87) Group 2: 0.13 (1.62)

Note: Critical  $\Delta\chi^2_{(1)}$  value is 6.63 at the 1% level

## DISCUSSION AND IMPLICATIONS

A first relevant finding is that our study reveals that a market-oriented culture enhances the proficiency in predevelopment, development and commercialization. The implication is that management can influence the efficiency and effectiveness of NPD activities by investing in organizational programs that enhance the market-oriented culture of the firm. This is important because proficiency in commercialization is positively associated with new product success. Although proficiency in predevelopment and development has no direct association with new product performance, managers must resist the temptation to pay less attention to these stages, because our findings demonstrate that the proficiency in predevelopment, development and commercialization are closely interrelated. This risk is however negligible, because our results show that a market-oriented culture supports the proficiency in predevelopment, development and commercialization.

Secondly, our finding that proficiency in commercialization is positively associated with new product performance reveals that by improving the proficiency of these activities firms can greatly increase the likelihood of new product success. The implication is that managers should pay particular attention to the launch activities of the NPD process. A market-oriented culture supports this managerial emphasis through the processes of gathering, interpreting, and using market information (Cooper, 1988). Although proficiency in predevelopment and development has no direct association with new product performance, managers must again resist the temptation to neglect these activities, because it is clear that the preceding activities of predevelopment and development have an indispensable role to play. It is as if there is a cascading effect present here: proficiency in predevelopment and development is a necessary condition for the final effect to occur, namely that of proficiency in commercialization on new product performance.

Thirdly, our findings show that market orientation's influence on new product performance is channeled through the proficiency in commercialization. An explanation might be that commercialization is predominantly the responsibility of the marketing department, whereas the predevelopment and development stages are often in control of R&D and engineering. The marketing department usually holds stronger beliefs about the importance of a market-oriented culture than employees from the R&D and engineering department. This way a market-oriented culture may have a greater influence on new product success through proficiency in commercialization than through proficiency in predevelopment and development. To further increase the likelihood of new product success through these stages as well, managers should ensure that programs that enhance a market orientation are implemented and embedded across all stages of the NPD process, and make sure that market orientation is not solely the responsibility of the marketing department.

Fourthly, our findings reveal that market orientation's influence on organizational performance is channeled through proficiency in commercialization and new product performance. This implies that the influence of market orientation on organizational performance is not pervasive to other organizational processes and activities besides NPD. An explanation might be that NPD is the one element of the marketing mix that is predominantly the responsibility of the firm, whereas promotion and distribution are often in control of organizations outside the firm (e.g., advertising agencies, retailers), and the channel or market often dictates the price (Baker and Sinkula, 1999b). This finding therefore provides a caution to managers because they indicate that a market-oriented culture provides no cost efficiencies for other organizational processes and activities, besides NPD, and does not enhance the profitability, sales and customer use of existing products.



A fifth finding worthy noting is that new product performance has a positive effect on organizational performance. This reaffirms that firms cannot depend on their current product offerings only to meet their sales and profit objectives. However important many new products do not succeed in the market place (Hultink *et al.*, 1998). This underlines the importance for managers to invest in creating a market-oriented culture to improve organizational performance through greater proficiency in NPD.

A final finding is that market turbulence, technological turbulence and innovation strategy do not moderate the relationship between market orientation and organizational performance. These findings lend support to the notion that the influence of market orientation on organizational performance is always completely channeled through the proficiency in commercialization and new product performance. This means that regardless of market characteristics and innovation strategy it is always worthwhile for firms to invest in creating a market-oriented culture to improve organizational performance through increased commercialization proficiency and new product performance.

## CONCLUSION

The objective of this study was to investigate how critical proficiency in NPD and new product performance are for market-oriented firms to achieve superior organizational performance. We have shown that the influence of market orientation on organizational performance is completely channeled through proficiency in NPD and new product performance. This shows that market orientation influences organizational performance in a much more subtle and complex, but manageable way, than has hitherto been presumed in the marketing and NPD literatures.

## STUDY LIMITATIONS AND FURTHER RESEARCH

This study is limited by several factors that should be addressed in future research. Firstly, although the study included data from firms in different industries, the relationships should be tested with other independent samples. Secondly, data for this study were collected using the key informant approach, which precludes a thorough analysis of validity and measurement error issues. It would be interesting to use multiple respondents in future research. Thirdly, our data on dependent and independent variables were collected on same style scales, which may have caused common method bias. Although this bias was not found using the Harman's one-factor test, future research should consider using different source data. Fourthly, it is possible that some of the subjective measures of performance may not be an accurate representation of true performance levels. Subsequent studies should employ both objective as well as subjective assessments. Fifthly, our study used a single, representative new product. Future research may consider using data on multiple new products embedded within the firms' NPD program. Sixthly, we focused on products new to the firm, but familiar to the market. Future research may consider focusing on products that span the full range of newness to avoid possible problems related to the use of classifications. Seventhly, our study focused on the mediating effect of proficiency in NPD and new product performance. Given that other organizational processes and activities are also likely to influence organizational performance, there might be some bias in the parameter estimates. Future research should therefore include other organizational processes and activities. Eighthly, although our causal inferences are grounded in an extant theoretical framework, the results need to be confirmed by longitudinal studies. Finally, this study modeled NPD process with distinct

activities. Future research may consider modeling this phase with overlapping activities, and fuzzy go decisions at different stages.

## REFERENCES

- Atuahene-Gima, K. (1995) An exploratory analysis of the impact of market orientation on new product performance: a contingency approach. *Journal of Product Innovation Management* **12**(4), 275–93.
- Atuahene-Gima, K. (1996) Market orientation and innovation. *Journal of Business Research* **35**(2), 93–103.
- Bagozzi, R.P., Yi, Y. and Phillips, L.W. (1991) Assessing construct validity in organizational research. *Administrative Science Quarterly* **36**(3), 421–58.
- Baker, W.E. and Sinkula, J.M. (1999a) The synergistic effect of market orientation and learning orientation on organizational performance. *Journal of the Academy of Marketing Science* **27**(4), 411–27.
- Baker, W.E. and Sinkula, J.M. (1999b) Learning orientation, market orientation, and innovation: integrating and extending models of organizational performance. *Journal of Market Focused Management* **4**, 295–308.
- Baron, R.M. and Kenny, D.A. (1986) The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* **51**(6), 1173–82.
- Cooper, R.G. (1979) The dimensions of industrial new product success and failure. *Journal of Marketing* **43**, Summer, 93–103.
- Cooper, R.G. (1988) Predevelopment activities determine new product success. *Industrial Marketing Management* **17**(2), 237–48.
- Cooper, R.G. (1994) Third-generation new product processes. *Journal of Product Innovation Management* **11**(1), 3–14.
- Cooper, R.G. and Kleinschmidt, E.J. (1986) An investigation into the new product process: steps, deficiencies, and impact. *Journal of Product Innovation Management* **3**(2), 71–85.
- Cooper, R.G. and Kleinschmidt, E.J. (1994) Screening new products for potential winners. *IEEE Transactions on Engineering Management* **22**(4), 24–30.
- Crawford, C.M. and Di Benedetto, C.A. (2002) *New Products Management*, 7th Edn, Homewood, IL: Irwin.
- Deshpandé, R. and Farley, J.U. (1998) Measuring market orientation: generalization and synthesis. *Journal of Market Focused Management* **2**(3), 213–32.
- Deshpandé, R., Farley, J.U. and Webster, F.E. (1993) Corporate culture, customer orientation and innovativeness in Japanese firms: a quadrad analyses. *Journal of Marketing* **57**, January, 23–37.
- Dess, G.G. and Robinson, R.B. (1984) Measuring organizational performance in the absence of objective measures: the case of the privately held firms and conglomerate business units. *Strategic Management Journal* **5**(3), 265–73.
- Drazin, R. and Schoonhoven, C.B. (1996) Community, population, and organization effects on innovation: a multilevel perspective. *Academy of Management Journal* **39**(5), 1065–83.
- Fleiss, J.L. (1981) *Statistical Methods for Rates and Proportions*, 2nd Edn, Chichester: Wiley.
- Gatignon, H. and Xuereb, J.M. (1997) Strategic orientation of the firm and new product performance. *Journal of Marketing Research* **34**, February, 77–90.
- Green, D.H., Barclay, D.W. and Ryan, A.B. (1995) Entry strategy and long term performance: conceptualization and empirical examination. *Journal of Marketing* **59**(4), 1–16.
- Griffin, A. (1997) PDMA Rresearch on new product development practices: updating trends and benchmarking best practices. *Journal of Product Innovation Management* **14**(6), 429–58.
- Griffin, A. and Hauser, J.R. (1992) Patterns of communication among marketing, engineering, and manufacturing: a comparison between two new product teams. *Management Science* **38**, March, 360–73.
- Griffin, A. and Page, A.L. (1996) PDMA success measurement project: recommended measures for product development success and failure. *Journal of Product Innovation Management* **13**(6), 478–96.
- Han, J.K., Kim, N. and Srivastava, R.K. (1998) Market orientation and organizational performance: is innovation a missing link? *Journal of Marketing* **62**, October, 30–45.

- Homburg, C. and Pflesser, C.A. (2000) Multiple-layer model of market-oriented organizational culture: measurement issues and performance outcomes. *Journal of Marketing Research* **37**, November, 449–62.
- Hultink, E.J., Griffin, A., Robben, H.S.J. and Hart, S. (1998) In search of generic launch strategies for new products. *International Journal of Research in Marketing* **15**(3), 269–85.
- Hunt, S.D. and Morgan, R.M. (1995) The comparative advantage theory of competition. *Journal of Marketing* **59**, April, 1–15.
- Jaworski, B.J. and Kohli, A.K. (1993) Market orientation: antecedents and consequences. *Journal of Marketing* **57**, July, 53–70.
- Kirca, Ahmet H., Jayachandran, S. and Bearden, W.O. (2005) Market orientation: a meta-analytic review and assessment of its antecedents and impact on performance. *Journal of Marketing* **69**(2), 24–41.
- Kleinschmidt, E.J. and Cooper, R.G. (1991) The impact of product innovativeness on performance. *Journal of Product Innovation Management* **8**(4), 240–51.
- Kohli, A.K. and Jaworski, B.J. (1990) Market orientation: the construct, research propositions and managerial implications. *Journal of Marketing* **54**, April, 1–18.
- Langerak, F. (2001) Effects of market orientation on the behaviors of salespersons and purchasers, channel relationships, and performance of manufacturers. *International Journal of Research in Marketing* **18**(3), 221–34.
- Lambkin, M. (1988) Order of entry and performance in new markets. *Strategic Management Journal* **9**, Special Issue, 127–40.
- Lukas, B.A. and Ferrell, O.C. (2000) The effect of market orientation on product innovation. *Journal of the Academy of Marketing Science* **28**(2), 239–47.
- Maidique, M. and Zirger, B.J. (1984) A study of success and failure in product innovation: the case of the US electronics industry. *IEEE Transactions on Engineering Management* **31**(4), 192–203.
- Matsuno, K. and Mentzer, J.T. (2000) The effects of strategy type on the market orientation–performance relationship. *Journal of Marketing* **64**, October, 1–16.
- Moorman, C. (1995) Organizational information processes: cultural antecedents and new product outcomes. *Journal of Marketing Research* **32**, August, 318–35.
- Naman, J.C. and Slevin, D.P. (1993) Entrepreneurship and the concept of fit: a model and empirical tests. *Strategic Management Journal* **14**, February, 137–53.
- Narver, J.C. and Slater, S.F. (1990) The effect of market orientation on business profitability. *Journal of Marketing* **54**, October, 20–35.
- Narver, J.C. and Slater, S.F. (1998) Additional thoughts on the measurement of market orientation. *Journal of Market Focused Management* **2**(1), 233–6.
- Pelham, A.M. and Wilson, D. (1996) A longitudinal study of the impact of market structure, firm structure, strategy and market orientation culture on dimensions of small firm performance. *Journal of the Academy of Marketing Science* **24**(1), 27–43.
- Ruekert, R.W. (1992) Developing a market orientation: an organizational strategy perspective. *International Journal of Research in Marketing* **9**, August, 225–45.
- Rust, R.T. and Cooil, B. (1994) Reliability measures for qualitative data: theory and implications. *Journal of Marketing Research* **31**, February, 1–14.
- Slater, S.F. and Narver, J.C. (1994a) Does competitive environment moderate the market orientation–performance relationship? *Journal of Marketing* **58**, January, 46–55.
- Slater, S.F. and Narver, J.C. (1994b) Market orientation, customer value, and superior performance. *Business Horizons* **37**, March–April, 22–8.
- Slater, S.F. and Narver, J.C. (2000) The positive effect of market orientation on business profitability: a balanced replication. *Journal of Business Research* **48**(1), 69–73.
- Song, X.M. and Montoya-Weiss, M.M. (1998) Critical development activities for really new versus incremental products. *Journal of Product Innovation Management* **15**(2), 124–35.
- Song, X.M. and Parry, M.E. (1996) What separates Japanese new product winners from losers. *Journal of Product Innovation Management* **13**(5), 422–39.

- Song, X.M. and Parry, M.E. (1997a) The determinants of Japanese new product successes. *Journal of Marketing Research* **34**, February, 64–76.
- Song, X.M. and Parry, M.E. (1997b) A cross-national comparative study of new product development processes: Japan and the United States. *Journal of Marketing* **61**, April, 1–18.
- Song, X.M., Souder, W.E. and Dyer, B. (1997) A causal model of the impact of skills, synergy, and design sensitivity on new product performance. *Journal of Product Innovation Management* **14**(2), 88–101.
- Steenkamp, J.B.E.M. and Van Trijp, H.C.M. (1991) The use of LISREL in validating marketing constructs. *International Journal of Research in Marketing* **8**(4), 283–99.
- Subramanian, R. and Gopalakrishna, P. (2001) The market orientation–performance relationship in the context of a developing economy: an empirical analysis. *Journal of Business Research* **53**(1), 1–13.
- Terwiesh, C., Loch, C. and Niederkofler, M. (1998) When product development performance makes a difference: a statistical analysis in the electronics industry. *Journal of Product Innovation Management* **15**(1), 3–15.
- Troy, L.C., Szymanski, D.M. and Varadarajan, P.R. (2001) Generating new product ideas: an initial investigation of the role of market information and organizational characteristics. *Journal of the Academy of Marketing Science* **29**(1), 89–101.
- Zirger, B.J. and Maidique, M.A. (1990) A model of new product development. *Management Science* **36**(7), 867–83.

## APPENDIX A: DEFINITION OF NEW PRODUCT DEVELOPMENT ACTIVITIES IN THE THREE STAGES

### Predevelopment Stage

#### *Strategic planning*

- Comprises the preliminary assessment of NPD resource requirements, market opportunities and strategic directives.

#### *Idea generation*

- Relates to the generation and elaboration of potential solutions to strategic opportunities.

#### *Idea screening*

- Relates to the evaluation of potential solutions to strategic opportunities.

#### *Business analysis*

- Involves an extensive assessment of the new product's resource requirements, market opportunities, risks and strategic directives.

### Development Stage

#### *Concept development*

- Comprises the execution of the marketing and technical tasks required for converting new product ideas into well-defined customer attributes that fulfill customers' needs and desires.

#### *Concept testing*

- Relates to the activities of alpha testing (i.e., with employees) and beta testing (i.e., with suppliers and customers) of the new product's concept.

#### *Prototype development*

- Relates to the execution of the technical and marketing tasks required for converting the customer attributes into engineering attributes.

#### *Prototype testing*

- Comprise the activities related to alpha and beta testing of the prototype.

#### *Product development*

- Relates to the designing, engineering and building of the product.

#### *Product testing*

- Relates to the in-house and out-house testing of the product.

### Commercialization Stage

#### *Market testing*

- Relates to the activities required for testing the physical product and launch tactics in the target market.

*Launch budgeting*

- Involves a budgeting task required to develop, implement and monitor launch strategy and tactics.

*Launch strategy*

- Involve the tasks required for answering the what, where, when and why to launch questions (e.g., segmenting, targeting and positioning),

*Launch tactics*

- Tasks related to the marketing mix decisions: product tactics, distribution, pricing and promotion.

**APPENDIX B: RESULTS OF THE SORTING TASK**

	Predevelopment Stage:	Development Stage:	Commercialization Stage:	Total	Number of interjudge agreements
<b>NPD Activities:</b>					
• Strategic planning	8	0	0	8	28 (8*7)/2
• Idea generation	8	0	0	8	28 (8*7)/2
• Idea screening	8	0	0	8	28 (8*7)/2
• Business analysis	7	1	0	8	21 (7*6)/2
• Concept development	2	6	0	8	15 (6*5)/2
• Concept testing	1	7	0	8	21 (7*6)/2
• Prototype development	0	7	1	8	21 (7*6)/2
• Prototype testing	0	7	1	8	21 (7*6)/2
• Product development	1	6	1	8	15 (6*5)/2
• Product testing	0	5	3	8	10 (5*4)/2
• Market testing	0	1	7	8	21 (7*6)/2
• Launch budgeting	1	0	7	8	21 (7*6)/2
• Launch strategy	2	0	6	8	15 (6*5)/2
• Launch tactics	0	1	7	8	21 (7*6)/2
					<u>286</u>

Notes: Proportion of interjudge agreement =  $286/392 ((14*8*7)/2) = 0.73$

PRL reliability = 0.99

Cohen's Kappa = 0.61

## APPENDIX C: ITEMS

---

### Instructions

Please use the following scale to indicate your extent of agreement about how well each of the following statements is an accurate description of your firm. Here: 1=strongly disagree, 7=strongly agree.

### Market Orientation

#### *Customer orientation:*

- Our firm gathers information about customers' needs
- Our firm has insight into the buying process of customers\*
- Our firm consults customers to improve the quality of service
- Our firm handles customers' complaints well
- Our firm involves customers in decisions that affect the relationship
- Our firm looks for ways to offer customers more value\*
- Our firm treats customers as partners

#### *Competitor orientation:*

- Our firm knows whether competitors are open to complaints by customers\*
- Our firm knows why customers continue buying from competitors
- Our firm knows whether customers buying from competitors are satisfied\*
- Our firm knows how competitors maintain relationships with customers\*
- Our firm monitors customers buying from competitors
- Our firm knows why customers switch to competitors
- Our firm knows which products competitors offer customers
- Our firm knows in what way competitors attract customers

#### *Inter-functional coordination:*

- Our firm's departments coordinate their contacts with customers
- Our firm's departments jointly satisfy customers' needs
- Our firm's departments are collectively responsible for the relationship with customers\*
- Our firm's departments jointly visit customers' plants\*
- Our firm's departments take decisions that affect the relationship with customers collectively
- Our firm's departments are collectively aware of the importance of the relationship with customers
- Our firm's departments coordinate their activities aimed at customers

### Instructions

The following activities are frequently part of a new product development process. During the development of the new product that you selected, how well was each of the following activities undertaken? Here: 1=done very poorly or mistakenly omitted altogether, 7=done excellently, and numbers between 1 and 7 indicate various degrees of proficiency.

### Predevelopment Stage

#### *Proficiency in strategic planning:*

- Initial assessment of the required investments, time, and risk of the project
- Establishing a timetable for the project
- Determining estimated expenditures for the project
- Scheduling project tasks within the approved budget for the project\*
- Defining team members' responsibilities
- Scheduling project tasks within the approved timetable for the project\*

#### *Proficiency in idea generation:*

- Determining market characteristics and trends
- Determining technological trends
- Involving lead users to generate product ideas
- Involving lead suppliers to generate product ideas\*
- Using brainstorming techniques to generate new product ideas\*

#### *Proficiency in idea screening:*

- Submitting product idea to customers for testing
- Submitting product idea to suppliers for testing
- Submitting product idea to employees for testing
- Interpreting findings from in-house and out-house testing of product idea

#### *Proficiency in business analysis:*

- Conducting a detailed market study
- Identifying appeal characteristics that would differentiate and sell the product.
- Determining required investments, time, and risk of the project
- Establishing milestones for measuring performance and progress

Note: \* Item deleted

---

**Continued****Instructions**

The following activities are frequently part of a new product development process. During the development of the new product that you selected, how well was each of the activities undertaken? Here: 1 = done very poorly or mistakenly omitted altogether, 7 = done excellently, and numbers between 1 and 7 indicate various degrees of proficiency.

**Development Stage***Proficiency in concept development:*

- Expanding the idea into a full product concept
- Determining specifications of the product concept
- Designing the product concept

*Proficiency in concept testing:*

- Selecting customers and suppliers to evaluate product concept\*
- Submitting product concept to customers for testing
- Submitting product concept to suppliers for testing
- Submitting product concept to employees testing
- Interpreting findings from in-house and out-house testing of product concept

*Proficiency in prototype development:*

- Translating the product concept into prototype
- Designing technical specifications prototype
- Designing functional specifications prototype
- Developing the prototype\*

*Proficiency in prototype testing:*

- Submitting prototype to customers for testing
- Submitting prototype to suppliers for testing
- Submitting prototype to employees for testing\*
- Interpreting findings from in-house and out-house testing of prototype

*Proficiency in product development:*

- Determining final specifications of the product
- Designing the product
- Developing the product

*Proficiency in product testing:*

- Submitting product design to customers for testing
- Submitting product design to suppliers for testing\*
- Submitting product design to employees for testing
- Interpreting findings from in-house and out-house testing of product design

**Instructions**

The following activities are frequently part of a new product development process. During the development of the new product that you selected, how well was each of the following activities undertaken? Here: 1 = done very poorly or mistakenly omitted altogether, 7 = done excellently, and numbers between 1 and 7 indicate various degrees of proficiency.

**Commercialization Stage***Proficiency in market testing:*

- Selecting customers for testing market acceptance
- Submitting the product to customers for in-use testing
- Submitting the product to employees for in-use testing\*
- Submitting the marketing program to customers for testing
- Interpreting results from market testing program

*Proficiency in launch budgeting:*

- Determining advertising expenditures
- Determining distribution expenditures
- Determining launch budget
- Allocating the launch budget

*Proficiency in launch strategy:*

- Segmenting the market\*
- Selecting target customer groups
- Selecting the new product's positioning
- Determining launch objectives\*
- Formulating the growth strategy
- Establishing standards to judge new product's performance and market acceptance\*

*Proficiency in launch tactics:*

- Selecting channels of distribution
- Determining the new product's price
- Designing marketing communication mix
- Designing product mix
- Determining role of sales force in launch\*

Note: \* Item deleted



**Continued****Instructions**

Please use the following scale to indicate your extent of agreement about how well the new product you selected has performed on each of the performance indicators mentioned below. Here: 1=very poor and 7=very good.

**New product performance***Market level measures:*

- Unit volume goals\*
- Met revenue goals
- Met sales growth goals
- Met market share goals

*Financial measures:*

- ROI or IRR
- Met profitability goals
- Met contribution margin goals\*
- Development costs

*Customer acceptance measures:*

- Customer acceptance
- Customer satisfaction
- Number of customers\*
- Customer competitive advantage\*

*Product level measures:*

- Met performance specifications\*
- Met quality specifications\*

*Timing measures:*

- Launch on time
- Time-to-market
- Break even time\*

**Instructions**

Please use the following scale to indicate your extent of agreement about how well your firm has performed over the last year relative to competitors on each of the performance indicators mentioned below. Here: 1=very much poorer and 7=very much better.

**Instructions**

Please use the following scale to indicate your extent of agreement about how well each of the following statements is an accurate description of the market environment your firm operates in. Here: 1=strongly disagree, 7=strongly agree.

**Market turbulence**

- In our market customer preferences change quite a bit over time
- In our market customers tend to look for new products all the time
- In our market new customers tend to have needs that are different from those of existing customers

**Technological turbulence**

- In our market the technology is changing rapidly
- In our market it is difficult to forecast where the technology will be in the near future
- In our market technological changes provide big opportunities

**Innovation strategy**

Please indicate which description fits your firm's innovation strategy best:

- Technological innovator
- Technological follower

---

**Continued**

---

**Organizational Performance**

- Sales growth
- Profitability
- New product success
- Sales share new products (i.e., products introduced last 5 years)
- Market share
- ROI or IRR

*Note:* \* Item deleted

---