

RESEARCH NOTES AND COMMENTARIES

WHAT WE WILL DO VERSUS WHAT WE CAN DO: THE RELATIVE EFFECTS OF UNIT-LEVEL NPD MOTIVATION AND CAPABILITY

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Although a firm's innovation performance has been commonly attributed to its innovative capability, in a study of 102 Chinese automobile assemblers, we find that employees' collective motivation for new product development (NPD) is more important than NPD capability in determining firms' innovation performance. This finding suggests that researchers need to simultaneously consider both unit-level capability and unit-level motivation in studying the mechanisms that drive innovation. Furthermore, our results indicate that a firm's strategic orientation focusing on NPD affects its employees' collective NPD motivation and NPD capability through relevant, mediating HRM practices. Copyright © 2013 John Wiley & Sons, Ltd.

INTRODUCTION

Extensive research in strategic management has studied how a firm's knowledge base, which includes individuals' knowledge, skills, and abilities as well as collectively embedded capabilities (Barney, 1991; Kogut and Zander, 1992; Teece, Pisano, and Shuen, 1997), affects firms' innovation performance, such as the success of new product development (Dougherty and Hardy, 1996; Smith, Collins, and Clark, 2005). This emphasis on the knowledge base in explaining sources of sustained competitive advantage is part of a larger 'knowledge movement' that has swept across many of the major management fields (Foss, 2011). However, while a firm with a relevant knowledge base has

the potential to innovate, it has long been recognized that this potential cannot be fully realized unless employees are motivated to engage in innovation-related tasks, both as individuals and as relevant collections of individuals (Ama- bille, 1988; DeShon *et al.*, 2004; Penrose, 1959; Vroom, 1964). Despite its significant role in firm innovation, motivation for innovation has been studied far less than innovation-related knowledge and capabilities in the strategic management literature (Anderson, De Dreu, and Nijstad, 2004; Foss, 2011). Recent strategic management studies have begun to return to considering motivation for innovation, but the limited number of studies primarily focus on individual-level motivation (e.g., Sauermann and Cohen, 2010). In this study, we focus on unit-level motivation for innovation and argue that motivation complements a firm's knowl- edge base in shaping innovation performance.

We focus on innovation in terms of new product development (NPD). Using a multi-respondent

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survey and longitudinal archival data from 102 independent automobile producers in China, our study shows that unit-level NPD motivation has a stronger impact on NPD performance than NPD capabilities. Furthermore, our results indicate that a firm's strategic orientation toward NPD positively influences unit-level NPD motivation by acting through appropriately matched human resource management practices.

THEORY AND HYPOTHESES

In general, innovation is the development and implementation of new ideas regarding a product, process, or service (Van de Ven, 1986). NPD is a specific type of innovation with an emphasis on designing and commercializing new products. NPD has two key characteristics: it is a collective effort and it involves high levels of risk and uncertainty. As many scholars have noted, NPD within firms is less about creating knowledge *de novo* and more about combining dispersed, localized, and often tacit bits of knowledge that exist both within and outside the firm into new wholes (Amabile, 1988). Thus, NPD is an intensely interactive and collective exercise in which a group of individuals share, exchange, and recombine their diverse and complementary knowledge (DeShon *et al.*, 2004; Hargadon and Bechky, 2006). As Van de Ven (1986: 591) observed, 'While the invention or conception of innovative ideas may be an individual activity, innovation (inventing and implementing new ideas) is a collective achievement.' Thus, we conceive of NPD as a unit-level process. Our main unit of analysis is the NPD or R&D unit of a firm, since the personnel within these units are—on a day-to-day basis—directly responsible for NPD tasks such as designing product concepts, producing and testing functional and production prototypes, ramping up production, and receiving customer feedback (Schilling, 2008).

Compared to other collective endeavors in organizations, NPD entails a higher level and a broader range of risks and uncertainties both external to the firm (such as market acceptance, availability of complementary goods, and intellectual property protection) and within the firm (such as technological sophistication and organizational change). As a result, NPD projects tend to have high failure rates. For instance, Stevens and Burley (1997) estimated that it takes about 3,000 raw ideas to produce one successful commercial product.

NPD motivation

Since NPD involves collective effort and entails a significant level of risk, its success depends not just on employees' knowledge and abilities, but also on their motivation to work collaboratively and take on the risks associated with innovation. Although motivation is widely recognized as a key contributor to individual and collective behavior, it has largely been neglected in unit-level innovation studies. Factors motivating individual creativity may not as strongly or directly motivate an NPD unit as a whole (Chen and Kanfer, 2006). In other words, since NPD is a collective phenomenon involving interaction and coordination among a group of individuals, NPD motivation should not be conceptualized as a simple aggregate of individuals' desire to create new ideas. Rather, NPD motivation should be studied at the unit level. We define *unit-level NPD motivation* as the collective motivation of the employees of an NPD unit to collaboratively share and recombine their knowledge and to take risks in order to operationalize new product designs.

Our conceptualization of NPD motivation reflects two key characteristics of NPD: collective effort and willingness to bear risk. The first element of unit-level NPD motivation is employees' collective willingness to work collaboratively in knowledge sharing and recombination, which does not come naturally to all workers. Indeed, a fundamental assumption underlying organization economics (such as agency theory and transaction cost economics) is that individuals' interests are not necessarily aligned with the firms' goals due to 'team production' or 'joint production' problems (Alchian and Demsetz, 1972; Williamson, 1985). The greater the complexity of the collective task, the more likely individuals may shirk or free ride. Moreover, individuals' opportunistic tendencies may be exacerbated in interdependent team tasks due to the difficulty in attributing team outcomes to individuals' contributions. Additionally, individuals may be reluctant to share their specialized knowledge with others since hoarding it gives them intraorganizational bargaining power (Williamson, Wachter, and Harris, 1975). Hence, in order for employees to collaboratively share and recombine their specialized knowledge, the incentives for them to do so must be greater than the payoff from hoarding their knowledge (Chadwick and Dabu, 2009). Beyond these opportunistic

tendencies, individuals may be reluctant to collaborate in NPD due to the challenges related to communication and coordination across functional specialties (Becker, 1964). Although knowledge diversity is a necessary condition for innovation, individuals with different specialized knowledge tend to have divergent perspectives and task identities that may create mistrust and a reluctance for conciliation and integration (Van Der Vegt and Bunderson, 2005). Thus, without the motivation to achieve a common goal, knowledge diversity can hamper knowledge coordination and integration (Flynn and Chatman, 2001).

The second element of NPD motivation is employees' collective willingness to take risks in developing, adopting, or implementing new ideas (Amabile *et al.*, 1996). NPD involves leaving the comfort zone of the status quo and taking on a high level and broad range of uncertainties. Not all employees are natural risk-takers, since '[h]uman beings and their organizations are mostly designed to focus on, harvest, and protect existing practices rather than to pave new directions' (Van De Ven, 1986: 594). The inertia of following well-established practices can overwhelm concerted efforts at NPD (Hannan and Freeman, 1984; Leonard-Barton, 1992). Moreover, both unwittingly and intentionally, firms can punish failed attempts at innovation. Thus, explicit effort has to be made to motivate employees to overcome the risk of uncertainty and failure in NPD (Edmondson, Bohmer, and Pisano, 2001). These efforts encompass both financial and nonfinancial incentives.

In sum, higher levels of NPD motivation enhance employees' engagement in NPD activities and help employees overcome their natural tendencies toward self-interest and risk aversion. Thus, we expect:

Hypothesis 1: Unit-level NPD motivation has a positive impact on firms' NPD performance.

The relative effects of unit-level NPD motivation and NPD capability

In order to effectively create and introduce new products, an NPD unit with strong NPD motivation must also have cognitive capabilities relevant to NPD. We define *NPD capability* as the collective cognitive ability of an NPD

unit's employees to consistently and effectively coordinate their interactions and communications to combine specialized knowledge in order to create and introduce new products. Because NPD is a collective effort, like NPD motivation, we study NPD capability at the unit level.

The distinction between NPD capability and NPD motivation is rooted in the fundamental difference between ability and motivation. Motivation is the psychological feature that arouses an individual to action toward a desired goal and sustains such action, whereas ability is the faculty for perceiving reality and solving problems. Ability and motivation are conceptually distinct in that ability determines what a person *can* do, whereas motivation determines what that person actually *will* do. Similarly, NPD capability determines what an NPD unit can do in terms of creating and introducing new products, whereas NPD motivation determines whether the employees of an NPD unit will unleash their potential and engage in NPD tasks. It is widely accepted that an individual's action is a consequence of both ability and motivation (Locke, 2000). Extending this logic to organizations, scholars from different disciplines—such as strategy (e.g., Penrose, 1959; Gottschalg and Zollo, 2007), organizational behavior (e.g., Vroom, 1964), human resource management (Delery and Shaw, 2001; Huselid, 1995)—have long held that employee ability and motivation are distinct and indispensable determinants of firm performance. In a similar vein, Amabile (1988) has submitted that both the motivation to innovate and the abilities relevant to innovation are necessary components of organizational innovation (Amabile, 1988).

Among most empirical studies regarding firm-level innovation, the causes and effects of firms' innovative capabilities have attracted much more attention than employees' collective motivation for innovation (Anderson, DeDreu, and Nijstad, 2004). A large body of firm-level empirical studies in the strategy and innovation literature has confirmed the positive influence of firms' knowledge assets and capabilities on firm-level innovation (Dougherty and Hardy, 1996; Smith *et al.*, 2005; Somaya, Williamson, and Zhang, 2007). Yet little theoretical and empirical attention has been given to the causes and effects of unit-level NPD motivation. Still, in recent years, a few strategy scholars have begun to theoretically link motivation to

firm-level value creation (e.g., Gottschalg and Zollo, 2007; Osterloh and Frey, 2000).

Indeed, some scholars suggest that motivation can be more important for firm innovation than capabilities (Amabile, 1988; Gottschalg and Zollo, 2007). They argue that while neither motivation nor capability is likely to be easy to create, motivation involves greater causal ambiguity than capability due to its complex connections with human values, needs, goals, and emotions. As a result, motivation is harder to cultivate, more susceptible to damage, and more difficult to imitate than capability. Thus, per resource-based theory, motivation may be a more significant determinant of firm heterogeneity than capability and a stronger determinant of cross-firm variance in innovation performance. In other words, capabilities are a necessary, but not a sufficient, condition for value creation. No amount of abilities can compensate for a lack of motivation, but a high degree of motivation can, to some degree, make up for a deficiency of capabilities (Amabile, 1988).

In a recent study of day-by-day events in innovative firms, Amabile and Kramer (2011) documented the importance of employee motivation in NPD through the following example: Karpenter Corporation, a consumer products company, had been named one of the 10 most innovative and successful companies in America. The employees of one of its NPD units had extensive skills and collective capability in developing new products. However, as they were feverishly working on a new product, a new management team dismissed their ideas and demanded that they work on different tasks. As a result, the team members' motivation for innovative work sapped. Four years later, the company went out of business. What caused this company to fail was not a lack of NPD capability, which did not change much from its previous level in the firm's successful years. Instead, it was the sudden drop in NPD motivation that made the difference in the company's performance. Thus, we expect:

Hypothesis 2: Unit-level NPD motivation has stronger positive impact on firms' NPD performance than unit-level NPD capability.

Theoretic model

Our main focus in this study is the relative effects between NPD motivation and NPD capability. We

do not formally hypothesize the positive direct effect of NPD capability on NPD performance because it has been tested and confirmed in many prior studies (e.g., Dougherty and Hardy, 1996; Smith *et al.*, 2005; Somaya *et al.*, 2007).

We consider a firm's strategic orientation toward NPD as a foundational antecedent to NPD motivation and capability because prior studies have provided evidence of a positive relationship between firms' strategic orientation toward innovation and innovation performance. For example, Dougherty and Hardy (1996) found that when senior managers focus on managing innovation, even large and mature organizations can become sustainably innovative. Jeong, Pae, Zhou (2006) linked firms' strategic orientation focusing on technology development with NPD performance and profitability. Thus, we suggest that strategic orientation focusing on NPD is a key antecedent to unit-level motivation and capability for NPD.

However, strategic orientation cannot enhance unit-level motivation and capability without implementation mechanisms. An important set of implementation mechanisms for a firm's strategic orientation is HRM practices (Miles and Snow, 1984). HRM practices are intended to directly affect employees' motivation and capability, both on an individual level and on the unit level (Chadwick and Dabu, 2009; Lepak *et al.*, 2006). Strategic HRM (SHRM) scholars argue that HRM practices do not affect firm performance in an isolated way, but rather as 'bundles' of inter-related HRM practices. SHRM researchers suggest that HR practices can be grouped into distinct policy domains targeting employee abilities or employee motivation (Delery and Shaw, 2001; Lepak *et al.*, 2006; MacDuffie, 1995). Specifically, hiring and training practices belong to the policy domain aimed at developing employee abilities, while reward and recognition practices are within the policy domain that primarily cultivates employee motivation. In this study, we adopt this categorization and examine two HRM policy domains—(1) staffing and training and (2) rewards and recognition—as mediators between strategic orientation toward innovation and NPD motivation.

As firms' strategic orientations and objectives vary widely, each firm's HRM policies should be designed specifically to aid the achievement of its unique orientation or objective. Therefore, to study how a firm implements the strategic

orientation focusing on NPD, we explicitly focus on the particular HRM policy domains aimed at enhancing NPD originating from the specific group of employees (i.e., the NPD unit) who are expected to directly contribute to NPD. Miles and Snow (1978) suggest that firms with strong focus on product development (i.e., those with a Prospector orientation), usually adopt reward systems that favor R&D. They also indicate that firms with strategic orientations toward product innovation tend to emphasize hiring and promoting R&D experts. Similarly, Schuler and Jackson (1987) point out that firms pursuing competitive strategies of innovation tend to hire individuals with such attributes as creativity, long-term focus, cooperativeness, a greater degree of risk taking, and high tolerance of ambiguity and unpredictability. The training practices of this type of firm tend to focus on broadening the scope of employee skills. Based on this discussion, our model includes links between a firm's strategic orientation toward NPD and the extent of the firm's adoption of two relevant HRM policy domains—(1) staff and training and (2) reward and recognition—in our model.

In general, reward and recognition practices are highly pertinent to employee motivation. Specific to NPD, previous research establishes that rewards and recognition for innovative work increase employees' motivation to engage in such activities (Amabile *et al.*, 1996; Chandler, Keller, and Lyon, 2000). Moreover, Amabile (1988) suggests that reward systems need to generously and equitably recognize innovation performance but not be tied to every detail in the innovation process. To motivate the joint effort among employees needed for NPD, individual rewards must signal recognition for individuals' contributions to collective NPD efforts (Lindenberg and Foss, 2011). Although reward and recognition practices have been mainly linked to employee motivation, they also affect employee capability through encouraging employees' engagement and participation in relevant tasks which, in turn, will allow employees to develop relevant capabilities by doing. Additionally, reward and recognition practices can also increase unit-level NPD capability. For example, an empirical study by Collins and Smith (2006) finds that HRM practices that encourage knowledge sharing among employees enhance social climates of trust and cooperation within the firm which, in turn, lead to more

knowledge exchange and recombination in the firm. Because NPD capability is largely enacted and evolved through learning by doing actual NPD projects (Orlikowski, 2002), reward and recognition practices that encourage NPD efforts will enhance employees' engagement in NPD activities and, consequently, help develop their NPD capability. Based on this discussion, we include the links between the extent of the adoption of relevant reward and recognition practices and NPD motivation as well as NPD capability in our model.

Staffing and training are the most important HRM practices contributing to the attainment and development of employee capabilities (Collins and Smith, 2006; Takeuchi *et al.*, 2007; Youndt and Snell, 2004). Since NPD capability is collective knowledge it needs to be developed through the interactions among the members of the collective after they are brought into the collective through learning by doing (Zhao, Anand, and Mitchell, 2004). A key to cultivating NPD capability is to provide employees with sufficient opportunities to learn how to function together through collective problem solving. Cross-functional training is also helpful in facilitating interactions among individuals with different specialties and strengthening shared knowledge and coordinative routines among them (Gittell, Seidner, and Wimbush, 2009). HRM practices such as job rotation and cross-training may expose individual employees to a broad context of how their skills fit into the overall operation of the organization and, thus, facilitate better knowledge recombination in NPD (Zhao and Anand, 2009). Although a major part of NPD capability has to be developed through doing NPD projects after employees are hired, rigorous staffing can provide a favorable entry condition for units to develop NPD capability later on. For example, hiring people with well-developed interpersonal skills and the ability to work in teams helps develop strong work-oriented relationships which facilitate the development of unit-level NPD capability (Youndt, Subramaniam, and Snell, 2004).

Although staffing and training are commonly deemed by HRM scholars as practices aimed at acquiring and developing human capital, they also help enhance NPD motivation. For example, staffing practices that emphasize person-job fit, person-organization fit, and person-group fit have strong correlations with job satisfaction

and organizational commitment (Kristof-Brown, Zimmerman, and Johnson, 2005). Training can also foster employees' intrinsic motivation for collaboration and knowledge sharing (Ostroff and Bowen, 2000). Training schemes that increase the understanding of how subgoal achievement helps realize higher-order goals are conducive to joint production motivation (Lindenberg and Foss, 2011). Thus, we include the links between NPD relevant staffing and training policy and NPD motivation as well as NPD capability in our model. In sum, we suggest that a firm's strategic orientation toward NPD affects its unit-level NPD motivation and capability through the mediation of different bundles of relevant HRM practices.

METHODS

We chose the incremental NPD activities of Chinese automobile assembly companies as a setting for this study. This research context is well suited for our theoretical purposes. First, emerging economies such as China provide opportunities for examining how competitive resources such as NPD capability and NPD motivation develop from a poor starting point. Second, this setting provides relatively large variance in strategies, managerial practices, and performance due to the lack of isomorphism among firms in an economy that is in an emerging stage of development (Zhao and Anand, 2009). Third, in unstable institutional environments such as emerging economies, firms mostly conduct exploitative or incremental innovation (Hitt, Li, and Worthington, 2005). This type of innovation is more amenable to examining how strategic orientation affects unit-level motivation and capability through HR practices than settings characterized by radical or dynamic innovation; the NPD activities we studied are mostly incremental in nature.

Sample and data collection

Due to the sponsorship of the key planning branch of the Chinese government, both the return rate and the quality of the responses were quite high: with the sponsorship of the National Development and Reform Commission of China and the Chinese Society of Automotive Engineering, we sent out surveys to 105 automotive firms and received

100 percent responses. To mitigate potential social desirability bias, which could be caused by the tendency of respondents to answer questions in a manner that will be viewed favorably by the sponsor of this study, we ensured anonymity and confidentiality to all respondents in the survey process and used a third-party agent to collect the data so that the government sponsor would have access only to the aggregated results and not individual responses. To ensure that our survey questions are properly designed (i.e., that they are not overly demanding, vague, or irrelevant to respondents), we conducted two rounds of discussion and revision of the survey with a team of industry and academic experts. We also ran a small-scale pilot test of the survey among several managers in the Chinese auto industry to root out problems in question design. We eliminated three firms from the responses due to excessive missing data, giving us a working sample of 102 cases.

We adopted a multiple respondent survey approach to avoid common method bias and to gain insights from the individuals who have the best view of different collective-level constructs. As shown in Table 2, strategic orientation focusing on NPD, a firm-level construct, was rated by a senior manager. The unit-level constructs, such as reward and recognition practices focusing on NPD, NPD motivation, and NPD capability, were measured by an NPD manager. Staffing and training emphasizing NPD were rated by an HR manager, since staffing and training decisions are usually controlled by the HR managers in Chinese firms. To validate the managers' responses, we also collected data on these constructs from a key NPD engineer from the same firm. The correlations of all constructs used in this study between the two raters are significant. For the NPD capability construct, the correlation between NPD managers and key NPD engineers is 0.65 ($p < 0.0001$). For the construct of NPD motivation, the correlation between NPD managers and key NPD engineers is 0.53 ($p < 0.0001$).

In addition to this survey data, we also collected longitudinal archival data on NPD revenue and on control variables such as firm age, firm size, return on assets, R&D spending, and foreign equity shares from the China Automotive Technology and Research Center. Our survey data were collected in 2007. NPD revenue, our dependent

Table 1. Construct measurement and confirmatory factor analysis^{a,b}

	α	Standardized loading
Strategic orientation focusing on NPD (Respondent: firm's top manager)	0.84	
Rate the strategic importance of these initiatives:		
1. Develop new product and new technology	0.80	0.80
2. Expand product types and derivatives	0.73	0.73
3. Reduce product development cycle time	0.88	0.88
Reward and recognition practices emphasizing NPD (Respondent: NPD unit manager)	0.87	
Rate the degree to which the following statements describe your unit:		
1. In terms of promotion and salary raises, we give priority to the employees who actively participate in NPD	0.74	
2. We recognize and reward employees for their knowledge-sharing initiatives	0.87	0.87
3. We recognize and reward employees based on our firm's NPD performance	0.77	0.77
Staffing and training practices emphasizing NPD (Respondent: HR manager)		
Rate the degree to which the following statements describe your unit:		
1. We continuously hire talented research and development personnel to meet our NPD needs	0.60	0.69
2. We have a rigorous hiring process to select personnel that fit our NPD tasks		0.62
Training practices	0.87	
1. Our NPD employees get ample opportunities to train in their work-specific skills		
2. Our NPD employees receive training in general skills such as communication and teamwork		
NPD capability (Respondent: NPD unit manager)	0.92	
Rate the degree to which the following statements describe your unit:		
1. Our NPD employees are capable of following an NPD procedure		
2. Our employees have a clear understanding of each other's responsibilities in NPD projects		
3. Our NPD employees from different functional areas are able to coordinate with each other by carrying out concurrent engineering approach of NPD		
4. In the NPD process, different functional departments (e.g., market, product design, technology design, manufacturing, and so on) can promptly and effectively share technical information and personnel resources		0.92
NPD motivation (Respondent: NPD unit manager)	0.74	
Rate the degree to which the following statements describe your unit:		
1. Our NPD employees take the initiative in helping one another to analyze and solve problems in the NPD process		0.43
2. Our NPD employees are not easily satisfied with the status quo and continuously try to make improvement and come up with new ideas		0.77

^a Fit of measurement model: $\chi^2(88) = 182.84$, $\chi^2/\text{df} = 1.37$, CFI = 0.95, IFI = 0.95, RMSEA = 0.060^b All estimates are significant at $p < 0.001$

Table 2. Correlation matrix and summary statistics

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1. Strategic orientation for NPD	4.47	0.66										
2. Reward/recognition practices	3.41	0.98	0.35**									
3. Staffing/training practices	3.90	0.74	0.28**	0.31**								
4. NPD motivation	3.99	0.76	0.33***	0.58***	0.30**							
5. NPD capability	3.70	0.88	0.23***	0.43***	0.32***	0.55***						
6. NPD performance (one year later)	11.11	2.29	0.18	0.29*	0.45***	0.52***	0.57***					
7. Firm age	17.45	16.70	-0.05	-0.04	-0.05	-0.03	0.14	-0.13				
8. Firm size	1.12	0.60	0.06	0.08	0.15	0.21**	-0.03	0.67***	-0.06			
9. ROA (previous year)	0.17	0.13	-0.05	0.11	0.01	0.15	0.04	0.34*	-0.13	0.21		
10. Foreign partner equity share	0.11	0.21	-0.08	-0.10	-0.11	-0.02	-0.02	0.25	-0.21*	0.10	0.20	
11. R&D intensity (previous year)	0.03	0.05	0.16	0.01	0.02	-0.10	-0.06	0.00	-0.05	0.10	-0.01	-0.08

a. * $p < 0.05$;
 b. ** $p < 0.01$ (two tailed)

variable, is archival data collected in 2008. The controls are archival data collected in 2006. These varying collection times across our dependent, explanatory, and control variables help mitigate ambiguity about the direction of causality in the study.

Dependent variable

NPD performance

We use firms' revenue generated from new products as a proxy for NPD performance. The data were collected by the Chinese Automotive Technology and Research Center in 2008, which is one year after our survey data were collected. To ensure a normal distribution of this variable, we employ its natural logarithm in the analysis.

Independent variables

All survey items were measured by five-point Likert scales. Table 2 provides the descriptions and basic statistics for these items. To measure the two unit-level constructs (i.e., NPD motivation and NPD capability), we followed two guidelines provided by Morgeson and Hofmann (1999: 261) to frame our survey questions in collective terms (such as 'our employees' and 'different functional departments') and we chose NPD unit managers as informants for these two unit-level constructs since they have the broad view of the overall patterns of behavior among employees in their units.

NPD motivation

NPD motivation is a unit-level construct. We used two items to capture the two key elements of this construct, i.e., employees' willingness to work collaboratively toward common goals related to NPD and employees' willingness to take risks in developing, adopting, or implementing new ideas.

NPD capability

NPD capability is also a unit-level construct that refers to the coordinative ability among NPD personnel to carry out NPD tasks. We measured this construct with four survey items that focus on the collective phenomena that constitute NPD capability, such as employees' understanding of each

other's responsibility in the NPD process, their ability to carry out NPD procedures and routines, and cross-department coordination abilities.

Control variables

Strategic orientation focusing on NPD

Since this firm-level construct describes the organizational direction of the firm, we chose top managers as informants to answer the questions relevant to this construct. We used three items that cover the strategic importance new products and technology, expansion of product ranges and reduction of NPD cycle times as perceived by top management.

Reward and recognition practices encouraging NPD

Our focus in this unit-level construct is the reward and recognition practices tied to employees' participation in NPD activities and NPD performance, rather than a general performance-based incentive policy as adopted in most of the strategic HRM literature. Since reward and recognition practices tied to NPD-related criteria are more likely to be adopted by an NPD unit than by other units in a firm, we limit this construct to an incentive policy adopted within an NPD unit. As such, we chose the NPD unit manager to be the informant for this construct. The three items measuring this construct cover the extent of incentive, reward, and recognition practices that promote NPD activities and knowledge sharing.

Staffing and training practices emphasizing NPD

Since staffing and training are two HR policies related directly to employee knowledge and tasks (Lepak *et al.*, 2006), we used a second-order construct that combines two sub-constructs: staffing practices and training practices related to NPD employees. We used HR managers as informants for this construct, since, based on our interview with several Chinese managers, we learned that staffing and training practices are usually managed centrally by HR managers.

Other control variables

Since a firm's NPD performance may be positively affected by its available resources (Collins

and Smith, 2006; Schilling, 2008), we control for firm size and prior year's profit (measured in ROA). In a similar vein, we also control for prior year's R&D intensity, which indicates a firm's resource commitment to NPD. In addition, we controlled for firm age because age may be correlated with other, unmeasured constructs pertinent to innovation, such as founders' values and organizational culture. Lastly, we control for foreign equity investment in the firm because multinational firms tend to have greater incentives to transfer knowledge and new product designs to a local affiliate when they have higher equity stakes in the affiliate (Chi and Roebl, 1997; Gomes-Casseres, 1990; Hennart, 1991).

Measurement validity

We conducted a confirmatory factor analysis to validate our specified measurement model. The fit index of our measurement model is satisfactory ($\chi^2 = 182.84$, degree of freedom = 134, CFI = 0.95, IFI = 0.95, RMSEA = 0.060), indicating sufficient fit between the data and the model. All items loaded significantly on the latent construct they were specified to measure.

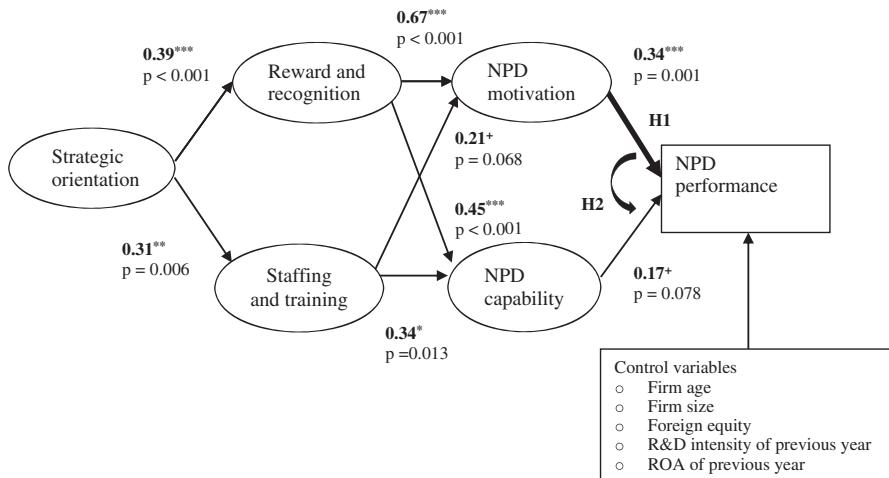
RESULTS

Main model

Table 2 reports descriptive statistics and bivariate correlations for all variables involved in this study. We tested our hypotheses using structural equation modeling, which allows for simultaneous estimation of multiple paths and accounts for measurement errors in the model. The hypothesized model shows a satisfactory fit to the data ($\chi^2 = 258.63$, degree of freedom = 183, CFI = 0.93, IFI = 0.93, RMSEA = 0.064). The model accounts for 68.9 percent of the variance in the dependent variable, NPD performance. Table 3 presents the results for the hypothesized paths. Hypothesis 1, which suggests a positive relationship between NPD motivation and NPD performance, received strong support (standardized estimate = 0.34, $p = 0.001$). We tested Hypothesis 2, which suggests NPD motivation has a stronger effect on NPD performance than NPD capability does, by comparing the estimates of the two relevant coefficients using a two-sample t-test. This hypothesis is strongly supported ($t = 3.49$, degree of freedom = 202,

Table 3. Standardized structural equation parameter estimates of Model 1

Endogenous variables	NPD performance	Reward and recognition	Staffing and training	NPD motivation	NPD capability
Firm age	-0.02 (0.790)				
Firm size	0.63*** (<0.001)				
Foreign equity	0.17* (0.037)				
R&D intensity (previous year)	0.02 (0.806)				
ROA (previous year)	0.11 (0.178)				
Strategic orientation		0.39*** (<0.001)		0.31** (0.006)	
Reward and recognition					0.67*** (<0.001) 0.45** (<0.001)
Staffing and training					0.21+ (0.068) 0.34* (0.013)
NPD motivation	0.34*** (0.001)				
NPD capability	0.17+ (0.078)				

⁺ $p < 0.10$;^{*} $p < 0.05$;^{**} $p < 0.01$ (two tailed) R^2 for NPD performance: 0.69Goodness-of-fit: $\chi^2(183) = 258.63$, $\chi^2/\text{df} = 1.41$, CFI = 0.93, IFI = 0.93, RMSEA = 0.064

Note: Thick arrows represent hypothesized effects; thin arrows represent controlled effects

Figure 1. Main hypothesized model

$p < 0.001$). Table 3 also reports the effect of control variables on NPD performance. Among five control variables, only firm size and foreign equity share showed significant positive effects on NPD performance. For the reader's convenience, these relationships are depicted in Figure 1.

Alternative nested models

To further establish the robustness of our theoretical model (Model 1), we compared this model to some plausible nested models (Bollen, 1989). The first alternative model (Model 2) we tested

contains only the direct path between strategic orientation and NPD performance, including control variables. The chi-square difference test between Model 2 and Model 1 is significant ($\chi^2_{\text{diff}} = 246.83$, $df_{\text{diff}} = 175$, $p < 0.001$), indicating that Model 1 fits the data better than Model 2. The second alternative nested model (Model 3) we tested includes a mediation effect of NPD capability between strategic orientation and innovation performance. This model fits poorly compared to the full model, i.e., Model 1 ($\chi^2_{\text{diff}} = 195.23$, $df_{\text{diff}} = 136$, $p < 0.001$). In the third alternative model (Model 4), we added the two HR constructs to mediate strategic orientation and NPD capability. The chi-square difference test between Model 4 and Model 1 is significant with $\chi^2_{\text{diff}} = 52.32$, $df_{\text{diff}} = 36$, $p = 0.039$, indicating that Model 4 fits the data worse than Model 1. In addition, we tested another alternative model (Model 5) that leaves out the two HR constructs from our full model (Model 1). Model 5 does not fit the data as well as the full Model 1 ($\chi^2_{\text{diff}} = 134.93$, $df_{\text{diff}} = 113$, $p = 0.078$). Finally, we tested a fifth alternative model (Model 6), which was Model 1 without the proximal variables of NPD capability and NPD motivation. Model 6 shows inferior fit compared to the full model ($\chi^2_{\text{diff}} = 165.50$, $df_{\text{diff}} = 99$, $p < 0.001$). In summary, the hypothesized full model (Model 1) fits the data better than all of the alternative nested models we tested, indicating that it is necessary and important to include in the model the motivation construct and its antecedents as specified in this article.

DISCUSSION

In comparing the effects of unit-level NPD motivation and capability, this research makes several theoretical contributions. First, by empirically demonstrating that NPD motivation has a more significant impact on NPD performance than NPD capability in this context, this study expands the resource-based literature, which has focused largely on the link between knowledge assets and firm heterogeneity and has overlooked motivation (Foss *et al.*, 2008). As a ‘knowledge movement’ (Eisenhardt and Santos, 2002) has swept across many of the major management fields (such as organizational theory and strategic management, strategic human resource management, and

innovation studies), it is important to recognize the role of the largely overlooked *motivation* construct as another, if not more important, source of firm competitiveness. Thus, our results add empirical support to recent arguments for motivation’s role in firm competitiveness (e.g., Gottschalg and Zollo, 2007; Osterloh and Frey, 2000).

The juxtaposition of NPD motivation and NPD capability in this article provides a more complete view of the causal mechanisms leading to innovation. Indeed, alternative results (available upon request) suggest that omitting NPD motivation can lead to overstatements of the effects of NPD capability as the latter construct ‘takes the credit’ from the unmeasured NPD motivation. The consequence of this omission could be significant, since it misleads both scholars and practitioners to overly focus on knowledge-based factors and ignore the motivational issues which may, in fact, be more important than ability factors for firm performance.

Second, by studying NPD motivation at the unit level, our study also extends the current focus on individual-level motivation in the innovation and creativity literature. The interactive and interdependent nature of NPD requires NPD employees to share and recombine their knowledge collaboratively. Simply assembling a group of individuals who are intrinsically motivated to undertake innovative tasks cannot ensure a collective motivation among them to share and recombine their knowledge. The interactions among individuals in the NPD process make it necessary to study NPD motivation at a collective or unit level (Morgeson and Hofmann, 1999)—and for firms to practice NPD motivation at that level as well.

Third, our study sheds light on the sources of NPD motivation. Our results demonstrate the role that HRM practices play as mediators between strategic orientation and unit-level NPD motivation and capability. Our study also contributes to the SHRM literature by reinvigorating the study of HRM practices’ antecedents, which has received relatively little attention in recent years. Our results suggest that strategic orientation toward innovation may be a useful antecedent to HRM practices in SHRM research.

This study also bears important implications for practitioners. First, employees’ collective motivation for innovation should be emphasized by managers as much as, if not more than, the employees’ NPD capability. For example, when staffing NPD

employees, our results suggest that firms should go beyond just looking for the most capable individuals; rather, they should try to recruit those who are sufficiently capable, willing to collaborate with others, and willing to take on the risks related to NPD. Second, reward and recognition practices should be carefully crafted since they may have greater impact than staffing and training practices on both NPD motivation and NPD capabilities. In contrast, in our sample, the mean of the construct 'reward and recognition' is significantly lower than that of 'staffing and training' ($p < 0.001$), indicating that on average, firms in our sample focused more on staffing and training than reward and recognition. Thus, our study may help firms appropriately adjust their emphasis in HRM practices aiming at fostering innovation.

This study does have a number of limitations that future research may address. First, since our focus is the comparative effect of unit-level NPD motivation and capability on firm innovation, we do not include an interaction effect between NPD motivation and capability in our model. In our data, these two constructs demonstrate significant additive effects. We conducted some preliminary tests on an interaction effect between NPD motivation and NPD capability, but we were not able to find significant results for this interaction. Further research is needed to examine the interaction between NPD motivation and NPD capability, which has great intuitive appeal, but as our results for this data set suggest, may not apply to all contexts. Second, our sample is limited to the producers of automotive vehicles. This homogeneity is a strength of the analysis because it mitigates extraneous influences that could hamper our ability to make inferences about the relationships we study. However, it also prevents us from investigating the effect of product type on firms' managerial approaches to innovation. Thus, future research could potentially study this issue by employing a wider range of product types.

In this article, we focus on one type of innovation, i.e., incremental NPD, as our empirical setting. We believe our findings may generalize to other types of incremental innovations such as incremental service or process innovation because all three types of innovation share, to varying degrees, the same characteristics: novelty, uncertainty, risk, and the need for collective effort. Moreover, these incremental innovations do not

involve radical changes to firms' core competencies and, thus, do not render existing management practices and firm capabilities obsolete. Since the generalizability of our findings is limited to incremental innovations, we encourage future research to study the causes and effects of innovative motivation in the context of radical innovation.

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REFERENCES

- Alchian AA, Demsetz H. 1972. Production, information costs, and economic organization. *American Economic Review* **62**(5): 777–795.
- Amabile TM. 1988. A model of creativity and innovation in organizations. *Research in Organizational Behavior* **10**: 123–167.
- Amabile TM, Conti R, Coon H, Lazenby J, Herron M. 1996. Assessing the work environment for creativity. *Academy of Management Journal* **39**(5): 1154–1184.
- Amabile TM, Kramer S. 2011. *The Progress Principle: Using Small Wins to Ignite Joy, Engagement, and Creativity at Work*. Harvard Business Press: Boston, MA.
- Anderson N, De Dreu CKW, Nijstad BA. 2004. The routinization of innovation research: a constructively critical review of the state-of-the-science. *Journal of Organizational Behavior* **25**(2): 147–173.
- Barney JB. 1991. Firm resources and sustained competitive advantage. *Journal of Management* **17**(1): 99–120.
- Becker GS. 1964. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. Columbia University Press: New York.
- Bollen KA. 1989. *Structural Equation with Latent Variables*. John Wiley & Sons: New York.
- Chadwick C, Dabu A. 2009. Human resources, human resource management, and the competitive advantage of firms: toward a more comprehensive model of causal links. *Organization Science* **20**(1): 253–272.
- Chandler GN, Keller C, Lyon DW. 2000. Unraveling the determinants and consequences of an innovation-supportive organizational culture. *Entrepreneurship: Theory and Practice* **25**(1): 59–76.

- Chen G, Kanfer R. 2006. Toward a systems theory of motivated behavior in work teams. *Research in Organizational Behavior* **27**: 223–267.
- Chi T, Roehl TW. 1997. The structuring of interfirm exchanges in business know-how: evidence from international collaborative ventures. *Managerial and Decision Economics* **18**(4): 279–294.
- Collins CJ, Smith KG. 2006. Knowledge exchange and combination: the role of human resource practices in the performance of high-technology firms. *Academy of Management Journal* **49**(3): 544–560.
- Delery JE, Shaw JD. 2001. The strategic management of people in work organizations: review, synthesis, and extension. *Research in Personnel and Human Resources Management* **20**: 165–197.
- DeShon RP, Kozlowski SWJ, Schmidt AM, Milner KR, Wiechmann D. 2004. A multiple-goal, multilevel model of feedback effects on the regulation of individual and team performance. *Journal of Applied Psychology* **89**(6): 1035–1056.
- Dougherty D, Hardy C. 1996. Sustained product innovation in large, mature organizations: overcoming innovation-to-organization problems. *Academy of Management Journal* **39**(5): 1120–1153.
- Edmondson AC, Bohmer RM, Pisano GP. 2001. Disrupted routines: team learning and new technology implementation in hospitals. *Administrative Science Quarterly* **46**(4): 685–716.
- Eisenhardt KM, Santos FM. 2002. Knowledge-based view: a new view of strategy. In *Handbook of Strategy and Management*, Pettigrew A, Thomas H, Whittington R (eds). SAGE Publications: London, U.K.; 139–164.
- Flynn FJ, Chatman JA. 2001. Strong culture and innovation: oxymoron or opportunity?. In *International Handbook of Organizational Culture and Climate*, Cooper CL, Cartwright S, Christopher PE (eds). John Wiley & Sons: West Sussex, U.K.; 263–288.
- Foss NJ. 2011. Why micro-foundations for resource-based theory are needed and what they may look like. *Journal of Management* **37**(5): 1413–1428.
- Foss NJ, Klein PG, Kor YY, Mahoney JT. 2008. Entrepreneurship, subjectivism, and the resource-based view: toward a new synthesis. *Strategic Entrepreneurship Journal* **2**(1): 73–94.
- Gittell JH, Seidner R, Wimbush J. 2009. A relational model of how high performance work systems work. *Organization Science* **21**(2): 490–506.
- Gomes-Casseres B. 1990. Firm ownership preferences and host government restrictions: an integrated approach. *Journal of International Business Studies* **21**(1): 1–22.
- Gottschalg O, Zollo M. 2007. Interest alignment and competitive advantage. *Academy of Management Review* **32**(2): 418–437.
- Hannan MT, Freeman J. 1984. Structural inertia and organizational change. *American Sociological Review* **49**: 149–164.
- Hargadon AB, Bechky BA. 2006. When collections of creatives become creative collectives: a field study of problem solving at work. *Organization Science* **17**(4): 484–500.
- Hennart J-F. 1991. The transaction costs theory of joint ventures: an empirical study of Japanese subsidiaries in the United States. *Management Science* **37**: 483–497.
- Hitt MA, Li H, Worthington WJ. 2005. Emerging markets as learning laboratories: learning behaviors of local firms and foreign entrants in different institutional contexts. *Management and Organization Review* **1**(3): 353–380.
- Huselid MA. 1995. The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal* **38**(3): 635.
- Jeong I, Pae JH, Zhou D. 2006. Antecedents and consequences of the strategic orientations in new product development: the case of Chinese manufacturers. *Industrial Marketing Management* **35**(3): 348–358.
- Kogut B, Zander U. 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science* **3**(3): 383–397.
- Kristof-Brown AL, Zimmerman RD, Johnson EC. 2005. Consequence of individuals' fit at work: a meta-analysis of person-job, person-organization, person-group, and person-supervisor fit. *Personnel Psychology* **58**(2): 281–342.
- Leonard-Barton D. 1992. Core capabilities and core rigidities: a paradox in managing new product development. *Strategic Management Journal, Summer Special Issue* **13**: 111–126.
- Lepak DP, Liao H, Chung Y, Harden EE. 2006. A conceptual review of human resource management systems in strategic human resource management research. *Research in Personnel and Human Resources Management* **25**: 217–271.
- Lindenberg SM, Foss N. 2011. Managing joint production motivation: the role of goal framing and governance mechanisms. *Academy of Management Review* **36**(3): 500–525.
- Locke EA. 2000. Motivation, cognition, and action: an analysis of studies of task goals and knowledge. *Applied Psychology: An International Review* **49**(3): 408–429.
- MacDuffie JP. 1995. Human resource bundles and manufacturing performance: organizational logic and flexible production systems in the world auto industry. *Industrial & Labor Relations Review* **48**(2): 197–221.
- Miles RE, Snow CC. 1978. *Organizational Strategy, Structure, and Process*. Stanford University Press: Stanford, CA.
- Miles RE, Snow CC. 1984. Designing strategic human resources systems. *Organizational Dynamics* **13**(1): 36–52.
- Morgeson FP, Hofmann DA. 1999. The structure and function of collective constructs: implications for multilevel research and theory development. *Academy of Management Review* **24**(2): 249–265.
- Orlikowski WJ. 2002. Knowing in practice: enacting a collective capability in distributed organizing. *Organization Science* **13**(3): 249–273.
- Osterloh M, Frey BS. 2000. Motivation, knowledge transfer, and organizational forms. *Organization Science* **11**(5): 538–550.

- Ostroff C, Bowen DE. 2000. *Moving HR to a Higher Level: HR Practices and Organizational Effectiveness*. Jossey-Bass: San-Francisco, CA.
- Penrose E. 1959. *The Growth of the Firm* (1st edn). M. E. Sharpe: White Plains, NY.
- Sauermann H, Cohen WM. 2010. What makes them tick? Employee motives and firm innovation. *Management Science* **56**(12): 2134–2153.
- Schilling MA. 2008. *Strategic Management of Technological Innovation* (2nd edn). New York: McGraw-Hill.
- Schuler RS, Jackson SE. 1987. Linking competitive strategies with human resource management practices. *Academy of Management Executive* **1**(3): 207–219.
- Smith KG, Collins CJ, Clark KD. 2005. Existing knowledge, knowledge creation capability, and the rate of new product introduction in high-technology firms. *Academy of Management Journal* **48**(2): 346–357.
- Somaya D, Williamson IO, Zhang X. 2007. Combining patent law expertise with R&D for patenting performance. *Organization Science* **18**(6): 922–937.
- Stevens G, Burley J. 1997. 3,000 raw ideas equals 1 commercial success!. *Research Technology Management* **40**(3): 67–81.
- Takeuchi R, Lepak DP, Wang H, Takeuchi K. 2007. An empirical examination of the mechanisms mediating between high-performance work systems and the performance of Japanese organizations. *Journal of Applied Psychology* **92**(4): 1069–1083.
- Teece DJ, Pisano G, Shuen A. 1997. Dynamic capabilities and strategic management. *Strategic Management Journal* **18**(7): 509–533.
- Van De Ven AH. 1986. Central problems in the management of innovation. *Management Science* **32**(5): 590–607.
- Van Der Vegt GS, Bunderson JS. 2005. Learning and performance in multidisciplinary teams: the importance of collective team identification. *Academy of Management Journal* **48**(3): 532–547.
- Vroom VH. 1964. *Work and Motivation*. Wiley: New York.
- Williamson OE. 1985. *The Economic Institutions of Capitalism*. Free Press: New York.
- Williamson OE, Wachter M, Harris J. 1975. Understanding the employment relation: the analysis of idiosyncratic exchange. *Bell Journal of Economics* **6**(1): 250–278.
- Youndt MA, Snell SA. 2004. Human resource configurations, intellectual capital, and organizational performance. *Journal of Managerial Issues* **16**(3): 337–360.
- Youndt MA, Subramaniam M, Snell SA. 2004. Intellectual capital profiles: an examination of investments and returns. *Journal of Management Studies* **41**(2): 335–361.
- Zhao ZJ, Anand J. 2009. A multilevel perspective on knowledge transfer: evidence from the Chinese automotive industry. *Strategic Management Journal* **30**(9): 959–984.
- Zhao ZJ, Anand J, Mitchell W. 2004. Transferring collective knowledge: teaching and learning in the Chinese auto industry. *Strategic Organization* **2**(2): 133–167.