Journal of Management
Vol. 44 No. 4, April 2018 1505–1529
DOI: 10.1177/0149206315614373

The Conjoint Influence of Top and Middle Management Characteristics on Management Innovation

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Management innovation entails the introduction of new-to-the-firm changes in management structures, processes, and practices intended to improve organizational functioning. We draw on relational demography theory to elucidate how behavioral dispositions stemming from top management and middle management similarity in professional characteristics (functional background and educational level) and biodemographic characteristics (age and gender) may facilitate management innovation. We argue that while a throughput functional orientation of top management can be expected to stimulate management innovation, greater similarity between top and middle management will strengthen the association between top management throughput orientation and management innovation by (1) engendering consistency in behavioral expectations between the managerial echelons and (2) motivating middle management to engage in extrarole behaviors. We test our theory on a sample of more than 8,000 top and middle managers in a cross-section of 33 organizations from 2000 to 2008 and adopt a novel content analysis–based measure of management innovation. We find compelling support for the

Acknowledgments: This article was accepted under the editorship of Patrick M. Wright. The authors would like to thank Annette Ranft and Karen Schnatterly for their editorial guidance and the anonymous reviewers for their constructive comments and suggestions throughout the review process. We would also like to thank Abdullah al Mamun, Sebastian Fourné, Susan Hill, Patrick Reinmoeller, Marko Reimer, and Sebastiaan van Doorn for their invaluable insights at different stages of the project and Catherine Walker for copyediting assistance. The project benefited from a research visit by the first author as an INSCOPE Visiting Fellow to the Erasmus University Rotterdam in 2014. All remaining errors are our own.

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moderating influence of professional similarity between top and middle management but uncover more complex patterns for cross-echelon similarity in biodemographic characteristics. We discuss implications for understanding the role of managers in management innovation, joint consideration of top and middle management characteristics in organizational change processes, the interplay between various types of innovation, and the measurement of management innovation. Promising future research directions are suggested.

Keywords: *content analysis; demographics and composition; management innovation; middle management; relational demography; top management*

Introduction

Management innovation (MI) entails the introduction of changes in management structures, processes, and practices intended to improve organizational functioning (Birkinshaw, Hamel, & Mol, 2008; Damanpour & Aravind, 2012; Volberda, Van Den Bosch, & Mihalache, 2014). GE's M-form structure, Toyota's lean manufacturing process, and Procter and Gamble's brand management technique are classic examples of MIs that have transformed the industrial landscape and created lasting competitive advantage for these companies. More recent examples, such as self-managed teams at Royal DSM in the Netherlands, nonhierarchical workspace arrangements at Vodafone UK, and event-driven budgeting at Statoil in Norway, all appear to be auspicious contemporary developments in this area.

An organization's top management[1] (TM) has the authority to decide on and allocate resources to MI (Damanpour & Schneider, 2006; Young, Charns, & Shortell, 2001), and evidence suggests that these types of innovation reflect particular characteristics of TM (Bantel & Jackson, 1989; Hoffman & Hegarty, 1993). However, TM also needs support from middle management[2] (MM; Floyd & Lane, 2000; Guth & MacMillan, 1986; Raes, Heijltjes, Glunk, & Roe, 2011), despite the fact that MI disrupts familiar managerial capabilities around which MM builds expertise, nurtures professional identity, and optimizes career plans (Glaser, Fourné, & Elfring, 2015; Huy, 2011). Although MM plays a critical role in the realization of TM's intent when supportive, they can also introduce delays to, reduce the quality of, or even sabotage changes advocated by TM (Balogun & Johnson, 2005; Mantere, 2008; Wooldridge, Schmid, & Floyd, 2008). Yet the literature is silent on how the characteristics of MM may help explain their inclinations to facilitate or hinder MI.

In this study, we introduce the joint consideration of TM and MM characteristics into the discussion of intraorganizational drivers of MI. We draw on relational demography theory to understand the behavioral dispositions associated with (mis)alignment between the characteristics of TM and MM (Tsui & O'Reilly, 1989; Turban & Jones, 1988). Relational demography informs us that subordinates are more likely to display supportive behaviors when they identify more closely with their superiors by virtue of similarity in professional (e.g., functional orientation and education level) and biodemographic (e.g., age and gender) characteristics (Goldberg, Riordan, & Schaffer, 2010; Tsui, Porter, & Egan, 2002). Drawing on this literature, we argue that TM-MM similarity in characteristics will particularly facilitate MI by (1) stimulating behavioral consistency between TM and MM and (2) motivating MM extrarole behaviors.

We offer several contributions. First, by theorizing both TM and MM characteristics, we adopt a multiechelon approach to address the question posed by Birkinshaw et al. (2008: 827): What is the role of managers in MI? Although studies have examined the influence of TM on MI (e.g., Damanpour & Schneider, 2009; Kimberly & Evanisko, 1981), we argue that the omission of MM from theoretical development can lead to unbalanced, or even biased, explanations of how codependent management cadres matter. We build the case that a more comprehensive understanding of MI can be reached by studying TM and MM in conjunction with one another rather than by considering either in isolation. In so doing, we bolster the emerging literature that advocates that these managerial layers should be considered jointly in order to understand strategy processes and outcomes (Floyd & Lane, 2000; Raes et al., 2011).

Second, we assign key boundary conditions to our understanding of how characteristics of management groups influence innovation (e.g., Bantel & Jackson, 1989). Unlike studies that have traditionally highlighted heterogeneity in characteristics, perspectives, and behaviors as drivers of technological and product innovation (e.g., Burgelman, 1983), we theorize that MI is facilitated by a set of alignment mechanisms between TM and MM. We thus advance the notion that demographic similarity—one form of homogeneity—might be an enabler of certain types of innovation. Given the increasing diversity in the workforce and the consequences that this is expected to have for innovation (Parrotta, Pozzoli, & Pytlikova, 2014), we contend that cross-echelon alignment in managerial composition could be an important vantage point from which we can understand an organization's capability and tendency to excel at different types of innovation.

Third, we provide empirical evidence on the joint influence of TM and MM on MI by testing hypotheses on a sample of 33 firms in the Netherlands covering the years 2000 to 2008 and comprising more than 8,000 top and middle managers. This is an important addition to the literature as the theoretical emphasis and empirical evidence to date has been fairly one-sided in favor of TM characteristics, and less attention has been given to MM characteristics more generally—presumably because of the difficulty of obtaining these data (Raes et al., 2011). Given the considerable challenges of gaining simultaneous access to both TM and MM data, especially over time, our data and findings allow us to inform the literature through an initial quantitative examination of the joint effects of TM and MM characteristics on MI.

Fourth, we cast light on MI as an integral—albeit underexplored—dimension of organizational renewal and long-term prosperity. Although there has been a more coherent research program examining technological and product innovation over the last decades (see Ahuja, Lampert, & Tandon, 2008), Damanpour and Aravind (2012) note that studies on MI are comparatively rare. A concerted focus on MI is important, as despite a growing realization that MI may confer organizational benefits (Bloom, Eifert, Mahajan, McKenzie, & Roberts, 2013), many firms still struggle to break away from orthodox management structures, processes, and practices (Hamel, 2006; Volberda, Van Den Bosch, & Heij, 2013). The insights from our study can particularly assist managers and researchers in understanding how to overcome some of the key intraorganizational barriers to MI.

Conceptual Background and Hypotheses

Studies on innovation have shown that organizational innovation reflects the functional background of TM, especially when the innovation is geared towards improving the internal functioning of the firm (Bantel & Jackson, 1989). Hambrick and Mason (1984) suggested

that experience in different functions can be classified according to two dimensions of task orientation. "Output" orientations stem from experience in domains such as marketing, sales, and product R&D where attention is focused on growth, customer demands, and the search for new market opportunities. "Throughput" orientation stems from experience in functions such as production, process engineering, and accounting where the emphasis is on the internal organization and on improving how the organization turns inputs into output. Consistent with the latter, results obtained by Hoffman and Hegarty show support for their assertion that for innovation "concerned with developing new internal structure or systems within the organization, the most relevant decision input is internally-oriented expertise (i.e., finance, personnel, production)" (1993: 555). Given that TM interprets information and articulates conclusions in ways that are consistent with, and reinforcing of, their dominant beliefs and experiences (Carpenter, Geletkanycz, & Sanders, 2004; Heyden, Reimer, & Van Doorn, in press), we can expect:

Hypothesis 1: TM throughput functional orientation will be positively related to MI.

MM Constraints to MI

Damanpour and Aravind (2012) noted that MI generally follows a top-down process. Indeed, Khanagha, Volberda, Sidhu, and Oshri (2013) observed that MI is rolled out organization-wide as intended changes are formalized in the corporate strategy document endorsed by TM. However, Lüscher and Lewis note that middle managers "often experience intense confusion, perceiving executive initiatives as replete with multiple and unclear mandates" (2008: 222). Given that the full range of bottlenecks associated with introducing elements that are new to the firm cannot be formalized at the outset by TM (Balogun & Johnson, 2005), the intentions of TM end up being more of a broad guideline than a detailed blueprint—with ample room for MM agency (Mantere, 2008).

Discrepancies between what TM envisions and what MM does can lead to costly delays, system failures, and reversal of plans if new ways of working fail to deliver the intended improvements. These potential inconsistencies in expected behaviors are further complicated by the hierarchical divide that separates TM and MM, given that direct supervision is often not feasible and formal communications take place episodically (Balogun & Johnson, 2005; Raes et al., 2011). When superiors and subordinates have limited interactions, they tend to develop differing interpretations of expected behaviors (Morrison, 1994). As a result, MM will be more likely to engage in behaviors that are misaligned with the intentions of TM.

In addition, MI disrupts familiar management capabilities and may make previously acquired managerial knowledge and skills redundant, requiring managers to learn new concepts and frameworks that could require significant personal investment with uncertain returns (Seibert, Kraimer, & Crant, 2001). This can be demotivating for MM, as prior investments in developing expertise with established approaches become sunk costs (Ng & Feldman, 2007). As subsequent task performance will be evaluated in relation to the new management structures, processes, and practices, MM will have to attend special training, engage in self-study and experimentation, and/or acquire additional certifications to operate a new system or tool. The efforts made by MM to learn the intricacies of new management approaches are crucial, as full-scale adoption of innovation is often delayed until sufficient operational know-how has been attained (Attewell, 1992).

This is further complicated by that fact that although employees tend to regard activities associated with established approaches as part of their "in-role," they often regard those that relate to supporting innovation, learning, experimentation, and change as "extrarole" demands (Van Dyne & LePine, 1998). In-role responsibilities are the familiar and predictable activities an organizational member is expected to perform, whereas extrarole behaviors are volitional activities that entail going the proverbial "extra mile" and being proactive in helping oneself and others[3] (Morrison & Phelps, 1999; Tsui et al., 2002). However, MM may not be motivated to engage in such behaviors, as extrarole activities can be draining and those who go the extra mile carry the risk of being scapegoated for failures (Glaser, Stam, & Takeuchi, in press; Trougakos, Beal, Cheng, Hideg, & Zweig, 2015). Thus, MI requires that MM, which is particularly disrupted by its introduction, be motivated to enact behaviors that require greater-than-usual effort.

The preceding discussion highlights key MM hurdles to MI, even when TM embodies characteristics that are favorable to MI (e.g., predominance of throughput-oriented functional experience). To theorize how these constraints can be relaxed, we draw on relational demography theory, which has shown that the behavioral dispositions of subordinates tend to vary according to the degree to which they identify with their superiors on the basis of similarity in characteristics (Tsui & O'Reilly, 1989).

Similarity Between Characteristics of TM and MM

The relational demography literature has emphasized supervisor–subordinate dynamics and provided important insights into how demographic similarity shapes the behavior of subordinates (Goldberg, Riordan, & Zhang, 2008; Tsui et al., 2002; Turban & Jones, 1988). With theoretical moorings in social identity and self-categorization theories (Ashforth & Mael, 1989; Tajfel & Turner, 1986), relational demography builds on the assertion that subordinates coclassify themselves and referent others into the same perceived social and/or professional groupings on the basis of characteristics that they share (Hogg & Terry, 2000). Ashforth and Mael further noted that individuals tend to be more supportive and committed to collectives with which they share salient aspects of their social identity—and this is especially applicable with regard to behaviors towards more visible referent groups (e.g., TM; Hogg & Terry).

The degree of identification with superiors on the basis of similar characteristics has, accordingly, been shown to be important for understanding work-related attitudes and behaviors of subordinates (e.g., Shore, Cleveland, & Goldberg, 2003; Tsui et al., 2002). Tsui et al. argue that demographic similarity invokes "an attraction dynamic whereby demographically similar individuals accentuate the positive attributes of each other and derive a positive social identity" (901). Dissimilar others in turn often face barriers to integration and increased conflict because of perceived differences in values, aloof demeanor, and/or miscommunication (Pelled, Ledford, & Mohrman, 1999). It has notably been argued that subordinates who are demographically similar behave in ways that are more consistent with their superiors' expectations and are more inclined to engage in extrarole behaviors (Dezsö & Ross, 2012; Goldberg et al., 2010; Tsui et al.).

Behavioral consistency. Similar others are perceived as a reflection of the self, and shared characteristics are often deemed to signal likenesses in deeper-level attitudes, values, and beliefs (Tsui & O'Reilly, 1989). Accordingly, subordinates perceive superiors similar to

themselves as more reliable, trustworthy, and competent (Lau, Lam, & Salamon, 2008). In turn, dissimilar others are often viewed as more dishonest, untrustworthy, and uncooperative (Pelled et al., 1999). These perceptions may underlie the beliefs and attitudes of subordinates regarding the extent to which changes are needed and the capacity of the organization to undertake them successfully (Rafferty, Jimmieson, & Armenakis, 2013). Furthermore, a more demographically similar MM is more likely to frame information from TM as an opportunity rather than a threat (Dutton & Ashford, 1993). In these situations, MM may be biased towards the upside potential of new information from TM, rather than the downside risk, and may be more predictable in their behaviors towards the more demographically similar TM (Dutton & Jackson, 1987).

In addition, similar others usually communicate more frequently regarding task-specific issues, and levels of informal interaction often increase in the face of task uncertainty (Zenger & Lawrence, 1989). When similar others interact, they tend to be more receptive to discussing and constructively reviewing information they receive from one another, with the result that there is less ambiguity over mutual expectations and more convergence in their interpretations of desired behaviors (Van Riel, Berens, & Dijkstra, 2009). Similar others also tend to be more efficient in their communications and exchange higher bandwidth of tacit knowledge (Gino, Shang, & Croson, 2009), thus increasing the informational value extracted from brief episodes of contact. This may help MM to arrive at a more aligned interpretation of what behaviors are expected to introduce the changes envisioned by TM (Balogun, 2006).

MM extrarole behaviors. Demographic similarity has also been associated with engagement in extrarole behaviors by subordinates (Tsui et al., 2002). From a social cognitive perspective, Morrison notes that "supervisors provide both information about formal job responsibilities and subtle cues about the informal responsibilities that employees should consider to be parts of their jobs" (1994: 1548). Morrison further notes that "if an employee defines a behavior as in-role, he or she is more likely to perform it than if he or she defines it as extra-role" (1545). As subordinates may have lower cognitive barriers to accepting cues from similar others (Gino et al., 2009), MM may be more likely to view behaviors relating to supporting MI as part of their expected duties. Thus, by virtue of adopting broader and more encompassing interpretations of what constitutes their in-roles, a demographically similar MM is more likely to enact the behaviors needed to facilitate MI as envisioned by TM.

From a status enhancement perspective, Goldberg et al. (2010) suggested that subordinates will make a greater effort to enhance social esteem for the salient characteristics they share with highly visible referent groups (e.g., TM). MI increases uncertainty and implies that extra effort will need to be made to reduce the likelihood of failure. Failure to introduce the intended changes will reflect poorly on the ability of TM to execute strategic tasks and may taint the status of the characteristics represented in that group. However, when similar superiors succeed in the face of uncertainty, the status of their salient characteristics is enhanced and becomes favorably associated with a perceived ability for executing similar important tasks competently (Goldberg et al.; McGinn & Milkman, 2013).

Finally, from a fairness perspective (Ritter, Fischbein, & Lord, 2005), whereas in-role performance can be assessed relatively objectively in relation to established managerial performance indicators, the task uncertainty associated with the introduction of MI may blur the distinction between in-roles and extraroles. Similar subordinates have been shown to be

better at anticipating what will be rewarded by their superiors (Judge & Ferris, 1993; Turban & Jones, 1988). In contrast, dissimilar subordinates who champion implementation of new-to-the-firm practices could be scapegoated or held accountable for unintended consequences and failures (Balogun, 2003). As a result of anticipatory injustice, a more dissimilar MM may seek to err on the conservative side and seek perceived safe harbor in familiar routines with established in-role performance indicators (Rodell & Colquitt, 2009).

Building on the preceding discussion, we advance the proposition that *a TM inclined towards MI by virtue of its compositional characteristics will be better able to introduce new management structures, processes, and practices when MM and TM are more similar in their characteristics.* To add depth to our proposition, we proceed to develop hypotheses relating to similarity in professional background (i.e., functional orientation and education level) and biodemographic characteristics (i.e., age and gender).

TM-MM Functional Orientation Similarity

Organizational members with similar knowledge boundaries tend to have higher consensus on organizational priorities and are better able to coordinate knowledge exchange and integration (Ben-Menahem, von Krogh, Erden, & Schneider, in press). Members of MM in throughput functions will be least fazed by MI, whereas output-oriented members (e.g., sales, marketing, R&D) have to traverse knowledge boundaries in order to embrace the rationale for, and utility of, new ways of doing managerial work (Bechky, 2003). Throughput-oriented members of MM will thus tend to have less difficulty accepting and comprehending insights from a similarly oriented TM, as they are more likely to consider initiatives to improve structures, processes, and practices as part of their in-roles. As the in-role activities and performance indicators of MM in output-oriented functions are primarily on the market side (e.g., market development, client acquisition), the effort required to introduce MI is more likely to be categorized as extrarole. Thus, a more throughput-oriented TM will be better able to introduce new management structures, processes, and practices when there is greater similarity in functional orientation between TM and MM.

Hypothesis 2: The positive relation between TM throughput orientation and MI will be stronger when there is greater similarity in functional orientation between TM and MM.

TM-MM Education Level Similarity

Education is a building block of problem-solving ability and an indicator of specific and general proficiency (Bantel & Jackson, 1989). General ability refers to cognitive aptitude for information processing and analysis, integrative complexity, and tolerance of ambiguity (Kimberly & Evanisko, 1981). As such, managers who are more highly educated may have more expansive interpretations of their in-roles by virtue of having wider and more efficient information-processing capabilities, a more sophisticated ability to cope with complexity, and greater confidence in their ability to manage a major transformation of the firm (Day & Lord, 1992). When those in MM are more highly educated than those in TM, they may feel that change processes lack ambition, are trivial, or are too slow, and they may thus lose motivation and drag their feet. In turn, an MM with a lower level of education may be more

overwhelmed by new-to-the firm changes and may estimate the likelihood of success somewhat differently from TM.

Education also affects perceptions of acceptable time horizons for payoffs. More highly educated managers tend to be more accommodating of long-term payoffs than those who are less educated, as the process of becoming highly educated itself entails trade-offs between short-term gains (e.g., immediate participation in the labor market) and potentially larger gains in an unknown future (Lindberg, 2009). When those in TM and MM have a more similar level of education, they will be more closely aligned in terms of how they perceive their own capability to effect change, the expected time horizons for payoffs, and also what they can expect of one another. From this, we can expect that a more throughput-oriented TM will be better able to introduce new management structures, processes, and practices when there is greater similarity in education level between TM and MM. Thus,

Hypothesis 3: The positive relation between TM throughput orientation and MI will be stronger when there is greater similarity in education level between TM and MM.

TM-MM Age Similarity

Age reflects general life experience, generational worldviews, and beliefs otherwise accrued over an individual's lifetime. Twenge, Campbell, Hoffman, and Lance (2010) observed that social values (e.g., making friends) and intrinsic values (e.g., having an interesting, results-oriented job) were rated lower by millennials than by baby boomers. This echoes the finding from Cherrington, Condie, and England (1979) who noted that younger workers place greater stock on the importance of money, whereas older workers attach more value to pride in craftsmanship and the moral importance of work. Given that changes to working practices disrupt both technical and social dimensions of the workplace, the value of MI may be experienced differently by younger and older managers. Whereas intended improvements to work processes might be valued more highly by younger managers from a technical standpoint, older managers might assess the changes more in terms of their social and emotional implications for the work environment. This might lead to diverse interpretations of where the intended improvements add value to, or detract from, the work environment.

In addition, the worldview of younger managers tends to reflect more current managerial trends and emerging practices than that of older managers, whose cognitive frames tend to reflect more traditional approaches to working. For instance, younger managers are typically more familiar with new practices, such as flexible working hours and alternative forms of work (e.g., virtuality; Gibson & Gibbs, 2006), and this might accentuate generational differences in work values (Twenge et al., 2010). Feldman and Ng further noted that individuals' ability to learn is variable over their lifetime, and the "cognitive cost" of learning new material is "greater for the middle aged and older adults than it is for young adults" (2007: 363; Kanfer & Ackerman, 2004). As such, differences in age may create tensions in terms of the elements of the work environment that are ascribed more importance and differences in the effort required to learn new ways of working. Taken together, we can expect that a more throughput-oriented TM will be better able to introduce new management structures, processes, and practices when there is greater similarity in age between TM and MM. Thus,

Hypothesis 4: The positive relation between TM throughput orientation and MI will be stronger when there is greater similarity in age between TM and MM.

TM-MM Gender Similarity

Gender differences are often believed to reflect deeper, sex-specific strengths and weaknesses in psychological disposition and task abilities (Hyde, Lindberg, Linn, Ellis, & Williams, 2008)—albeit often inaccurately (S. N. Taylor & Hood, 2011). This inaccuracy is particularly prevalent in relationships across genders, where gender cues inform expectations about role abilities and reinforce stereotypes (Kark, Waismel-Manor, & Shamir, 2012), such as expected management styles and attitudes towards change (Damanpour & Schneider, 2006; Eagly & Johnson, 1990). As such, superiors and subordinates who are of different genders are more likely to see one another's strengths and weaknesses differently and will be less accurate in their assessment of expected task proficiency. In addition, men have been shown to react more unfavorably to feedback from women in the work environment, making open and critical communications more difficult and reducing the depth of insights absorbed from periodic interactions (Geddes & Konrad, 2003). Same-sex superiors and subordinates in turn report more positive working relationships (Vecchio & Brazil, 2007), and this then leads them to frame the information exchanged more constructively.

Threats to status may also be accentuated when groups that embody particular characteristics are associated with failure—this is especially the case for minorities in highly visible positions, such as women in TM (Haslam & Ryan, 2008). Dezsö and Ross note that "female representation in TM should engender greater motivation and organizational commitment in lower-level women managers, leading them to improve their individual performance and contributions to the managerial groups to which they belong" (2012: 1076). This is because a female middle manager will benefit from exerting extra effort to support a female top manager's success, as a favorable association may be made between the achievements of that top manager and the salient characteristic that they share. In addition, females in TM might be more empathetic to the challenges faced by women in lower management positions and be more likely to recognize the efforts of females in MM that are extrarole (Haslam & Ryan). As such, female members of MM may expect to receive fairer rewards (e.g., recognition) for going the extra mile. From this, we can expect that a more throughput-oriented TM will be better able to introduce new management structures, processes, and practices when there is greater similarity in gender between TM and MM. Thus,

Hypothesis 5: The positive relation between TM throughput orientation and MI will be stronger when there is greater similarity in gender between TM and MM.

Data and Method

We test our hypotheses on a sample of organizations operating in the Netherlands. Data on MM are notoriously difficult to gather, as firms have to safeguard sensitive information about their employees and have little incentive to disclose the identity and performance of individual managers. The main justification for using this sample was that we had a unique

opportunity to acquire longitudinal data on MM characteristics that could be matched reliably to TM and firm-level data. Data on middle managers were obtained in cooperation with a large globally recognized human resources consulting firm that conducts performance evaluations of these managers.[4] Although this imposes restrictions on data that can be collected (e.g., identities of individuals have to be strictly protected), we were able to obtain raw anonymized demographic data on more than 7,000 manager-year observations from 2001 to 2007, which we complemented with data from close to 1,000 top managers by using archival sources. For the larger data set, additional firm- and industry-level data were collected for the years 2000 to 2008. In aggregate, we managed to assemble a data set of 33 firms across different industries with a usable sample of 225 firm-year observations for which sufficient data could be obtained to test the current hypotheses. Although our sample is not random, it provides us with a unique opportunity to test hypotheses by using a longitudinal data set on both TM and MM characteristics.

Variables and Measures

Predictors. For Hypothesis 1 (H1), we operationalized *TM throughput functional orientation* as the proportion of top managers with functional expertise in administration, general management, finance/accounting, human resources, and production/operations (Hambrick & Mason, 1984; Heyden, Reimer, & Van Doorn, in press; Hoffman & Hegarty, 1993). As Hypotheses 2 through 5 (H2, H3, H4, and H5, respectively) are moderating hypotheses, we aimed to develop a straightforward measure of the degree of similarity between TM and MM in order to obtain a single variable that would allow for intuitive interpretation (Dawson, 2014). We sought to create interaction terms between the variable corresponding to H1 and TM-MM similarity variables—*TM-MM functional orientation similarity* (H2), *TM-MM education level similarity* (H3), *TM-MM age similarity* (H4), and *TM-MM gender similarity* (H5). As there were no established guidelines for operationalizing TM-MM demographic similarity, we did so in several steps.

First, we calculated group scores for TM and MM characteristics and adopted the same coding for each layer. We adopted the coding described for H1 to obtain *MM throughput functional orientation* scores. For *TM education level* and *MM education level*, we took the proportion of managers with advanced degrees (i.e., master's level or higher) in each managerial cadre (Heyden, Kavadis, & Neuman, 2017). For *TM age* and *MM age*, we took the average age, and for *TM female representation* and *MM female representation*, we took the proportion of women in each respective cadre (Helfat, Harris, & Wolfson, 2006). Next, to obtain similarity scores (ranging from low to high similarity), we subtracted the MM scores from the TM scores obtained in the previous step. At this stage, both the larger negative and larger positive values denote greater *dis*similarity between TM and MM for each characteristic. We thus took the square of this score to eliminate the negatives and obtain a unidirectional metric score that could be included intuitively in our multivariate model. To aid interpretation, we inverted this value so that values in the more positive direction would denote higher levels of similarity between TM and MM on a particular characteristic. We then constructed interaction terms between *TM throughput functional orientation* and the similarity measures corresponding to the moderating hypotheses.

Table 1
Search Dictionary Computer-Aided Content Analysis

Theoretical Node 1: Structures	Theoretical Node 2: Processes	Theoretical Node 3: Practices
Architect*	Activit*	_based/ -based
Design*	Communicat*	Best_practic*
Diversif*	Distribut*	Concept*
Flex*	Efficien*	Framework
Hierarch*	IT	Incentiv*
Layer	Proced*	Method*
Network*	Process*	Model*
Outsourc*	Routin*	Practic*
Portfolio*	Rule*	Styl*
Struct*	Standard*	Technique*
	Standardi?e*	Tool

Note: General keywords used to capture change in our compound query include terms such as adopt*, chang*, first, implement*, improv*, innov*, modif*, new, novel*, replac*, simplif*, strateg*, transform*, unprecedent*, and their variations.

Dependent Variable: A Content Analysis Approach

We developed a novel approach for measuring MI by using a computer-aided content analysis. Computer-aided content analysis assists researchers in filtering, categorizing, and processing information by combining the strengths of computer reliability and expert human judgment (Krippendorff, 2004). It rests on the premise that groups of words reveal underlying themes and that co-occurrences of keywords can be interpreted as reflecting association between the underlying concepts (Duriau, Reger, & Pfarrer, 2007: 6). As a first step, we developed a search dictionary to capture different dimensions of MI. We drew on the definitions of Vaccaro, Jansen, Van Den Bosch, and Volberda (2012) and identified keywords representing management structures (i.e., "how organizations arrange communication and align and harness effort from their members"), processes (i.e., "routines that govern the work of managers"), and practices (i.e., "what managers do as part of their job on a day-to-day basis"). To capture *changes* in these dimensions, we further identified synonyms of "change" by consulting reputable sources (e.g., Merriam-Webster thesaurus) and seeking suggestions from expert peers. This allowed us to adopt a compound query approach by identifying keywords of MI that co-occur with keywords reflecting change, thereby increasing the accuracy of our dictionary. Our search dictionary is presented in Table 1.

Textual sources. Analysis of documented sources, such as annual reports, has been gaining acceptance as a useful and unobtrusive source of reliable textual data (e.g., Heyden, Oehmichen, Nichting, & Volberda, 2015; Tuggle, Schnatterly, & Johnson, 2010). Annual reports have a long tradition of usefulness in management studies worldwide (e.g., Chang, Most, & Brain, 1983), and the merits of their specific components in our particular empirical context have also been discussed (e.g., Vergoossen, 1993). As with all sources of documented information, one has to make a careful judgment regarding their strengths and limitations

Table 2
Sample Excerpts From Computer-Aided Content Analysis

Company[a]	Sample Excerpt
Alpha (2006)	"We now have a strong focus on execution, all through the organization. We have implemented the unit steering model and standardized selected key work processes."
Beta (2003)	"We have replaced the existing structure with four core divisions, each headed by a member of the Executive committee. In a change from the past, the new structure ensures greater accountability for performance and customer service while making better use of our internal supply chains and facilitating the sharing of resources and best practice."
Charlie (2004)	"In 2004, the first steps were taken within the Fixed division to structure its activities around the following customer groups and operations: Consumer, Business and Wholesale & Operations."

[a]Pseudonyms.

for the purposes of a specific study, as some have questioned the validity of corporate communications (e.g., Crawford, 2003). We thus took precautions by interrogating data extracted from these sources further.

Validity and reliability of search dictionary. We ascertained the face validity of our search dictionary by consulting several peers with expertise in strategic and organizational change in order to help us validate our list of indicators. We adjusted the list following their suggestions and removed items if we also agreed after further consideration that they could be deemed ambiguous. Then, using QSR NVivo 10, we sought to identify MI keywords that occurred within plus or minus 25 words of our list of synonyms for "change." We visually inspected samples of this output to judge whether our co-occurrence logic captured reasonably what we were intending to measure, and on the basis of an agreement principle, we excluded keywords that were deemed ambiguous. We further computed the Cronbach's alpha scores to determine interkeyword consistency for each node, and alphas obtained were greater than .70 after exclusion of inconsistent keywords. We used Krippendorff's alpha as our measure of intercoder reliability (Krippendorff, 2004) and determined intercoder reliability of a random sample of 100 keywords in a plus or minus 10 word context between two expert coders (lead authors), two naïve coders (research assistants), and the experts and naïve coders. Alpha scores obtained ranged between .68 and .88 across the different conditions and theoretical nodes, giving us confidence that our dictionary was performing reliably for subsequent analyses. Table 2 shows sample excerpts from the computer-aided content analysis.

Other validity considerations. We looked further at the concurrent validity of our proposed measure by correlating it with several objective measures with which it could reasonably be expected to be associated. First, we considered the *overhead ratio* (i.e., operating expenses/[taxable net interest income + operating income]). The management activities of a firm are considered to be overhead; thus, we can expect that MI should be negatively correlated to this ratio as a result of efficiency gains from changes in administrative practices and/or increases in value derived from administrative overhead. The bivariate correlation attained was −.18 ($p < .01$), consistent with our expectations. Next,

we looked at *reorganization expenses*, which are classified as exceptional items in financial statements. When these are substantial, such as when a firm adopts a new system organization-wide, they are reported distinctively so as to account for one-off expenses associated with changes to the internal organization. We constructed a dummy variable, taking the value of 1 for cases that indicated that they incurred restructuring costs in the current fiscal year and 0 otherwise. The bivariate correlation coefficient was .30 ($p < .001$), consistent with our expectations. Finally, we looked at *managerial productivity*, as MI has been associated with increased productivity (Bloom et al., 2013). We calculated a measure of managerial productivity that captures the total revenues of the firm per manager by dividing firm sales by the total number of managers in our sample and found a positive correlation ($r = .20$; $p < .01$), in line with expectations. Together, these steps gave us confidence that our novel measurement approach was empirically tapping into MI as theorized.

Dependent variable score. In line with Birkinshaw et al. (2008: Foonote 2), we attest that the distinction between structures, processes, and practices is not clean either conceptually or empirically, so it would be difficult to define MI in a way that excluded another dimension unless it was theoretically relevant for the specific research question (cf. Young et al., 2001). We applied our search dictionary to our textual sources as a compound query (plus or minus 10 words) in NVivo. As an illustration, to capture a "change in structure," we sought to count only instances of keywords with the root "struct" when they occurred within a plus or minus 10 word context of "change." The final counts of keywords extracted from our computer-aided content analysis were corrected for the length of the overall text, and the saved scores were recorded as percentages. Our measure thus taps into the *extent of MI*, and scores for this variable ranged up to 2.13 in this study. For our multivariate analysis, we take this variable at t_{+1} to accommodate temporal manifestation of the theorized mechanisms and to mitigate causality issues. Our interpretation of our dependent variable is akin to that of Mol and Birkinshaw (2009) and Vaccaro et al. (2012), with higher scores indicating a greater extent of organization-wide changes in managerial structures, processes, and practices.

Controls. We controlled for *firm performance* by taking return on assets because well-performing firms have more slack resources with which to experiment with MI, and *firm size* was taken into account (using the log of total employees) because it has also been shown to play a role (Vaccaro et al., 2012). We further controlled for *TM size* and *MM size* by taking the log of the number of both top managers and middle managers in our sample and we used *TM average organizational tenure* as shorter tenured members are more likely to have brought with them new insights into how managers perform their tasks elsewhere. We included year dummies to capture unobserved time effects and industry dummies, which we recoded from the SBI (Dutch Standaard Bedrijfsindeling) industry codes into business services and consulting (21.33%); consumer goods, wholesale, and retail (14.22%); financial services (14.22%); heavy and regulated industries (18.22%); manufacturing (14.22%); and other (17.78%). We used fluctuation in sales as a metric of *industry dynamism* in the main industry code (Castrogiovanni, 2002). We also residual-centered the interaction terms to mitigate multicollinearity.

Analysis and Results

We analyzed the data by using generalized estimating equations. This multivariate technique is suitable in the event of nonindependent observations and has been considered as an emerging best practice in quantitative management research (Echambadi, Campbell, & Agarwal, 2006), as it accounts for both time-invariant "subject" effects and time-varying "within-subject" effects (Ballinger, 2004). We specified a firm-level subject effect and treated the repeated annual observations as within-subject effects. Estimation followed a stepwise approach, and model fit was assessed based on the Wald's chi-square and QIC (quasi–Akaike information criterion) statistics.

Table 3 provides an overview of the descriptive and bivariate statistics for the variables used in this study, and Table 4 displays our multivariate results. The full model shows the best fit with a Wald's chi-square of 132.39 ($p < .001$) and a QIC of 134.93. We observe that the parameter for H1 (*TM throughput functional orientation*) was significant and in the expected direction ($b = 0.14$; $p < .05$). This corroborates H1 and provides us with a solid base upon which to examine the moderating effects of interest, where we expected that a greater degree of similarity between TM and MM in functional orientation (H2), education level (H3), age (H4), and gender (H5) would strengthen the baseline association postulated for H1.

Looking at the parameter corresponding to H2, we see a statistically significant coefficient ($b = 0.13$; $p < .05$), which warrants inspection of the interaction plots. As can be seen in Figure 1a, the influence on MI is most pronounced for the high TM-MM throughput orientation condition—providing support for H2. For H3, we also obtained a statistically significant estimate ($b = 0.25$; $p < .001$), providing evidence that the greater similarity in education level between TM and MM strengthens the baseline relation postulated for H1. Looking at the corresponding plot in Figure 1b, we observe that the obtained effect is most pronounced for the high similarity condition, thus supporting H3. For H4, however, we did not obtain a statistically significant effect ($b = 0.05$; n.s.). Looking at Figure 1c, we see that there is no discernable difference between the slopes for either high or low similarity conditions—thus, we have to reject H4. For H5 in turn, we did obtain a statistically significant result ($b = -0.10$; $p < .05$), but from the corresponding interaction plot in Figure 1d, we can see that the results are in the opposite direction to what we had predicted. This suggests that MI is most pronounced when there is less similarity between TM and MM in terms of gender. To dig deeper into possible statistical reasons for our rejected hypotheses, we also conducted sensitivity tests where we excluded the highest and lowest MI values for each observation year and reran our models on the basis of this subsample ($n = 199$). This approach replicated our pattern of results, with a notable strengthening of the statistical significance of the parameter corresponding to H5 ($p < .01$).

Discussion

In this study, we have looked at intraorganizational determinants of MI by examining the conjoint influence of TM and MM characteristics. We have argued that although TM may be predisposed to introduce new managerial structures, processes, and practices, MI could have a disruptive effect on MM. Informed by insights from relational demography theory, we have argued that a TM that is inclined to change the internal functioning of the organization through MI may be better enabled to do so when MM is behaviorally aligned with TM and motivated to engage in extrarole behaviors. We have developed specific

Table 3
Bivariate Correlations and Descriptive Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*M*	*SD*
1. Management innovation																										0.51	0.43
2. TM throughput functional orientation	.26																									0.81	0.26
3. MM throughput functional orientation	.03	.08																								0.40	0.19
4. TM education level	.06	.00	.11																							0.45	0.13
5. MM education level	.06	.29	.18	.18																						0.40	0.17
6. TM age	.08	−.06	.06	.18	−.02																					52.99	3.76
7. MM age	−.15	−.13	.32	.41	.13	.33																				43.20	3.16
8. TM female representation	−.24	.00	−.05	−.14	.26	−.15	−.02																			0.05	0.11
9. MM female representation	.13	.08	−.42	−.25	.31	−.28	−.48	.14																		0.18	0.12
10. TM size	.40	.13	−.03	−.03	.12	.03	−.14	−.14	.11																	0.61	0.16
11. MM size	.09	.02	.08	−.05	−.17	.31	.08	−.14	−.29	.08																1.52	0.50
12. TM tenure	.06	−.22	−.12	−.05	−.21	.43	−.08	−.35	−.19	.11	.29															15.86	8.27
13. Firm size	.48	.16	.00	−.16	−.02	.29	.20	−.09	−.03	.53	.24	.19														3.92	0.90
14. Industry dynamism	−.15	−.08	−.12	−.05	−.09	.07	.03	.23	.04	−.10	−.01	−.07	.05													0.08	0.17
15. Return on assets	.06	−.14	.01	.22	−.08	−.02	.06	−.10	−.16	.14	.01	.05	−.03	.03												0.04	0.09
16. TM-MM functional similarity	−.07	−.53	.69	.05	−.09	.12	.32	−.13	−.34	−.04	.11	.06	−.03	−.02	.07											−0.27	0.25
17. TM-MM education level similarity	.07	−.18	−.01	.37	−.79	.14	.16	−.37	−.45	−.10	.22	.17	.13	.09	.14	.16										−0.15	0.15
18. TM-MM age similarity	−.16	−.08	.15	.22	.16	−.62	.48	.13	−.04	−.14	−.25	−.50	−.17	−.01	.11	.13	−.04									−111.16	79.58
19. TM-MM gender similarity	−.21	.05	.29	.17	−.20	.27	.35	.08	−.76	−.11	.29	.05	.06	.16	.08	.16	.27	−.03								−0.04	0.05
20. Business services and consulting	−.04	.04	.09	.41	.22	−.11	.07	−.09	.23	−.26	−.26	−.15	−.26	−.12	.14	−.02	−.05	.24	−.28							0.21	0.41
21. Consumer goods, wholesale, retail	.05	.04	−.10	−.18	−.19	.12	−.22	−.16	−.03	−.10	−.05	.34	−.15	−.07	−.02	−.11	.09	−.33	.08	−.21						0.14	0.35
22. Financial services	.10	.30	.17	.01	.31	−.10	−.01	−.18	.07	.25	.26	−.15	.05	−.09	−.04	−.07	−.14	.08	−.10	−.21	−.17					0.14	0.35
23. Heavy and regulated industries	−.14	−.05	.05	−.15	.08	−.08	−.08	.36	−.17	.01	−.06	−.10	−.09	.02	.01	.02	−.17	.02	.21	−.24	−.19	−.19				0.18	0.39
24. Manufacturing	−.05	−.22	.03	.08	−.20	.04	.20	.00	−.28	−.21	.09	.23	.14	−.02	−.10	.18	.19	.03	.16	−.21	−.17	−.17	−.19			0.14	0.35
25. Other	.09	−.10	−.24	−.21	−.23	.16	.03	.02	.17	.31	.05	−.10	.33	.27	−.01	−.01	.09	−.10	−.04	−.24	−.19	−.19	−.22	−.19		0.18	0.38

Note: Correlations above |.11| are significant at $p < .10$; correlations above |.14| are significant at $p < .05$; correlations above|.17| are significant at $p < .01$; correlations above |.22| are significant at $p < .001$ (two-tailed). TM = top management; MM = middle management.

Table 4
Generalized Estimating Equation Results for Extent of Management Innovation

	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Return on assets	0.05	(0.05)	0.06	(0.05)	0.04	(0.05)	0.05	(0.05)	0.05	(0.05)	0.05	(0.05)
Industry dynamism	–0.04	(0.07)	–0.06	(0.07)	–0.05	(0.07)	–0.04	(0.07)	–0.05	(0.07)	–0.09	(0.07)
Firm size	0.46	(.013)***	0.49	(0.13)***	0.55	(0.12)***	0.46	(0.13)***	0.45	(0.13)***	0.58	(0.12)***
TM tenure	–0.17	(0.09)*	–0.16	(0.08)†	–0.20	(0.09)*	–0.17	(0.08)*	–0.16	(0.08)†	–0.16	(0.08)*
TM size	0.11	(0.13)	0.07	(0.13)	0.04	(0.12)	0.11	(0.13)	0.10	(0.13)	–0.03	(0.12)
MM size	0.16	(0.09)†	0.16	(0.09)†	0.17	(0.08)*	0.16	(0.09)†	0.16	(0.09)†	0.19	(0.08)*
TM female representation	–0.26	(0.10)**	–0.22	(0.10)*	–0.26	(0.09)**	–0.26	(0.10)**	–0.25	(0.10)**	–0.21	(0.09)*
MM female representation	0.20	(0.13)	0.21	(0.13)	0.21	(0.13)	0.20	(0.13)	0.21	(0.13)	0.25	(0.12)*
TM age	0.03	(0.07)	0.05	(0.07)	–0.02	(0.07)	0.04	(0.07)	0.03	(0.07)	–0.04	(0.07)
MM age	–0.28	(0.09)**	–0.28	(0.09)**	–0.31	(0.09)**	–0.28	(0.09)**	–0.27	(0.09)**	–0.31	(0.09)***
TM education level	0.36	(0.16)*	0.37	(0.16)*	0.37	(0.13)**	0.36	(0.16)*	0.38	(0.15)*	0.40	(0.13)**
MM education level	0.06	(0.10)	0.04	(0.10)	0.04	(0.09)	0.06	(0.10)	0.05	(0.10)	–0.01	(0.08)
MM throughput functional orientation	0.16	(0.09)†	0.16	(0.09)†	0.15	(0.09)†	0.16	(0.09)†	0.17	(0.09)†	0.16	(0.09)†
TM-MM gender similarity	–0.25	(0.08)**	–0.25	(0.08)**	–0.22	(0.08)**	–0.25	(0.08)**	–0.24	(0.08)**	–0.21	(0.08)**
TM-MM age similarity	0.19	(0.07)**	0.19	(0.06)**	0.18	(0.06)**	0.19	(0.06)**	0.18	(0.06)**	0.16	(0.06)**
TM-MM education level similarity	0.04	(0.08)	0.04	(0.09)	0.02	(0.08)	0.04	(0.09)	0.04	(0.08)	0.01	(0.08)
TM-MM functional similarity	–0.05	(0.07)	–0.04	(0.07)	–0.09	(0.08)	–0.05	(0.07)	–0.04	(0.07)	–0.08	(0.08)
H1: TM throughput functional orientation	0.17	(0.07)*	0.16	(0.07)*	0.14	(0.07)*	0.17	(0.08)*	0.17	(0.07)*	0.14	(0.06)*
H2: TM Throughput × TM-MM Functional Similarity			0.11	(0.05)*							0.13	(0.06)*
H3: TM Throughput × TM-MM Education Level Similarity					0.21	(0.06)**					0.25	(0.06)***
H4: TM Throughput × TM-MM Age Similarity							0.00	(0.07)			0.05	(0.07)
H5: TM Throughput × TM-MM Gender Similarity									–0.09	(0.05)†	–0.10	(0.05)*
Wald's chi-square	91.01	***	95.71	***	115.10	***	89.88	***	89.13	***	132.39	***
QIC	152.03		149.62		141.16		152.85		152.07		134.93	

Note: $N = 215$. Predictors from 2001 to 2007; dependent variable at t_{+1} (i.e., 2002–2008); model estimated with industry dummies, year dummies, and intercept but are excluded here because of space constraints. TM = top management; MM = middle management; H1–H5 = Hypotheses 1–5, respectively; QIC = quasi–Akaike information criterion.

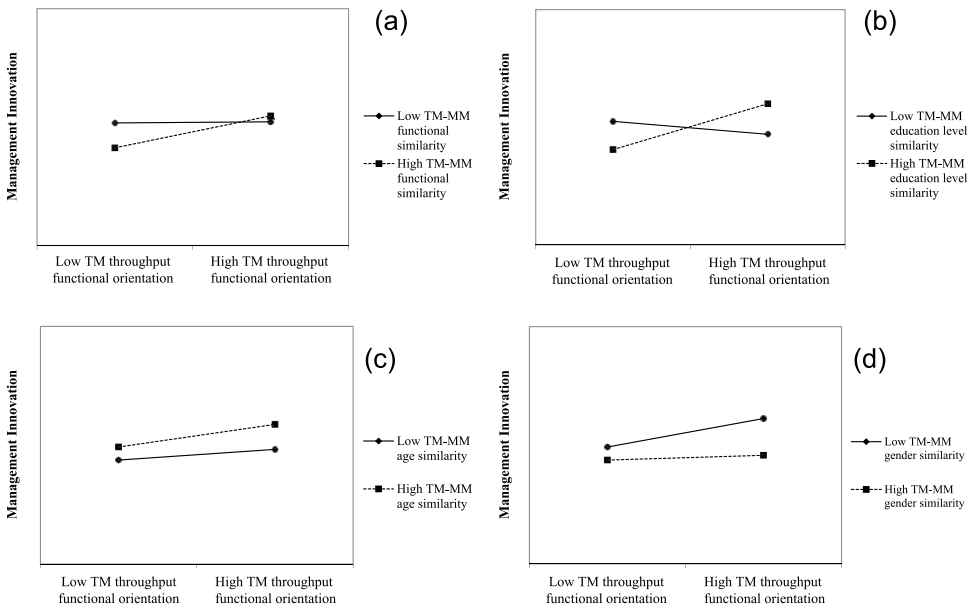
†$p < .10$.

*$p < .05$.

**$p < .01$.

*** $p < .001$.

Figure 1
Interaction Plots



Note: The plots display the slopes for the effect of TM throughput orientation on management innovation under conditions of high and low similarity in (a) TM-MM functional orientation, (b) TM-MM education level, (c) TM-MM age, and (d) TM-MM gender. TM = top management; MM = middle management.

hypotheses to examine how similarity in professional and biodemographic characteristics between these two managerial cadres plays a role. Our findings provide support for our first three hypotheses (H1–H3) but point to more complex processes that need to be investigated further for H4 and H5. Our theorizing and findings offer several contributions with allied implications.

Management and MI

Our study provides a pioneering account of how behavioral dispositions that are shaped by the professional and biodemographic identification context between TM and MM may enable or constrain MI. In the context of top-down strategy more generally, some scholars have pointed out that neglecting to consider the strategic involvement of MM could be a factor that accounts for some inconsistent results in the strategic leadership literature (Carpenter et al., 2004; Wooldridge et al., 2008). This is crucial, given that interactions between TM and MM tend to be limited, creating room for differing interpretations of the rationale for intended changes (Balogun & Johnson, 2005; Mantere, 2008; Raes et al., 2011). In addition, MM has to be motivated to learn new ways of working and give sense to others of the rationale for MI. The lack of consideration for how the intended changes affect MM, the very actors who are entrusted with implementing changes, could be one key reason for why firms still struggle to introduce MI (Hamel, 2006).

In providing some insights to the question raised by Birkinshaw et al. (2008), we find that the role of managers in MI is socially quite complex and that understanding the (mis)alignment between the characteristics of TM and MM is crucial. In particular, it is important to consider the extent to which MM identifies with TM on different characteristics and is inclined to behave in ways that are consistent with TM expectations and willing to expend additional effort. We thus highlight that *both* TM and MM need to be researched together to address this question, as better explanations can be achieved than when the roles or characteristics of either level are considered in isolation. As such, we believe the time is right for a research agenda that looks at how the characteristics of both TM and MM matter and, perhaps more importantly, at the particular contexts in which they do so.

TM and MM Characteristics

The literature on similarity in supervisor–subordinate relations has been found to be particularly insightful for our purposes in that it provides a theoretical point of departure for understanding the behavioral dispositions associated with coexisting characteristics of TM and MM. Focusing on these characteristics is important, as although some have examined the actual roles enacted by middle managers during periods of instability (e.g., Huy, 2002; A. Taylor & Helfat, 2009), the shortcoming of studying enacted roles is that they can usually be ascertained only *after* the implications and consequences of the actions taken become apparent. The relational demography approach we take provides a complementary angle that helps us to *anticipate* MM behaviors by looking at the identification context arising from similarity in characteristics between TM and MM. By drawing attention to MM characteristics more generally, we introduce cross-echelon demographic similarity as a useful way of understanding how the characteristics of TM and MM influence firm processes. However, these characteristics coexist in complex ways. In particular, while we found support for the influence of similarity in professional characteristics (H2 and H3), the findings on biodemographic similarity (H4 and H5) were counter to our expectations.

One reason for the nonfinding of TM-MM age similarity as a moderator between TM throughput orientation and MI (H4) could be that TM and MM are characterized by systematic differences in age. In other words, on average, it simply takes longer to progress through the organizational ranks to reach each cadre. Thus, the fact that there is less similarity in age between TM and MM could be a systematic feature of age distributions across organizational ranks and not a sufficiently salient characteristic to differentiate perceived social groupings (Hogg & Terry, 2000). In addition, it could be that, as a moderator, the subgroup of observations where TM and MM are actually of similar ages is pretty small. In these cases, a greater degree of age similarity might be reflecting the presence of an older MM group, with MM members who have stagnated in their upward progression and are less likely to be willing to devote additional effort, given their diminished career opportunities (Fairburn & Malcomson, 2001). This could point to more complex nonlinear associations, where proximity in age may breed resentment by MM and a large age differential may cause communication disconnects and accentuate generational divides.[5] Whether this is the case remains to be examined more in depth.

For TM-MM gender similarity (H5), we found evidence that greater similarity plays a role but in the opposite direction than hypothesized. Indeed, in the broader literature on demographic similarity, findings on gender similarity have more generally been inconclusive

(cf. Chattopadhyay, 1999; Epitropaki & Martin, 1999; Jeanquart-Barone, 1993). One explanation could be that the representation of women in TM is small (5% on average in our sample; see also Dezsö & Ross, 2012; Helfat et al., 2006). This might imply that the status enhancement submechanism might need to take into account whether female members of MM actually *want* to be associated with female members of TM, who are likely to be in a minority or low-status position (Steele, Spencer, & Aronson, 2002). Women in MM may therefore not necessarily benefit much from their extra support for women in TM, who are few in numbers and might have only limited influence. Instead, female middle managers may need to be well regarded by male top managers, whose preferences are likely to predominate in decisions regarding career opportunities. This resonates with earlier findings that show that the level of trust between subordinates and supervisor tends to be higher when female subordinates report to male supervisors (Jeanquart-Barone). Given an increasing push for women to take on senior leadership positions, a key open question to be examined is whether this effect will be reinforced, neutralized, or reversed as more women enter the executive suite. As such, we suggest that this hypothesis in particular may need to be retested in the future and/or in contexts with higher representation of women in senior positions.

Taken together, our rich findings provide a basis for future inquiry into (1) how the characteristics of both these important management echelons matter, (2) the complex ways in which the different characteristics coexist, and (3) how they can be managed to enable cross-echelon consistency in terms of behavioral expectations and MM motivation to engage in extrarole activities. Our observation that firms are better able to introduce MI when there is greater degree of similarity between their TM and MM echelons has important implications—including with regard to decisions on staffing at both these levels of management. However, it also raises paradoxical challenges, as we discuss next.

The Interplay Between Types of Innovation

Although studies usually emphasize market-focused technological and product innovation (Ahuja et al., 2008), the competitive advantages offered by these types of innovation have become relatively short lived, being eroded by low-cost/high-skilled global competitors, reverse engineering, and a weakening of intellectual property protection (Damanpour & Aravind, 2012; Volberda et al., 2013). Therefore, studying MI is timely and important. However, different forms of innovation have different paths for realization and adoption. Most notably, technological innovation tends to follow a bottom-up process that is nurtured by variance-increasing behaviors of MM, such as the exploration and championing of autonomous initiatives (Burgelman, 1983; Mom, van Neerijnen, Reinmoeller, & Verwaal, 2015). MI, on the other hand, follows a top-down approach (Damanpour & Aravind; Khanagha et al., 2013), where we have highlighted the importance of variance-reducing behaviors grounded in alignment between TM and MM.

Although we have shown that demographic similarity between these two echelons can help to facilitate the introduction of MI, dissimilarity (or diversity more generally) can be expected to be crucial in inducing variation necessary for the development of innovative new products and services. Thus, although our study shows that homogeneity plays a counterintuitive role in combating managerial inertia, this same homogeneity could act as a constraint to other forms of innovation. To the extent that multiple types of innovation are important

and coexist (Damanpour, Walker, & Avellaneda, 2009), the behavioral demands can become somewhat confusing and paradoxical, since the behaviors needed to realize different forms of innovation can seem to be inherently at odds. Our study reveals an important paradox in balancing these different modes of renewal, and we believe it is imperative to connect models of MI not only to models of change but also to models that emphasize the tensions inherent in different approaches to balancing stability and change (Andriopoulos & Lewis, 2009; Hill & Birkinshaw, 2014). As firms need to combat inertia in both market-side and intraorganizational activities, this poses a clear challenge for organizations in how to manage both similarity and dissimilarity in order to balance pursuit of different forms of innovation. Ultimately, this itself is a management problem, and we may need to adjust our ways of doing, and thinking about, managerial work in creative new ways to find workable solutions to manage these tensions.

Measuring MI

Measuring MI is also fertile ground for advancing this young and burgeoning field. By using rigorous computer-aided content analysis, we also make an important advance with regard to measuring MI. As MI is not as readily visible as, for instance, product innovation, our approach provides a creative and unobtrusive methodological avenue for future inquiry. Whereas some have turned to cross-sectional self-reporting by senior managers (e.g., Vaccaro et al., 2012), others have relied on surveys from censuses and state bureaus to measure MI (e.g., Mol & Birkinshaw, 2009). Complementing previous approaches, our approach is akin to historical archival analysis but allows us to quantify the extent of changes introduced unobtrusively and over a longer period of time (cf. Birkinshaw & Mol, 2006). Although we acknowledge that this method can be laborious, we contend that it enriches the repertoire of viable approaches to measuring MI across firms and over time. Expanding the repertoire of valid and reliable options available to researchers in this young and growing field, and having a clear appreciation of their different strengths and limitations, is key for advancing MI research.

Limitations

Our study is subject to several limitations. First, we have focused on the extent of MI but have not distinguished whether these changes were radical or incremental. Moreover, the concept of MI is clearly multidimensional, and the antecedents of specific dimensions could be studied autonomously to assess the extent to which changes in one dimension co-occur with changes in others—perhaps even adding degrees of radicalness. In addition, when obtaining these extremely hard-to-get data, we were unable to get data on the tenure of middle managers (cf. Mom, Fourné, & Jansen, in press). Tenure similarity between TM and MM thus remains an interesting and important hypothesis to test. In addition, we have theorized and operationalized *level* effects for our group characteristics. However, other conceptualizations and operationalizations of group composition, paired with appropriate theories, could also be considered (Harrison & Klein, 2007). Finally, the mechanisms discussed could be different in contexts where cultural norms delineate other superordinate-subordinate behaviors associated with demographic similarity (Schaubroeck & Lam, 2002).

Future Research

Future studies could examine whether MM, or particular subsets of middle managers, were involved in developing and/or pretesting particular management practices and how they may play a role in adapting MI to fit the organization (Ansari, Reinecke, & Spaan, 2014). Research in this area could supplement insights into how the information search patterns (e.g., internal and/or external) of TM influence the practices that executives are exposed to and the options they consider (Heyden, Van Doorn, Reimer, Van Den Bosch, & Volberda, 2013). Studies of this kind would probably require qualitative designs that track a particular MI from idea inception (which could be internal or external) to its ultimate introduction organization-wide (see, for instance, Deichmann & van den Ende, 2014). Moreover, giving deeper consideration to the emotional costs imposed on individual middle managers as well as their psychological dispositions might provide important insights into their willingness to engage in supportive behaviors (Huy, 2011; Tuncdogan, Van Den Bosch, & Volberda, 2015). Our model could also be expanded by including other actors in key strategic leadership positions, such as boards of directors, and others who are also affected by MI, such as employees.

Notes

1. Top management consists of decision makers in the upper layer of senior management who are collectively entrusted with strategy formulation. They often carry individual titles such as CEO, chief financial officer, chief operating officer, and senior vice president (Carpenter et al., 2004).

2. Middle management is defined as the managerial layer below the TM but above supervisory levels (Floyd & Wooldridge, 1997; Huy, 2011; Mantere, 2008).

3. Key MM extrarole activities include encouraging informal information sharing, selling TM's initiatives to subordinates, helping others in the organization to make sense of the importance and implications of changes, coming up with initiatives that help implementation efforts, self-learning, and steering activities to support the objectives of management (Floyd & Wooldridge, 1992; Tsui et al., 2002; Van Riel, Berens, & Dijkstra, 2009).

4. Empirically, although it is usually clear who TM members are, we suggest that MM has to be defined within the confines of the specific types of organizations being studied. For instance, a middle manager can be narrowly defined as a department or unit head in a functionally organized medium-sized firm (e.g., marketing and communication manager) or more broadly as a strategic business unit manager in a larger multinational firm (e.g., divisional general manager). We assume members of MM in the narrow form.

5. We thank an anonymous reviewer for highlighting this possibility.

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