

## Top Management Team Advice Seeking and Exploratory Innovation: The Moderating Role of TMT Heterogeneity

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**ABSTRACT** Research on strategic decision making has considered advice-seeking behaviour as an important top management team attribute that influences organizational outcomes. Yet, our understanding about how top management teams utilize advice to modify current strategies and pursue exploratory innovation is still unclear. To uncover the importance of advice seeking, we delineate between external and internal advice seeking and investigate their impact on exploratory innovation. We also argue that top management team heterogeneity moderates the impact of advice seeking on exploratory innovation. Findings indicated that both external and internal advice seeking are important determinants of a firm's exploratory innovation. In addition, we observed that top management team heterogeneity facilitates firms to act upon internal advice by combining different perspectives and developing new products and services. Interestingly, heterogeneous top management teams appeared to be less effective to leverage external advice and pursue exploratory innovation.

## INTRODUCTION

In the face of market or technological discontinuities senior managers are confronted with the need to facilitate or champion exploratory innovation (Benner and Tushman, 2003; Hoffman and Hegarty, 1993). Exploratory innovation builds on new knowledge and requires the departure from existing skills and capabilities (Benner and Tushman, 2003; Jansen et al., 2006). This type of innovation is crucial for organizations operating in more dynamic environments (Jansen et al., 2006), and is considered to be key to an organization's long-term survival (Levinthal and March, 1993). Studies have shown that some top management teams (TMTs) have the ability to recognize distant opportunities and devote organizational resources to exploratory innovation, while others fail to do so and put their organizations at risk of becoming obsolete (Day, 1994; Kaplan et al., 2003;

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Young et al., 2001). In this sense, the impact of TMTs on the pursuit of exploratory innovation has emerged as an important theme.

Previous research has shown that TMTs play an important role by orchestrating strategic renewal, including organizational reorientations (Tushman and Rosenkopf, 1996; Virany et al., 1992), new product launches (Boeker, 1997; Ciborra, 1996; Eisenhardt and Tabrizi, 1995; Song and Montoya-Weiss, 1998), and changes in research and development strategies (Kor, 2006). Although TMTs can influence organizational responses by establishing formal and informal coordinating mechanisms for implementation of exploratory innovation (Jansen et al., 2006), little attention has been given to the ways in which TMTs deal with knowledge sources that can enable them to notice and interpret environmental change, or that influence their decisions whether or not to pursue certain courses of action. Interestingly, researchers have observed that top management attribution biases can lead to the persistence of existing strategies and the avoidance of exploratory efforts (Hambrick et al., 1993; Kaplan et al., 2003). Blame is attributed to failed attempts of exploration rather than to lack of exploration (Danneels, 2008). As a result, firms follow paths where they have solid prior experience and make investments to proximate markets rather than distant ones (Dimov and De Holan, 2010). Executives are often unable to recognize new opportunities unless they are closely related to their existing knowledge and skills (Haynie et al., 2009). Little investigation has been made into the ways in which management teams use their knowledge sources to overcome these biases. Following from this, tracing how TMTs develop views on potential courses of action and overcome the persistence of existing strategies, can carry important benefits for research and practice.

Strategic decision making literature has proposed executives' advice-seeking behaviour as an important determinant of TMTs' decisions about whether or not to modify current strategies (McDonald and Westphal, 2003) and pursue exploratory innovation. A network of external advisers – managers at other companies – provide knowledge to TMTs to stay in touch with environmental changes. In addition, top executives maintain linkages with managers from within their own organizations. These lower-level managers are another important knowledge source as they may possess critical operational information or propose their own initiatives for exploratory innovation (Bower, 1970; Burgelman, 1983). Thus, advice from external and internal sources are two independent information streams that can provide TMTs with new knowledge and qualitative assessments of current and future exploratory innovation strategies. In this study, we argue that the extent to which senior executives seek and use advice is associated with the inclination of organizations to pursue exploratory innovation (Arendt et al., 2005; Balkundi and Kilduff, 2005; McDonald and Westphal, 2003; McDonald et al., 2008).

We provide a refined understanding of senior executives' role in pursuing exploratory innovation and contribute to prior literature in at least two important ways. Firstly, we probe into the mechanisms that connect TMT advice-seeking behaviours to exploratory innovation as an organizational-level outcome. We go beyond previous studies that have sought to explain organizational innovation with top management group demographics or individual-level executive attributes (e.g. Barker and Mueller, 2002; Papadakis and Barwise, 2002; Srivastava and Lee, 2005; West and Anderson, 1996). We emphasize that TMT behaviour is another crucial determinant of an organization's exploratory effort

(Hambrick and Mason, 1984; Simsek et al., 2005). To elaborate that, we examine TMT advice-seeking behaviours directed both externally and internally (cf. Arendt et al., 2005; McDonald and Westphal, 2003; McDonald et al., 2008). Power and social identity theories have explained the tendency of individual senior executives to prefer one type over the other (Menon and Pfeffer, 2003; Menon et al., 2006). For instance, a preference for internal advice may be associated with in-group favouritism and out-group derogation while the choice for external advice may be triggered by internal competition and extensive criticism of internal ideas (Menon and Pfeffer, 2003). Yet, empirical evidence is still lacking on whether these theoretical mechanisms continue to be relevant on a group level, that is, whether the cumulative advice-seeking behaviour of the TMT can implicate the pursuit of exploratory innovation.

Secondly, we acknowledge the role of TMT composition in the processing of acquired advice by studying the moderating role of TMT heterogeneity. TMT heterogeneity refers to the degree to which there are differences in demographic, functional, and background dimensions in team composition (Simons et al., 1999). Since heterogeneous teams approach information processing and decision making differently than do homogeneous ones (Dahlin et al., 2005; Van Knippenberg and Schippers, 2007), we suggest that the impact of external and internal advice seeking is contingent upon TMT heterogeneity. Characteristically, heterogeneous teams are able to recombine acquired information and knowledge in different ways (Rodan and Galunic, 2004) and to connect with a qualitatively more diverse set of advisers from both across and within firm boundaries (Granovetter, 1973; Hoffman and Maier, 1961; Jackson, 1992; Reagans et al., 2004). In this sense, we argue that TMT heterogeneity moderates the relationship between both types of advice seeking and exploratory innovation. As a result, our study contributes to new insights as to how TMT heterogeneity affects the effectiveness of different behavioural attributes (i.e. external and internal advice seeking) to exploratory innovation.

## LITERATURE AND HYPOTHESES

### TMT Advice Seeking and Exploratory Innovation

Exploratory innovation is radical and designed to meet the needs of emerging customers or markets (Benner and Tushman, 2003). It requires new knowledge or departure from existing knowledge and often is associated with experimentation, flexibility, and divergent thinking (Levinthal and March, 1993; McGrath, 2001). Exploratory innovation offers new designs, new approaches to new markets, or the utilization of new distribution channels (Benner and Tushman, 2003). The rationale to pursue exploratory innovation rests on the insight that it is important for a firm's long-term survival and for its ability to cope with discontinuous environmental change (Levinthal and March, 1993; March, 1991).

To pursue exploratory innovation, organizations must engage in distant search and radical product development during which they face high uncertainty about their probability of success (Jansen et al., 2006). This makes exploration a non-trivial option and organizations have a tendency to persist with existing strategies and with exploitation of current products and markets. This tendency is often associated with absence of systems

for monitoring and analysing environmental signals or for fostering action in response to these signals. Managers who dare to explore also risk punishment and attribution of blame if their exploration efforts fail (Danneels, 2008; Sitkin, 1992). Firms also become deeply embedded in the demands of existing customers, which obstructs them from adopting emerging disruptive technologies (Christensen and Bower, 1996; Pfeffer and Salancik, 1978).

Surmounting the persistence of existing strategies can be achieved when senior executives become involved as product champions or organizational sponsors to exploratory innovation initiatives (Day, 1994). In such cases, TMTs actively participate in resolving issues regarding resource allocation and modification of organizational requirements (Bower, 1970; Ettlie and Subramaniam, 2004). For example, Kaplan et al. (2003) found that the TMTs of some major pharmaceutical firms are particularly skilled in recognizing external discontinuities and adequately committing organizational resources to strategic renewal. In recent literature, scholars have studied how TMT advice-seeking behaviour is associated with the motivation of TMTs to focus their attention on environmental discontinuities. Advice seeking is defined as the formation of opinions, attitudes, and judgments through deliberate information exchange with other individuals, also called advisers (Bonaccio and Dalal, 2006; Brehmer and Hagafors, 1986; Sniezek and Buckley, 1995; Sniezek et al., 2004). Multiple studies have suggested that advice seeking is a ubiquitous phenomenon as senior executives have a tendency to rely on oral and personal information sources more heavily than they do on written and impersonal ones, such as reports or outputs from management information systems (Brown and Eisenhardt, 1997; Elenkov, 1997; McDonald and Westphal, 2003; Mintzberg, 1973). The focus of the concept of advice seeking lies primarily on the intensity of effort with which TMTs pursue advice rather than on the particular source of advice. In this sense, advisers to the TMT can be both external and internal to the organization, including managers of other firms, or lower level managers within the same organization.

The primary role of advice seeking is considered to be the task-related information exchange that can improve the probability of accurate decisions (Bonaccio and Dalal, 2006; Goldsmith and Fitch, 1997; McDonald and Westphal, 2003). Advisers also offer decision makers new alternatives that may have not been considered earlier and provide new perspectives on the problem at hand. Credible advice from external and internal sources can alter the choices TMT members make and may guide subsequent organizational action and behaviour away from established patterns and routines (Druckman, 2001).

Previous qualitative research on individual level has viewed external advice seeking and internal advice seeking as alternatives to each other highlighting social identity and power issues. Firstly, in hierarchical organizations, some managers tend to prefer external advisers over internal ones, because they see the latter as competitive threats to their position and status (Menon and Pfeffer, 2003). Acknowledging ideas and suggestions from internal advisers can be seen as a transfer of power to rivals who are also competing for organizational rewards (Salancik and Pfeffer, 1982). Such status implications may prompt managers to be less inclined to seek for internal advice. Furthermore, internal knowledge is more readily available, allowing managers to be more thorough in examining it and thus be more critical of it compared to external advice. This can lead to the

overvaluation of external advice, solely based on its relative scarcity and costs to obtain (Menon and Pfeffer, 2003; Menon et al., 2006). Secondly, other managers may prefer internal advisers and resist knowledge from external sources, known as the 'not-invented-here' syndrome (Katz and Allen, 1982). The tendency to dismiss external knowledge may bias managers towards considering internal ideas as superior to advice gained from outside sources, even in situations when the latter would have more advantages to the organization. In such situations, managers that rely solely on internal sources of advice may reinforce a perception of reality that ridicules external sources and glorifies information that has come only from within their own firm. Consequently, on a TMT level, the presence of externally or internally oriented managers can determine the degree of external or internal advice-seeking behaviour of the group. Therefore, we distinguish these two behaviours as two independent TMT-level characteristics, each representing the external or internal advice-seeking activities of different members of the team.

### **External Advice Seeking and Exploratory Innovation**

External advice seeking may be beneficial to facilitating exploratory innovation as organizational outcome as it enables TMTs to span organizational boundaries and gain new external knowledge. External advisers that possess specialized knowledge can affect TMT cognition with regard to possibilities for new learning alliances, technological transfers, and knowledge exchange (Kaplan et al., 2003). The more actively a TMT seeks external advice, the wider the array of opportunities to acquire and assimilate knowledge that is not yet known by TMT members. For instance, Cao et al. (2006) argued that CEO turnover, and arguably of any other senior executive, would have negative consequences for the firm's exploration due to the loss of the external social capital resources that they possess. In addition to spanning organizational boundaries, external advice can be instrumental in coping with resistance to radical organizational changes that accompany exploratory innovation. Seeking external advice can facilitate the effort of the TMT to provide legitimacy for particular exploratory strategies. For instance, external managers can be consulted with the purposes of training employees to work with unfamiliar technologies, managing the process of change, or substantiating the necessity of the intended shift towards exploratory innovation (Gable, 1996; Ko et al., 2005).

Finally, seeking external advice may also assist in reaching consensus among TMT members. TMT members may be in competition with one another for promotion within the hierarchy and thus have biases towards particular exploratory efforts that can bring them personal status gains. Thus, they may be unwilling to support projects proposed by their internal rivals (Menon and Pfeffer, 2003; Menon et al., 2006), which can also be an obstacle to achieving organizational commitment to radical changes. External advice seeking can be used for reaching consensus among disagreeing sides through the supply of independent analyses and evaluation of proposals. Hence, we predict that TMT external advice seeking enables organizations to pursue exploratory innovation.

*Hypothesis 1:* TMT external advice seeking will be positively related to a firm's exploratory innovation.

### **Internal Advice Seeking and Exploratory Innovation**

TMTs may also use internal advice seeking as leverage to innovation that departs from existing products and markets. Firstly, by allowing for internal consultation, a climate of openness to daring new ideas is created. Under the frame of trust that internal advice seeking creates inside the organization (Inkpen and Choudhury, 1995; Snizek and Van Swol, 2001), the process of idea generation is catalysed. If the TMT has established a pattern of seeking advice internally, other organizational members would be more willing to share their ideas, especially when the ideas they present could be seen as unconventional or when proposing new ideas diverges greatly from their existing job description and function. Prior studies have suggested that this type of consultative mode for decision making creates a positive atmosphere for exploratory innovation (Somech, 2006; Vroom and Yetton, 1973). Not seeking internal advice may seal off opportunities for potentially valuable initiatives stemming from within the organization itself.

Secondly, TMTs that look for input from other organizational members have the ability to form more feasible, as opposed to bold but unrealistic, exploratory innovation strategies. Seeking internal advice makes TMTs more aware of the existing skills and capabilities of the firm and that may prove crucial to the implementation of exploratory strategies. Trying to implement radical product diversification, for instance, may fail because the TMT did not foresee a mismatch between the required and available resources or competences needed to produce and market new products (Grant, 1996; Wernerfelt, 1984). Consulting functional specialist managers to undergo thorough analyses of new ideas may provide useful feedback and criticism (Menon and Pfeffer, 2003) and highlight important details about the implementation phases of radically new product development projects or process improvements.

*Hypothesis 2:* TMT internal advice seeking will be positively related to a firm's exploratory innovation.

### **The Moderating Role of TMT Heterogeneity**

Besides directly relating external and internal advice seeking to exploratory innovation, it is also important to consider how acquired advice is further processed within TMTs. TMT heterogeneity is a compositional characteristic that strongly influences the cognitive and information processing capabilities of TMTs. Heterogeneity refers to the degree to which there are differences along demographic, functional, and background dimensions in the composition of a group (Simons et al., 1999; Van Knippenberg and Schippers, 2007). Heterogeneity enhances problem solving, judgment, and decision-making capabilities through team-level processing of unique job-relevant information, team reflexivity, and healthy task-related conflicts (Hinsz et al., 1997; Van Knippenberg and Schippers, 2007; Van Knippenberg et al., 2004). Interestingly, prior studies have also shown that team heterogeneity can also have detrimental effects on group functioning due to processes of social categorization and emotional conflict (Mannix and Neale, 2005; Pelled et al., 1999; Van Knippenberg and Schippers, 2007). Each of these 'optimistic' and 'pessimistic' views may prevail depending on the characteristics of the task at



hand (Mannix and Neale, 2005; Pelled et al., 1999). The primary task of external and internal advice seeking is information acquisition, therefore we consider the mechanisms of the 'optimistic' view of TMT heterogeneity as the most relevant and applicable for this context. As heterogeneous TMTs approach and process advice differently to homogeneous ones (Dahlin et al., 2005), we argue that the effectiveness of both types of advice seeking will depend on the degree of TMT heterogeneity.

Regarding external advice seeking and exploratory innovation, we expect that the benefits of using external advice in generating exploratory innovation will be amplified when TMTs are heterogeneous. Because the external networks of heterogeneous TMTs are less overlapping, external advice seeking provides a wider range of possible unique information inflows (Granovetter, 1973; Reagans et al., 2004). Heterogeneous TMTs are able to connect to a larger pool of potential external advisers from various areas of expertise (Hambrick, 1994), and enhance their ability to create novel strategic combinations for generating exploratory innovation (Hansen, 1999). Rather, homogeneous TMTs would likely regard information from external contacts as redundant, causing them to remain insensitive to environmental changes and external threats. In addition to this, the cohesiveness associated with homogeneous TMTs (Coleman, 1988) can contribute to the development of social control mechanisms that can stifle attempts for radical thinking and ideas. Therefore, even though senior executives may increase their external advice-seeking behaviour, they will face difficulties to put more radical and unconventional proposals on the table and thus would prefer to conform to the status quo. Strong cohesion also raises suspicion against external information, creating an 'us versus them' mentality and 'not-invented-here' bias (Katz and Allen, 1982).

With regard to integrating acquired external advice, heterogeneous teams also have a larger absorptive capacity (Cohen and Levinthal, 1990; Van den Bosch et al., 2003). Members of such teams come from varying knowledge backgrounds and are able to recognize patterns in idiosyncratic ways and to contribute with multiple interpretations on a single piece of advice. Such heterogeneity leads to the creation of more original and valuable exploratory ideas than, in comparison with, if senior executives with similar backgrounds were to pool their ideas (Van den Bosch et al., 1999). A homogeneous TMT may not seek external advice that is difficult to comprehend or to relate to their existing knowledge base, thereby limiting the potential for exploratory innovation.

*Hypothesis 3:* TMT heterogeneity moderates the relationship between TMT external advice seeking and exploratory innovation, such that TMT external advice seeking is more positively associated with exploratory innovation as TMT heterogeneity increases.

We also argue that TMT heterogeneity enables TMTs to apply internal advice more effectively to pursue exploratory innovation. The availability of heterogeneous skills and knowledge among TMT members often implies that different perspectives are represented at a higher hierarchical level within organizations (Ibarra, 1995; Podolny and Baron, 1997). Ideas for developing exploratory innovation often originate from lower organizational ranks in the form of minority dissent to established procedures and ways of doing things. A heterogeneous TMT means that various minorities are likely to have

representation at the highest level in the organization. The opportunity to connect with a similar individual from the TMT increases the minorities' willingness to share information (Burt, 1982; Tsai and Ghoshal, 1998). A lack of representation, on the other hand, lowers the probability of acceptance of novel ideas (De Dreu and West, 2001). If heterogeneity is low, such organizational members are likely to consider themselves excluded and on the peripheral, with their proposals lacking impetus and legitimacy.

When there is diversity of top executives' prior related knowledge, increasing the level of internal advice seeking can lead to more original interpretations to seemingly non-radical and incremental improvements suggested by the internal advisers (Cohen and Levinthal, 1990). Heterogeneous TMTs therefore have a stronger ability to assess the feasibility of exploratory ideas, because the members of heterogeneous TMTs are each in dialogue and relate to different internal advisers. In comparison with homogeneous TMTs, the variation in the pool of advisers to heterogeneous TMTs is much larger. Such TMTs have a higher capacity to assimilate and incorporate highly-specialized and tacit information from their internal advisers into their decision making (Hansen, 1999). Hence, internal advice that flows towards heterogeneous TMTs is richer and contributes to their advantage over homogeneous TMTs with regard to the contributions to a firm's exploratory innovation.

*Hypothesis 4:* TMT heterogeneity moderates the relationship between TMT internal advice seeking and exploratory innovation, such that TMT internal advice seeking is more positively associated with exploratory innovation as TMT heterogeneity increases.

## METHODS

### Sample and Data Collection

Our empirical research was conducted at small and medium-sized firms (SMEs) across a wide variety of industries in The Netherlands. We focused on TMTs within SMEs as prior studies had suggested that SMEs cannot rely on slack resources or extensive systems to pursue exploratory innovation. Because of this, TMTs in small and medium-sized companies possess a higher discretion concerning decisions related to exploratory innovation (Simsek et al., 2005). Our primary source of data was a survey sent to a sample of 7884 firms drawn from the REACH electronic database, the largest information source about organizations registered in The Netherlands Chambers of Commerce. To ensure we were able to survey knowledgeable respondents for typically confidential information (Miller et al., 1998), we addressed the survey strictly to the CEO. Two weeks after the initial mailing, we sent reminder notes and followed up with telephone calls to increase responses. We obtained fully completed surveys from 705 respondents (8.94 per cent response rate). The final sample included firms from multiple industries, categorized into four broad groups: manufacturing (34 per cent), construction (17.7 per cent), services (14 per cent), and others (34.2 per cent). The average number of employees was 58 (S.D. = 44), the average firm age was 19.10 years (S.D. = 10.11), and the average TMT size was 4.9 (S.D. = 4.96) individuals.



To test for non-response bias, we examined differences between respondents and non-respondents. A *t*-test showed no significant differences ( $p > 0.05$ ) between the two groups based on the number of full-time employees, revenues, and years since the firm's founding. We also compared early and late respondents and paper and web respondents in terms of demographic characteristics and model variables. These comparisons did not reveal any significant differences ( $p > 0.05$ ), indicating that differences between respondents were not related to non-response bias. To examine reliability issues associated with single-informant data, we surveyed an additional TMT member from each respondent firm. We received a total of 104 second-respondent surveys, or 14.8 per cent of our final sample, from firms that were comparable in size, age, and revenues to our full sample. We calculated an inter-rater agreement score ( $r_{wg}$ ) for each study variable (James et al., 1993). The median inter-rater agreement ranged from 0.88 to 0.93, which suggests high agreement. The examination of intra-class correlations also revealed a strong level of inter-rater reliability: correlations were consistently significant at the 0.001 level (Jones et al., 1983).

We also examined the potential for the occurrence of single method bias. We performed Harman's one-factor test on items included in our regression model to examine whether common method bias augmented relationships. We found multiple factors, and the first factor did not account for the majority of variance. Also, we tested whether the addition of a single latent method factor connected with all the item scales would significantly improve the fit over a model with just the studied constructs as latent factors (Podsakoff et al., 2003; Widaman, 1985). The overall chi-square fit statistics for the model with the common method factor was significant ( $\chi^2/\text{d.f.} = 1.761$ , CFI = 0.989, RMSEA = 0.033), but the incremental fit index had a rho of 0.006, which suggests non-significant improvement. Additionally, the factor loadings for the studied constructs remained significant even after we had considered the method effect. These results suggest that common method bias did not dramatically affect the study's findings and that the respondents were able to differentiate well between the variables.

## Measurement of Constructs

We used existing scales from previous literature that were verified through various analyses.

*Exploratory innovation.* To measure exploratory innovation we adapted a five-item measure developed by Jansen et al. (2006). It captures whether organizations depart from existing knowledge and pursue radical innovations for emerging customers or markets. The respondents were asked about the extent to which: (1) the organization accepts demands that go beyond existing products and services; (2) they invent new products and services; (3) they experiment with new products and services in their local market; (4) they commercialize products and services that are completely new to the firm; and (5) they utilize new opportunities in new markets ( $\alpha = 0.85$ ). To assess reliability and validity for the exploratory innovation scale we correlated the responses with objective measures. Following previous literature (He and Wong, 2004; Manu, 1992), we used the percentage of total sales accounted for by new products introduced within the past three

years. This measure showed significant positive correlation with the perceptual measure for exploratory innovation ( $r = 0.33$ ,  $p < 0.001$ ), which increased our confidence in the scale's validity.

*External and internal advice seeking.* We followed McDonald and Westphal (2003) and adapted a team-level scale that captured the extent of TMT advice-seeking behaviour. We generated a number of alternative wordings and variations, which were refined and validated by gathering expert researchers' opinions and through pre-testing among managers for clarity and unambiguity. In the final version of the scale, we asked the respondents to rate: (1) frequency of the TMT's advice seeking; (2) the extent to which they gathered knowledge with regard to their current strategy; and (3) the extent to which they sought advice with regard to future strategy. We repeated the questions twice, firstly about advice sought from managers from other organizations (*external advice seeking*), and secondly, about advice sought from within their own organization (*internal advice seeking*). To provide evidence for convergent and discriminant validity, we used exploratory factor analysis. The results replicated the intended two-factor structure, with each item loading clearly on its intended factor (all factor loadings were between 0.86 and 0.91 for external advice seeking and between 0.88 and 0.94 for internal advice seeking). The Cronbach's  $\alpha$  were 0.89 and 0.93 for external and internal advice seeking, respectively.

*TMT heterogeneity.* The scale used for TMT heterogeneity was adopted from Campion et al. (1993). It is a five-item composite measure that asked respondents to assess the degree of heterogeneity on both demographic and functional attributes, namely expertise, background, experience, complementary skills, and education ( $\alpha = 0.74$ ). Research has shown that composite team heterogeneity constructs are good predictors of team outcomes (Van Knippenberg and Schippers, 2007).

*Control variables.* We included various control variables that have appeared in previous literature as determinants of exploratory innovation (e.g. Jansen et al., 2006; Sidhu et al., 2004, 2007; Srivastava and Lee, 2005). Because larger firms may have more resources yet may lack the flexibility to pursue exploratory innovation, we included the natural logarithm of the number of full-time employees within organizations to account for firm size. Secondly, incumbent firms may be more inclined towards existing strategies and face difficulties in pursuing exploratory efforts; we included firm age measured by the natural logarithm of the number of years from founding. Thirdly, TMT size might affect dynamics in decision making processes and therefore we included TMT size by measuring the number of senior executives who are responsible for strategy formulation and implementation (Siegel and Hambrick, 2005). Fourthly, context or industry effects may influence the extent to which organizations pursue exploratory innovation (Sidhu et al., 2007). In view of this, we included four industry dummies based on Standard Industry Classification codes: manufacturing, construction, services, and other industries (cf. McGrath, 2001). Fifthly, environmental attributes such as dynamism tend to affect organizations in pursuing exploratory innovation. We therefore included a four-item measure for environmental dynamism (cf. Dill, 1958; Jansen et al., 2006). The scale for environmental dynamism ( $\alpha = 0.80$ ) tapped into the rate of change and the instability of

the external environment. Finally, we also controlled for the level of exploitative innovation as prior studies have argued that it may influence the level of exploratory innovation (Tushman and O'Reilly, 1996). We used a four-item scale (Jansen et al., 2006) that captures the extent to which organizations build upon existing knowledge and pursue incremental innovations that meet the needs of existing customers or markets ( $\alpha = 0.73$ ).

### Validation of Measures

For all multi-item scales, we constructed an integrated confirmatory factor analysis (CFA) in order to test for convergent and discriminant validity. Each item was constrained to load only on its respective latent variable. The results showed a good fit within the model ( $\chi^2/\text{d.f.} = 2.039$ , CFI = 0.982, RMSEA = 0.038). All loadings were significant ( $p < 0.001$ ), which showed the convergent validity of the scales. The factor correlation matrix had moderate values (between 0.142 and 0.235), and we tested whether each correlation differed significantly from unity. We constructed models where this correlation was constrained to one and compared with the unconstrained model. The results from each of the six pairwise comparisons showed that constraining to unity worsens the models' fit in each case (rho values between 0.222 and 0.390), which attested to the discriminant validity of the latent variables.

### ANALYSIS AND RESULTS

Table I contains the descriptive statistics and bivariate correlations between the numeric variables used in the analysis. We constructed linear regression models and have reported the standardized coefficients in Table II. Model 1 (Table II) is the baseline model and includes only the control variables, Model 2 shows the main effects, and Model 3 includes the interaction effects.

The required conditions for the regression method were satisfied. To reduce the impact of multicollinearity, we mean-centred the independent variables that were used in the interaction terms (Aiken and West, 1991). We used variance inflation factors (VIFs) to judge the presence of multicollinearity in the models. Across all models, the highest VIF was 1.42, which is well below the cut-off point of 10 (Neter et al., 1990). The full model showed an  $R^2$  of 30.9 per cent. Of the control variables, TMT size is positively associated with exploratory innovation ( $p < 0.01$ ). Environmental dynamism is associated with pursuing exploratory innovation ( $p < 0.001$ ) as organizations try to avoid the obsolescence of their product portfolio. Interestingly, our results also indicate that exploitative innovation is positively associated with exploratory innovation ( $p < 0.01$ ), which suggests that firms often possess both types of innovative capabilities.

We will discuss the regression results obtained in Model 3. As predicted, external advice seeking has a positive and significant association with exploratory innovation ( $\beta = 0.073$ ,  $p < 0.05$ ). Hypothesis 1 is supported. As predicted by Hypothesis 2, Model 3 indicates a positive and significant relationship between internal advice seeking and exploratory innovation ( $\beta = 0.123$ ,  $p < 0.001$ ). Overall, our results indicate that both

Table I. Descriptive statistics and correlation coefficients<sup>a</sup>

<i>Variable</i>	<i>Mean</i>	<i>S.D.</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>
1. Exploratory innovation	4.28	1.21								
2. External advice	3.63	1.45	0.19**							
3. Internal advice	4.94	1.36	0.23**	0.19**						
4. TMT heterogeneity	5.22	0.96	0.15**	0.14**	0.17**					
5. Firm age <sup>b</sup>	19.10	10.11	-0.10**	-0.10**	-0.07*	-0.03				
6. Firm size <sup>c</sup>	58.35	43.59	-0.05	0.00	0.05	-0.02	0.11**			
7. TMT size	4.90	4.96	0.08*	-0.01	0.06	-0.01	0.05	0.10**		
8. Environmental dynamism	4.49	1.25	0.48**	0.18**	0.16**	0.08*	-0.09*	-0.02	-0.02	
9. Exploitative innovation	5.20	1.09	0.23**	0.14**	0.22**	0.22**	-0.03	0.07	0.03	0.18**

*Notes:*

<sup>a</sup> *N* = 705.

<sup>b</sup> Years since founding.

<sup>c</sup> Number of full-time employees.

\* *p* < 0.05; \*\* *p* < 0.01 (two-tailed).

Table II. Results of hierarchical regression analyses<sup>a</sup>: exploratory innovation

	1 $\beta$	2 $\beta$	3 $\beta$
(Constant)			0.001
Firm age <sup>b</sup>	-0.054	-0.038	-0.028
Firm size <sup>c</sup>	-0.048	-0.054†	-0.054†
TMT size	0.091**	0.087**	0.088**
Environmental dynamism	0.450***	0.423***	0.426***
Exploitative innovation	0.156***	0.114**	0.105**
Construction	-0.024	-0.014	-0.009
Services	-0.071*	-0.072*	-0.067†
Others	0.015	0.025	0.035
External advice		0.072*	0.073*
Internal advice		0.109**	0.123***
TMT heterogeneity		0.067*	0.066*
External advice $\times$ TMT heterogeneity			-0.086**
Internal advice $\times$ TMT heterogeneity			0.061*
N	705	705	705

*Notes:*<sup>a</sup> Standardized coefficients.<sup>b</sup> Logarithm of years since founding.<sup>c</sup> Logarithm of number of employees.†  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

types of advice seeking contribute to exploratory innovation; however, internal advice seeking has a relatively stronger association than external advice seeking.

Contrary to Hypothesis 3 that posited a positive moderating effect of TMT heterogeneity, Model 3 shows that TMT heterogeneity reduces the strength of the positive relationship between external advice seeking and exploratory innovation ( $\beta = -0.088$ ,  $p < 0.01$ ). Hypothesis 3 was not supported. We did find support for Hypothesis 4, as TMT heterogeneity positively moderates the effectiveness of internal advice seeking to exploratory innovation ( $\beta = 0.070$ ,  $p < 0.05$ ). Whereas TMT heterogeneity decreases the effectiveness of external advice seeking, our results show that TMT heterogeneity increases the relation of internal advice seeking on developing new products and services for emerging markets. Figure 1 plots the interaction effects using the values of one standard deviation above (i.e. high level) or below the mean (i.e. low level) of the advice-seeking variables (Aiken and West, 1991). Figure 1a shows that under high levels of TMT heterogeneity, the effect of external advice on exploratory innovation has a slightly negative slope ( $\beta = 0.070$ ), but a  $t$ -test (Aiken and West, 1991) revealed that this slope is not significantly different from zero ( $p > 0.10$ ). Under low levels of TMT heterogeneity the relationship between external advice seeking and exploratory innovation is positive and significant ( $\beta = 0.159$ ,  $p < 0.01$ ). Figure 1b illustrates the positive effect of TMT heterogeneity on the relationship between internal advice seeking and exploratory innovation (Hypothesis 4). The positive slope under high TMT heterogeneity is stronger and significant ( $\beta = 0.184$ ,  $p < 0.001$ ), while under low TMT heterogeneity

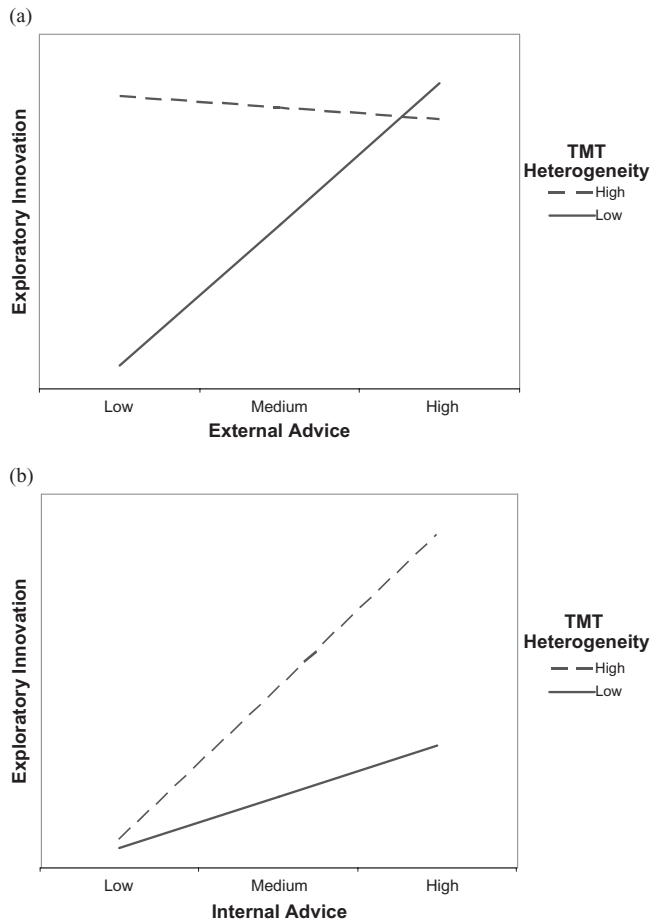


Figure 1. Interaction effects. (a) TMT heterogeneity  $\times$  external advice; (b) TMT heterogeneity  $\times$  internal advice

it is not significant ( $\beta = 0.062$ ,  $p > 0.10$ ). Thus, heterogeneous TMTs are in a better position to utilize internal advice and to develop exploratory innovation than homogeneous TMTs.

## DISCUSSION

Upper-echelon theory argues that senior executives act on the basis of highly personalized interpretations of the situations they face (Hambrick and Mason, 1984). Several studies have acknowledged that the ability to respond to opportunities for exploratory innovation, such as performance declines or the emergence of discontinuous technologies, is a function of TMT cognition, and particularly their search for and use of advice (Gilbert, 2005; Kaplan et al., 2003; McDonald and Westphal, 2003). Our results provide strong evidence that TMT external and internal advice-seeking behaviour is an important determinant for firms pursuing exploratory innovation. By engaging in external and



internal advice-seeking behaviour, TMTs are not only able to signal successfully environmental discontinuities and threats, but are also able to facilitate strategic renewal and increase exploratory innovation in their respective organizations (Day, 1994; Volberda et al., 2001).

Our study unites two contrasting theoretical perspectives on the preference and effectiveness of external versus internal advice seeking. The first perspective puts managers against each other in rivalries to obtain organizational resources and higher status within the hierarchy (Menon et al., 2006). In this sense, organizations tend to prefer external to internal advice seeking and utilize information from external sources to generate new ideas for products and services. The second perspective emphasizes in-group favouritism and out-group derogation (Katz and Allen, 1982), which explains the tendency for organizations to incorporate information from internal sources into strategic decision making and strategic renewal. Our proposition was that both mechanisms have strong merits as predictors of exploratory innovation, thus making a case for integrating the two perspectives rather than opposing them as mutually exclusive views (cf. Menon and Pfeffer, 2003). Although our empirical study provides evidence that TMTs more often seek advice from internal than from external advisors (mean of 4.94 and 3.63, respectively, – see Table I), both types of advice-seeking behaviours contribute to a firm's exploratory innovation. In this sense, our study provides important evidence for answering previous calls for multi-firm and multi-industry research that increases our understanding of organizational outcomes of managerial information search both within and across organizational boundaries (Menon and Pfeffer, 2003). Our findings suggest that future research on advice seeking needs to go beyond investigating potential benefits of either external or internal advice seeking in isolation. Future research might not only consider senior executives as environmental monitors and disseminators (Mintzberg, 1973), but also as active information seekers from within their own organizations. Although the positive correlation between external and internal advice seeking confirms such a complementary effect, future research needs to uncover contextual attributes that explain the potential complementarities between both types of advice seeking in increasing important TMT as well as organizational outcomes.

Our findings indicate that external advice seeking is an important TMT determinant of an organization's exploratory innovation. External advice seeking not only provides possibilities for learning new insights; it may also provide legitimacy for particular exploratory innovations. External advisers can be sought to train employees to work with unfamiliar technologies, to manage the process of change, and to convince and substantiate the necessity of the intended shift towards exploratory innovation (Hambrick et al., 1993). By revealing the importance of TMT external advice seeking for exploratory innovation, our study confirms previous assertions on the importance of organizational boundary-spanning and distant knowledge search (Ancona and Caldwell, 1992; Hambrick et al., 1993; Menon and Pfeffer, 2003). Specifically, in addition to knowledge transfer across boundaries at lower levels within the organization (Henderson and Cockburn, 1994), our study reveals that upper echelons are also able to encourage firms to stay abreast of emerging technologies by soliciting external advisers themselves.

This study also indicates that TMT advice seeking from internal sources contributes to a firm's exploratory innovation. Through internal advice seeking, TMTs are able to

catalyse new ideas generation from within the organization and to realize potential opportunities for new products and services. Our findings provide new insights into the process of innovation championing literature, which has explored both top-down and bottom-up origination and development of innovative ventures. Scholars generally agree that in both cases the role of senior executives is critical. In bottom-up processes, TMT members need to give impetus and provide strategic context to emerging exploratory innovation initiatives (Bower, 1970; Burgelman, 1983). In top-down models, senior executives actively create and champion such initiatives (Day, 1994; Eisenmann and Bower, 2000). Our study suggests that the implementation of new initiatives may benefit from a consultative decision-making approach by senior executives. TMTs that encourage interaction across hierarchical levels during decision making regarding exploratory innovation signal that new initiatives are desirable.

Our study also contributes to prior literatures on the role of senior executives in overcoming the persistence of current strategies. Senior managers are often restrained by their own perceptual biases or are keen to seek advice exclusively from their closest contacts (McDonald and Westphal, 2003; McDonald et al., 2008). Our study shows that the increased information flows surrounding more connected TMT members enable them to reduce inertia and stimulate organizational change and renewal. Arguably, internal processes within the TMT may also play an important role for that purpose. We therefore suggest that future attention needs to be given to specific TMT attributes and processes such as shared vision, contingency rewards, and social integration that may influence the extent to which TMTs are inclined to acquire and apply divergent advice (Jansen et al., 2008).

In addition to the importance of external and internal advice seeking, we also argued that TMT heterogeneity increases the effectiveness of both types of advice seeking. Contrary to our prediction, however, heterogeneous teams were not able to generate benefits from external advice seeking for pursuing exploratory innovation. A possible explanation for this rather interesting result could be the notions of local search and learning as a process of satisficing (March and Simon, 1958; Stuart and Podolny, 1996; Winter, 2000). Heterogeneous TMTs may not be benefiting from external advice seeking because their members may have sufficient access to heterogeneous knowledge within the team and consider external advice only as a substitute. Homogeneous TMTs, on the other hand, may consider external advice as complementary to their own knowledge sources and skills and are more willing to use external advice as leverage to pursue exploratory efforts. In essence, increasing external advice seeking can be a substitute for the lack of diversity within the team. Still, the combinative impact of TMT heterogeneity and external advice seeking deserves further attention through in-depth case studies.

Our study reveals that under heterogeneous TMTs, internal advice has a stronger relationship with exploratory innovation. Underlying diversity in heterogeneous TMTs encourages organizational members to share ideas for radical new products or new uncharted markets (Ibarra, 1995; Podolny and Baron, 1997; Tsai and Ghoshal, 1998). The possible occurrence of conflict and creation of faultlines between senior executives with diverse backgrounds deserves more attention in further research (Pelled et al., 1999; Van Knippenberg and Schippers, 2007). Nonetheless, the study contributes to the

literature on TMT heterogeneity with additional evidence that the effects of diversity on organizational outcomes must be understood beyond the typologies of the demographic or functional, and as underlying processes of information exchange and decision making (Van Knippenberg and Schippers, 2007).

For managers, our study suggests important guidelines for analysing and assessing the use of strategic advice when the organization aims at increasing exploratory innovation. Firstly, it provides an analytical framework for the possibilities of sourcing distant knowledge by the TMT. Increasing external advice leads to higher exploratory innovation for homogeneous TMTs, while increasing internal advice seeking leads to higher exploratory innovation for heterogeneous TMTs. An increase in external advice for heterogeneous TMTs, and an increase in internal advice for homogeneous TMTs would have no significant effects on exploratory innovation. Secondly, our study provides a caution to organizational transformation efforts that attempt costly reshuffling of the TMT advice linkages. The results show that the intensity of advice-seeking behaviour targeted at acquiring distant knowledge is important for exploratory innovation regardless of whether it is sourced externally or internally. Thirdly, we encourage selection and promotion policies that favour heterogeneity in TMTs, since they influence exploratory innovation more than the use of external advisers.

## LIMITATIONS AND CONCLUSION

Several limitations of this study deserve discussion. Firstly, although our survey technique attempted to achieve aggregated measurements for the TMT, not all TMT members in the responding organizations completed our survey. This may affect construct validity even though we have attempted to reduce such issues by validating our scales through inter-rater agreement scores and interclass correlations. Another limitation is the cross-sectional design of the study, which prevents us from making a firm conclusion about the direction of causality between the variables we have studied. For instance, firms strong on exploratory innovation might also be more skilled in attracting and building heterogeneous TMTs that are more prone to seek advice more intensely. Future research could address this shortcoming through a longitudinal set-up.

Future studies could also consider the role of TMT discretion over the innovation process (Hambrick, 2007; Hambrick and Finkelstein, 1987). Our sample consisted of SMEs in which TMTs have significant latitude of action. In large organizations, under multiple layers of hierarchy, TMTs may need to use other levers to steer the organization towards more exploratory innovation. Under low managerial discretion, advice seeking may retain its information gathering purpose, but the structure of TMTs' informal networks of influence may play a stronger role in executing decisions (Ibarra, 1993; Krackhardt, 1990). Future research should also investigate when TMTs turn to the board of directors for advice. This is a special category of advisers, because they also fulfil monitoring and control functions on behalf of the shareholders (e.g. Hillman and Dalziel, 2003; Westphal, 1999). They can be an important source of advice, especially if they possess relevant strategic information by virtue of their external network ties (Carpenter and Westphal, 2001).

Although this study is focused on the role of TMTs, exploratory innovation in organizations may be a consequence of factors that exist beyond the scope and power of senior executives and groups. Organization-wide policies, processes, and cultures may provide nurturing contexts for the creation of exploratory ideas by stimulating exchange and combination of knowledge resources at all levels (Tsai and Ghoshal, 1998). Good examples of these are policies for encouragement of experimentation or for tolerance of failures (Danneels, 2008). Such contexts can predispose individuals and teams to distant search and recognition of new opportunities, and may precede the advice-seeking behaviours of managers. Exploring the antecedents of advice seeking across different hierarchical levels can therefore be a fruitful path for future research.

Finally, we looked at TMT advice seeking through a knowledge and information exchange lens by adopting a rational model of strategic decision making (Eisenhardt and Zbaracki, 1992). Strategic decisions, however, may be derived from political interests and concerns. Particularly in cases where large-scale changes are undertaken, various groups and stakeholders can become active and senior managers would need to consider their response to them. Therefore, further research can incorporate a power and politics perspective and study how the interaction with the rational approach can impact the organizational outcomes (e.g. Eisenhardt and Bourgeois, 1988; Pfeffer, 1981, 1992).

## REFERENCES

- Aiken, L. S. and West, S. C. (1991). *Multiple Regression Testing and Interpreting Interactions*. Newbury Park, CA: Sage.
- Ancona, D. G. and Caldwell, D. F. (1992). 'Bridging the boundary: external activity and performance in organizational teams'. *Administrative Science Quarterly*, **37**, 634–65.
- Arendt, L. A., Priem, R. L. and Ndofor, H. A. (2005). 'A CEO-adviser model of strategic decision making'. *Journal of Management*, **31**, 680–99.
- Balkundi, P. and Kilduff, M. (2005). 'The ties that lead: a social network approach to leadership'. *Leadership Quarterly*, **16**, 941–61.
- Barker, V. L. and Mueller, G. C. (2002). 'CEO characteristics and firm R&D spending'. *Management Science*, **48**, 782–801.
- Benner, M. J. and Tushman, M. L. (2003). 'Exploration, exploitation, and process management: the productivity dilemma revisited'. *Academy of Management Review*, **28**, 238–56.
- Boeker, W. (1997). 'Executive migration and strategic change: the effect of top manager movement on product-market entry'. *Administrative Science Quarterly*, **42**, 213–36.
- Bonaccio, S. and Dalal, R. S. (2006). 'Advice taking and decision-making: an integrative literature review, and implications for the organizational sciences'. *Organizational Behavior and Human Decision Processes*, **101**, 127–51.
- Bower, J. L. (1970). *Managing the Resource Allocation Process: A Study of Corporate Planning and Investment*. Boston, MA: Harvard Business School Press.
- Brehmer, B. and Hagafors, R. (1986). 'The use of experts in complex decision-making: a paradigm for the study of staff work'. *Organizational Behavior and Human Decision Processes*, **38**, 181–95.
- Brown, S. L. and Eisenhardt, K. (1997). 'The art of continuous change: linking complexity theory and time-paced evolution in relentlessly shifting organizations'. *Administrative Science Quarterly*, **42**, 1–34.
- Burgelman, R. A. (1983). 'A process model of internal corporate venturing in the diversified major firm'. *Administrative Science Quarterly*, **28**, 223–44.
- Burt, R. S. (1982). *Toward a Structural Theory of Action: Network Models of Social Structure, Perception and Action*. New York: Academic Press.
- Campion, M. A., Medsker, G. J. and Higgs, A. C. (1993). 'Relations between work group characteristics and effectiveness: implications for designing effective work groups'. *Personnel Psychology*, **46**, 823–47.
- Cao, Q., Maruping, L. M. and Takeuchi, R. (2006). 'Disentangling the effects of CEO turnover and succession on organizational capabilities: a social network perspective'. *Organization Science*, **17**, 563–76.

- Carpenter, M. A. and Westphal, J. D. (2001). 'The strategic context of external network ties: examining the impact of director appointments on board involvement in strategic decision making'. *Academy of Management Journal*, **44**, 639–60.
- Christensen, C. M. and Bower, J. L. (1996). 'Customer power, strategic investment, and the failure of leading firms'. *Strategic Management Journal*, **17**, 197–218.
- Ciborra, C. U. (1996). 'The platform organization: recombining strategies, structures, and surprises'. *Organization Science*, **7**, 103–18.
- Cohen, W. M. and Levinthal, D. A. (1990). 'Absorptive capacity: a new perspective on learning and innovation'. *Administrative Science Quarterly*, **35**, 128–52.
- Coleman, J. S. (1988). 'Social capital in the creation of human capital'. *American Journal of Sociology*, **94**, S95–S120.
- Dahlin, K. B., Weingart, L. R. and Hinds, P. J. (2005). 'Team diversity and information use'. *Academy of Management Journal*, **48**, 1107–23.
- Danneels, E. (2008). 'Organizational antecedents of second-order competences'. *Strategic Management Journal*, **29**, 519–43.
- Day, D. L. (1994). 'Raising radicals: different processes for championing innovative corporate ventures'. *Organization Science*, **5**, 148–72.
- De Dreu, C. K. W. and West, M. A. (2001). 'Minority dissent and team innovation: the importance of participation in decision making'. *Journal of Applied Psychology*, **86**, 1191–201.
- Dill, W. R. (1958). 'Environment as an influence on managerial autonomy'. *Administrative Science Quarterly*, **2**, 409–43.
- Dimov, D. and De Holan, P. M. (2010). 'Firm experience and market entry by venture capital firms (1962–2004)'. *Journal of Management Studies*, **47**, 130–61.
- Druckman, J. N. (2001). 'Using credible advice to overcome framing effects'. *Journal of Law, Economics, and Organization*, **17**, 62–82.
- Eisenhardt, K. M. and Bourgeois, L. J. (1988). 'Politics of strategic decision making in high-velocity environments: toward a midrange theory'. *Academy of Management Journal*, **31**, 737–70.
- Eisenhardt, K. M. and Tabrizi, B. (1995). 'Accelerating adaptive processes: product innovation in the global computer industry'. *Administrative Science Quarterly*, **40**, 84–110.
- Eisenhardt, K. M. and Zbaracki, M. J. (1992). 'Strategic decision making'. *Strategic Management Journal*, **13**, 17–37.
- Eisenmann, T. R. and Bower, J. L. (2000). 'The entrepreneurial M-form: strategic integration in global media firms'. *Organization Science*, **11**, 348–55.
- Elenkov, D. S. (1997). 'Strategic uncertainty and environmental scanning: the case for institutional influences on scanning behaviour'. *Strategic Management Journal*, **18**, 287–303.
- Ettlie, J. E. and Subramaniam, M. (2004). 'Changing strategies and tactics for new product development'. *Journal of Product Innovation Management*, **21**, 95–109.
- Gable, G. G. (1996). 'A multidimensional model of client success when engaging external consultants'. *Management Science*, **42**, 1175–98.
- Gilbert, C. G. (2005). 'Unbundling the structure of inertia: resource versus routine rigidity'. *Academy of Management Journal*, **48**, 741–63.
- Goldsmith, D. J. and Fitch, K. (1997). 'The normative context of advice as social support'. *Human Communication Research*, **23**, 454–76.
- Granovetter, M. S. (1973). 'The strength of weak ties'. *American Journal of Sociology*, **78**, 1360–80.
- Grant, R. M. (1996). 'Toward a knowledge-based theory of the firm'. *Strategic Management Journal*, **17**, 109–22.
- Hambrick, D. C. (1994). 'Top management groups: a conceptual integration and reconsideration of the "team" label'. *Research in Organizational Behavior*, **16**, 171–213.
- Hambrick, D. C. (2007). 'Upper echelons theory: an update'. *Academy of Management Review*, **32**, 334–43.
- Hambrick, D. C. and Finkelstein, S. (1987). 'Managerial discretion: a bridge between polar views on organizations'. In Cummings, L. L. and Staw, B. M. (Eds), *Research on Organizational Behavior*. Greenwich, CT: JAI Press, **9**, 369–406.
- Hambrick, D. C. and Mason, P. A. (1984). 'Upper echelons: the organization as a reflection of its top managers'. *Academy of Management Review*, **9**, 193–206.
- Hambrick, D. C., Geletkanycz, M. A. and Fredrickson, J. W. (1993). 'Top executive commitment to the status quo: some tests of its determinants'. *Strategic Management Journal*, **14**, 401–18.
- Hansen, M. T. (1999). 'The search-transfer problem: the role of weak ties in sharing knowledge across organization subunits'. *Administrative Science Quarterly*, **44**, 82–111.



- Haynie, J. M., Shepherd, D. A. and McMullen, J. S. (2009). 'An opportunity for me? The role of resources in opportunity evaluation decisions'. *Journal of Management Studies*, **46**, 337–61.
- He, Z. and Wong, P. (2004). 'Exploration and exploitation: an empirical test of the ambidexterity hypothesis'. *Organization Science*, **15**, 481–4.
- Henderson, R. and Cockburn, I. (1994). 'Measuring competence – exploring firm effects in pharmaceutical research'. *Strategic Management Journal*, **15**, 63–84.
- Hillman, A. J. and Dalziel, T. (2003). 'Boards of directors and firm performance: integrating agency and resource dependence perspectives'. *Academy of Management Review*, **28**, 383–96.
- Hinsz, V. B., Tindale, R. S. and Vollrath, D. A. (1997). 'The emerging conceptualization of groups as information processes'. *Psychological Bulletin*, **121**, 43–64.
- Hoffman, R. C. and Hegarty, W. H. (1993). 'Top management influence on innovations: effects of executive characteristics and social culture'. *Journal of Management*, **19**, 549–74.
- Hoffman, L. R. and Maier, N. R. (1961). 'Quality and acceptance of problem solutions by members of homogeneous and heterogeneous groups'. *Journal of Abnormal and Social Psychology*, **62**, 401–7.
- Ibarra, H. (1993). 'Network centrality, power and innovation involvement: determinants of technical and administrative roles'. *Academy of Management Journal*, **36**, 471–501.
- Ibarra, H. (1995). 'Race, opportunity, and diversity of social circles in managerial networks'. *Academy of Management Journal*, **38**, 673–703.
- Inkpen, A. and Choudhury, N. (1995). 'The seeking of strategy where it is not: towards a theory of strategy absence'. *Strategic Management Journal*, **16**, 313–23.
- Jackson, S. E. (1992). 'Team composition in organizational settings: issues in managing an increasingly diverse work force'. In Worchel, S., Wood, W. and Simpson, J. (Eds), *Group Process and Productivity*. Newbury Park, CA: Sage.
- James, L. R., Demaree, R. G. and Wolf, G. (1993). 'R<sub>wg</sub>: an assessment of within-group interrater agreement'. *Journal of Applied Psychology*, **78**, 306–9.
- Jansen, J. J. P., Van Den Bosch, F. A. J. and Volberda, H. W. (2006). 'Exploratory innovation, exploitative innovation, and performance effects of organizational antecedents and environmental moderators'. *Management Science*, **52**, 1661–74.
- Jansen, J. J. P., George, G., Van den Bosch, F. A. J. and Volberda, H. W. (2008). 'Senior team attributes and organizational ambidexterity: the moderating role of transformational leadership'. *Journal of Management Studies*, **45**, 982–1007.
- Jones, A. P., Johnson, L. A., Butler, M. C. and Main, D. S. (1983). 'Apples and oranges: an empirical comparison of commonly used indices of interrater agreement'. *Academy of Management Journal*, **26**, 507–19.
- Kaplan, S., Murray, F. and Henderson, R. (2003). 'Discontinuities and senior management: assessing the role of recognition in pharmaceutical firm response to biotechnology'. *Industrial and Corporate Change*, **12**, 203–33.
- Katz, R. and Allen, T. J. (1982). 'Investigating the not-invented-here (NIH) syndrome: a look at performance, tenure and communication patterns of 50 R&D project groups'. *R&D Management*, **12**, 7–19.
- Ko, D., Kirsch, L. and King, W. (2005). 'Antecedents of knowledge transfer from consultants to clients in enterprise system implementations'. *MIS Quarterly*, **29**, 59–85.
- Kor, Y. Y. (2006). 'Direct and interaction effects of top management team and board compositions on R&D investment strategy'. *Strategic Management Journal*, **27**, 1081–99.
- Krackhardt, D. (1990). 'Assessing the political landscape: structure, cognition, and power in organizations'. *Administrative Science Quarterly*, **35**, 342–69.
- Levinthal, D. A. and March, J. G. (1993). 'The myopia of learning'. *Strategic Management Journal*, **14**, 95–112.
- Mannix, E. and Neale, M. A. (2005). 'What differences make a difference? The promise and reality of diverse teams in organizations'. *Psychological Science in the Public Interest*, **6**, 31–55.
- Manu, F. A. (1992). 'Innovation orientation, environment and performance: a comparison of US and European markets'. *Journal of International Business Studies*, **23**, 333–59.
- March, J. G. (1991). 'Exploration and exploitation in organizational learning'. *Organization Science*, **2**, 71–87.
- March, J. G. and Simon, H. A. (1958). *Organizations*. New York: Wiley.
- McDonald, M. L. and Westphal, J. D. (2003). 'Getting by with the advice of their friends: CEOs' advice networks and firms' strategic responses to poor performance'. *Administrative Science Quarterly*, **48**, 1–32.
- McDonald, M., Khanna, P. and Westphal, J. (2008). 'Getting them to think outside the circle: corporate governance, CEO's external advice networks, and firm performance'. *Academy of Management Journal*, **51**, 453–75.



- McGrath, R. G. (2001). 'Exploratory learning, innovative capacity, and managerial oversight'. *Academy of Management Journal*, **44**, 118–31.
- Menon, T. and Pfeffer, J. (2003). 'Valuing internal vs. external knowledge: explaining the preference for outsiders'. *Management Science*, **49**, 497–513.
- Menon, T., Thompson, L. and Choi, H. S. (2006). 'Tainted knowledge vs. tempting knowledge: people avoid knowledge from internal rivals and seek knowledge from external rivals'. *Management Science*, **52**, 1129–44.
- Miller, C. C., Burke, L. M. and Glick, W. H. (1998). 'Cognitive diversity among upper-echelon executives: implications for strategic decision processes'. *Strategic Management Journal*, **19**, 39–58.
- Mintzberg, H. (1973). *The Nature of Managerial Work*. New York: Harper & Row.
- Neter, J., Wasserman, W. and Kutner, M. H. (1990). *Applied Linear Statistical Models*. Homewood, IL: Irwin.
- Papadakis, V. M. and Barwise, P. (2002). 'How much do CEOs and top managers matter in strategic decision-making?'. *British Journal of Management*, **13**, 83–95.
- Pelled, L. H., Eisenhardt, K. M. and Xin, K. R. (1999). 'Exploring the black box: an analysis of work group diversity, conflict, and performance'. *Administrative Science Quarterly*, **44**, 1–28.
- Pfeffer, J. (1981). *Power in Organizations*. Marshfield, MA: Pitman.
- Pfeffer, J. (1992). *Managing with Power: Politics and Influence in Organizations*. Boston, MA: Harvard Business School Press.
- Pfeffer, J. and Salancik, G. R. (1978). *The External Control of Organizations: A Resource Dependence Perspective*. New York: Harper and Row.
- Podolny, J. M. and Baron, J. N. (1997). 'Resources and relationships: social networks and mobility in the workplace'. *American Sociological Review*, **62**, 673–93.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y. and Podsakoff, N. P. (2003). 'Common method biases in behavioral research: a critical review of the literature and recommended remedies'. *Journal of Applied Psychology*, **88**, 879–903.
- Reagans, R., Zuckerman, E. and McEvily, B. (2004). 'How to make the team: social networks vs. demography as criteria for designing effective teams'. *Administrative Science Quarterly*, **49**, 101–33.
- Rodan, S. and Galunic, C. (2004). 'More than network structure: how knowledge heterogeneity influences managerial performance and innovativeness'. *Strategic Management Journal*, **25**, 541–62.
- Salancik, G. R. and Pfeffer, J. (1982). 'Who gets power – and how they hold on to it: a strategic-contingency model of power'. In Tushman, M. L. and Moore, W. L. (Eds), *Readings in the Management of Innovation*. Boston, MA: Pitman.
- Sidhu, J. S., Volberda, H. W. and Commandeur, H. R. (2004). 'Exploring exploration orientation and its determinants: some empirical evidence'. *Journal of Management Studies*, **41**, 913–32.
- Sidhu, J. S., Commandeur, H. R. and Volberda, H. W. (2007). 'The multifaceted nature of exploration and exploitation: value of supply, demand, and spatial search for innovation'. *Organization Science*, **18**, 20–38.
- Siegel, P. A. and Hambrick, D. C. (2005). 'Pay disparities within top management groups: evidence of harmful effects on performance of high-technology firms'. *Organization Science*, **16**, 259–74.
- Simons, T., Pelled, L. H. and Smith, K. A. (1999). 'Making use of difference: diversity, debate, and decision comprehensiveness in top management teams'. *Academy of Management Journal*, **42**, 662–73.
- Simsek, Z., Veiga, J., Lubatkin, M. and Dino, R. (2005). 'Modeling the multilevel determinants of top management team behavioral integration'. *Academy of Management Journal*, **48**, 69–84.
- Sitkin, S. B. (1992). 'Learning through failure: the strategy of small losses'. In Staw, B. M. and Cummings, L. L. (Eds), *Research in Organizational Behaviour*. Greenwich, CT: JAI Press, 14, 231–66.
- Snizek, J. A. and Buckley, T. (1995). 'Cueing and cognitive conflict in judge-advisor decision making'. *Organizational Behavior and Human Decision Processes*, **62**, 159–74.
- Snizek, J. A. and Van Swol, L. M. (2001). 'Trust, confidence, and expertise in a judge-advisor system'. *Organizational Behavior and Human Decision Processes*, **84**, 288–307.
- Snizek, J. A., Schrah, G. E. and Dalal, R. S. (2004). 'Improving judgement with prepaid expert advice'. *Journal of Behavioral Decision Making*, **17**, 173–90.
- Somech, A. (2006). 'The effects of leadership style and team process on performance and innovation in functionally heterogeneous teams'. *Journal of Management*, **32**, 132–57.
- Song, X. M. and Montoya-Weiss, M. M. (1998). 'Critical development activities for really new versus incremental products'. *Journal of Product Innovation Management*, **15**, 124–35.
- Srivastava, A. and Lee, H. (2005). 'Predicting order and timing of new product moves: the role of top management in corporate entrepreneurship'. *Journal of Business Venturing*, **20**, 459–81.
- Stuart, T. and Podolny, J. (1996). 'Local search and the evolution of technological capabilities'. *Strategic Management Journal*, **17**, 21–38.

- Tsai, W. and Ghoshal, S. (1998). 'Social capital and value creation: the role of intrafirm networks'. *Academy of Management Journal*, **41**, 464–76.
- Tushman, M. L. and O'Reilly, C. A. (1996). 'Ambidextrous organizations: managing evolutionary and revolutionary change'. *California Management Review*, **38**, 8–29.
- Tushman, M. L. and Rosenkopf, L. (1996). 'Executive succession, strategic reorientation and performance growth: a longitudinal study in the US cement industry'. *Management Science*, **42**, 939–53.
- Van den Bosch, F. A. J., Volberda, H. W. and De Boer, M. (1999). 'Coevolution of firm absorptive capacity and knowledge environment: organizational forms and combinative capabilities'. *Organization Science*, **10**, 551–68.
- Van den Bosch, F. A. J., Van Wijk, R. and Volberda, H. W. (2003). 'Absorptive capacity: antecedents, models, and outcomes'. In Easterby-Smith, M. and Lyles, M. A. (Eds), *Handbook of Organizational Learning and Knowledge Management*. Oxford: Blackwell.
- Van Knippenberg, D. and Schippers, M. C. (2007). 'Work group diversity'. *Annual Review of Psychology*, **58**, 515–41.
- Van Knippenberg, D., De Dreu, C. K. W. and Homan, A. C. (2004). 'Work group diversity and group performance: an integrative model and research agenda'. *Journal of Applied Psychology*, **89**, 1008–22.
- Virany, B., Tushman, M. L. and Romanelli, E. (1992). 'Executive succession and organization outcomes in turbulent environments: an organization learning approach'. *Organization Science*, **3**, 72–91.
- Volberda, H. W., Baden-Fuller, C. and Van Den Bosch, F. A. J. (2001). 'Mastering strategic renewal: mobilising renewal journeys in multi-unit firms'. *Long Range Planning*, **34**, 159–78.
- Vroom, V. and Yetton, P. (1973). *Leadership and Decision Making*. Pittsburgh, PA: University of Pittsburgh Press.
- Wernerfelt, B. (1984). 'A resource-based view of the firm'. *Strategic Management Journal*, **5**, 171–80.
- West, M. A. and Anderson, N. R. (1996). 'Innovation in top management teams'. *Journal of Applied Psychology*, **81**, 680–93.
- Westphal, J. D. (1999). 'Collaboration in the boardroom: behavioral and performance consequences of CEO-board social ties'. *Academy of Management Journal*, **42**, 7–24.
- Widaman, K. F. (1985). 'Hierarchically nested covariance structure models for multitrait-multimethod data'. *Applied Psychological Measurement*, **9**, 1–26.
- Winter, S. G. (2000). 'The satisficing principle in capability learning'. *Strategic Management Journal*, **21**, 981–96.
- Young, G. J., Charns, M. P. and Shortell, S. M. (2001). 'Top manager and network effects on the adoption of innovative management practices: a study of TQM in a public hospital system'. *Strategic Management Journal*, **22**, 935–51.