CHAPTER 4

Stuck in the Middle?
Impact of Top Management Boundary-Spanning

Abstract
This study examines the impact of management’s boundary-spanning on exploratory innovation of business units. Analyses of multi-source and multilevel data, collected from 72 top managers and 397 middle managers operating in 34 units of a multinational organization, indicated that boundary-spanning on the part of top management teams (TMT’s) is positively related to the units’ exploratory innovation, but that it increases middle managers’ (MM’s) role conflict at the same time. This role conflict results in a negative effect on units’ exploratory innovation and thus offsets some of the benefits. Contrary to expectations, the boundary-spanning of MM's does not relate to exploratory innovation. Furthermore, we show that role conflict is reduced when considering the fit between boundary-spanning on both management levels, in terms of relative size and overlapping ties. Taken together, these findings provide new insights into the configuration of multilevel boundary-spanning that enables or constrains managers to maximize their units’ exploratory innovation.

3 This chapter is based on the paper that has been submitted and currently under review at the special issue of Organization Science.
4.1 INTRODUCTION

Previous studies indicate that boundary-spanning activities on the part of management, including substantial communication with areas outside their organizational unit, have a positive effect on inter-unit cooperation and learning (Allen & Cohen, 1969; Tushman & Scanlan, 1981). Boundary-spanning is shown to drive performance outcomes, such as creativity, new product development and service levels (Bechky, 2003; Carlile, 2004; Hargadon, 2003; Tortoriello et al., 2012), in other words: exploratory innovation (Jansen et al., 2006). While existing literature is typically explicit in detailing the potential benefits of such practices, empirical evidence on the success of boundary-spanning outcomes is mixed (Tortoriello et al., 2012). For instance, researchers have shown that managers who span boundaries are particularly susceptible to stress (Podolny & Baron, 1997) and can even restrict the flow of knowledge throughout organizations in an attempt to maintain their power and influence (Cross et al., 2002; Gould & Fernandez, 1989; Tortoriello et al., 2012). The mixed findings suggest that the effects of boundary-spanning activities can vary among managers. However, existing studies often treat managers as a homogeneous group, which makes it difficult to differentiate between boundary-spanning effects and its outcomes across managerial levels.

Indeed, organizational strategy research has long acknowledged the fact that managers play different roles based on their position within the managerial hierarchy and that, as such, top management teams (TMT) and middle management (MM) are distinct, both in terms of their activities and of the effects these activities have on organizational outcomes (Floyd & Lane, 2000). However, despite the successful application of role theory to explain a myriad of organizational phenomena (Floyd & Lane, 2000; Fried & Tiegs, 1995; Raes et al., 2011), boundary-spanning literature has thus far overlooked its relevance. In fact, given the distinction role theory draws when considering TMT and MM, it can be argued that we actually understand little about the potential impact of boundary-spanning activities on key organizational outcomes.

Three questions emerge when applying role theory to the relationship between boundary-spanning and exploratory innovation. First of all, do different managerial roles have an impact on the effect of boundary-spanning on exploratory innovation? Role theory suggests that the answer is yes. Previous research has already demonstrated that the roles of TMT’s and MM’s differ significantly, especially in terms of demands for strategy formulation (TMT) and implementation (MM) (Bartlett & Ghoshal, 1995; Currie & Procter, 2005; Floyd & Lane, 2000; Raes et
al., 2011; Wooldridge et al., 2008). In addition, scholars have argued that formal authority plays a critical role and found that the higher the position within the formal hierarchy, the more likely managers are to be successful innovators (Baldridge & Burnham, 1975; Ibarra, 1993). Secondly, how do boundary-spanning activities at one level affect managers on adjoining levels? Existing social-psychological research indicates that those who engage in boundary-spanning also experience significant role overload and role conflict because they are subject to simultaneous and often conflicting pressures (Kahn et al., 1964; Katz & Kahn, 1978). Moreover, recently it has been suggested that an actor’s social network influences other actors as well (Galunic et al., 2012), and that the costs of cross-unit boundary-spanning may extend to members other than the focal actor, with unit differences in terminology, perspectives and expectations leading to an overall lack of understanding (Mehra et al., 2006) and inconsistent communication (Noble, 1999).

Thirdly, what are the effects when MM boundary-spanning ties are similar or different from the boundary-spanning ties of TMT? Role theory, in addressing the distinction between MM and TMT, opens the door to a multilevel perspective on boundary-spanning. Thus, a configuration of boundary-spanning on different management levels may provide insight into how network structures condition interactions between top-level and middle management.

The aim of this study is to address these three questions by developing and empirically testing a multilevel model (see Figure 4.1) within the setting of a large multinational organization, taking the different management roles into account. In doing so, we bring boundary-spanning research and role theory together to examine the difference between the effects of the boundary-spanning activities of TMT and MM on exploratory innovation. Moreover, we differentiate between two intra-organizational networks; the information network of TMT’s and the information networks of the MM’s. This facilitates our analysis of how TMT boundary-spanning activities in intra-organizational networks stimulate exploratory innovation within their units, while at the same time increasing the potential for role conflict among their subordinates. Furthermore, our multilevel model addresses the important issue of the fit between MM’s boundary-spanning and the TMT network in which they are embedded. The idea that network activity at one level of a system is related to network structures at other levels matches Burts’ (2007) observation that opportunities for direct social capital disappear with the inclusion of indirect contacts. Hence, we show that the fit, in terms of relative size and overlapping ties,
between TMT and MM boundary-spanning conditions their joint effect on exploratory innovation.

This study contributes to existing literature in several ways. By assuming heterogeneity in boundary-spanning across TMT and MM levels, we aim to reconcile the mixed findings and provide a better understanding of when boundary-spanning improves organizational performance. Drawing on role theory (Kahn et al., 1964), this study contributes to existing boundary-spanning literature by spelling out the contingencies under which boundary-spanning will not automatically translate into benefits. Although research demonstrates the importance of ties crossing technical, departmental or functional boundaries for an effective knowledge transfer within organizations (Allen, 1977; Hansen, 1999; Tsai, 2001), existing theories overlook the differential role of formal positions in determining the positive or negative outcomes of such actions. Hence, by investigating these seemingly contradictory effects empirically, our findings shed light on the ‘dark side’ of boundary-spanning (Podolny & Baron, 1997). As such, we respond to calls to clarify the consequences of boundary-spanning in intra-organizational networks, especially with regard to exploratory innovation (Hoang & Gimeneo, 2010; Tushman & Scanlan, 1981). Furthermore, we contribute to network theory by differentiating between multiple levels of networks and examining how they may jointly influence the relationship between TMT boundary-spanning and subordinate role conflict. In that respect, the interplay between boundary-spanning performed at multiple levels is of particular interest. Indeed, we show that looking at boundary-spanning in terms of the fit between TMT and MM is at least as important as examining the management levels separately. We thus respond to recent calls to adopt and test a multilevel perspective on social network theories (Brass, 2000; Moliterno & Mahony, 2011; Payne et al., 2011; Simsek, 2009).

We develop a multilevel framework that conceptualizes the relationships mentioned above and maps the distinction between TMT and MM boundary-spanning activities and their impact on exploratory innovation. Next, we examine to what extent, and under what conditions, boundary-spanning improves the exploratory innovation within units, while at the same time restricting the efforts of individuals working within those units. Our results indicate that MM’s play an active role in mitigating role conflict, by showing how some individuals span similar ties as their TMT’s, rather than becoming ‘stuck’ in conflicting demands from TMT. Finally, implications for theory development and consequences for practitioners are discussed.
4.2 LITERATURE REVIEW AND HYPOTHESES

Boundary-Spanning at Multiple Levels

Existing studies into organizational networks have demonstrated the importance of ties that span unit boundaries in terms of effective knowledge transfer within organizations (Burt, 1992; Hansen, 1999; Tsai, 2001; Tushman & Scanlan, 1981). These authors argue that boundary-spanning ties are instrumental in achieving strategic objectives and link multiple sources of diverse knowledge that may be useful to collaboration and exploratory innovation (Burt, 1992; Lingo & O'Mahony, 2009; Obstfeld, 2005; Reagans & Zuckerman, 2001). Since exploratory innovation requires new knowledge (Benner & Tushman, 2002) and benefits when a work environment provides rich knowledge stimuli and sufficient resources (Amabile et al., 1996), we expect that units with boundary-spanning ties are better able to discover and monitor information needed for exploratory innovation. However, while most research into boundary-spanning has sufficiently examined the positive outcomes for organizations, studies tend to ignore the different groups that exist within the organization or implicit assume that there is homogeneity within organizations.

Figure 4.1: Multilevel research framework

Earlier studies acknowledge that managers operating at different levels play different organizational roles (Floyd & Lane, 2000). For instance, at top-level managers act in concert with others throughout the organization to identify effective means through which new business can be created or new products can be developed (Hornsby et al., 2009), whereas middle managers are responsible for championing, facilitating, synthesizing and implementing information (Floyd & Lane, 2000). One important difference between TMT's and MM's is the fact that top-level managers are involved in the decision-making process, while middle managers...
focus on communicating information between operating and top-level management (Floyd & Lane, 2000). It has been demonstrated that this difference in formal authority plays a crucial role in executing tasks and an organization’s structural ability to ‘make more of’ organizational factors that support exploration (Hornsby et al., 2009; Ibarra, 1993). A consistent finding has been that managers operating in positions of authority have the biggest influence on innovation (Baldrige & Burnham, 1975; Ibarra, 1993), which means that one may expect that managers who operate higher up in the organization’s hierarchy will strengthen the effect of boundary-spanning on exploratory innovation.

The result of these power differences also highlights another distinction between TMT and MM roles. Earlier studies have demonstrated that the roles of TMT and MM vary significantly in their requirements in terms of strategic thinking and actions (Bartlett & Ghoshal, 1995; Currie & Procter, 2005; Floyd & Lane, 2000; Wooldridge et al., 2008). Several researchers have pointed to the need for TMT’s to ensure integration across differentiated units (Smith & Tushman 2005; Tushman & O’Reilly, 1996) and their responsibility for strategy formulation (Raes et al., 2011). Lubatkin et al., (2006) found that the behavioral integration of TMT’s facilitates the processing of disparate demands that are essential for exploratory innovation. Key tasks for TMT’s are thus to convey the units’ strategic priorities effectively to their direct subordinates, in most cases middle managers. The MM’s role, on the other hand, implies that they are the accomplices of the TMT, while at the same time representing their own organizational units (Sims, 2003). Given their pivotal role as organizational linking pins, the key aspect of the MM’s role is to accelerate strategy implementation (Raes et al., 2011). As summarized by Floyd and Lane (2000, p. 158), the TMT’s role includes ratifying, directing and recognizing, while the MM’s role is to champion, facilitate, synthesize and implement. An obvious and crucially relevant difference in this respect has to do with the significance of boundary-spanning with regard to these activities. For example, TMT boundary-spanning is expected to support actions such as opportunity discovery and strategic formulation, as it imbues such actions with fresh external knowledge and information (Pappas & Wooldridge, 2007). However, these positive effects may disappear when considering the nature of the activities performed by MM. For instance, the synthesizing and implementation of strategic plans may not benefit from the injection of new external information. Given these different role requirements the relationship between boundary-spanning and exploratory innovation is once again expected to be stronger for TMT than for MM.
Taken together, boundary-spanning creates the opportunity for TMT’s and MM’s to access a variety of different perspectives and information flows within the intra-organizational network (Perry-Smith & Shalley, 2003). Due to the possible manipulation and control of information, boundary-spanning thus helps TMT and MM realize exploratory innovation at unit level. However, based on differences in authority and role-related task requirements, we expect the relationship between boundary-spanning and exploratory innovation to be stronger for TMT’s than it is for MM. Based on these arguments, we propose:

Hypothesis 1a. TMT boundary-spanning is positively related to their units’ exploratory innovation
Hypothesis 1b. MM boundary-spanning is positively related to their units’ exploratory innovation
Hypothesis 1c. The positive relationship between boundary-spanning and exploratory innovation will be stronger for TMT than for MM’s

TMT Boundary-Spanning as Antecedent of MMs Role Conflict
While acquiring external knowledge provides organizational units with the opportunity to see a problem or task from an alternative perspective that can stimulate creativity and exploratory innovation (Hansen, 1999; Hargadon & Sutton, 1997; Leonard-Barton, 1995; Perry-Smith, 2006), it also creates inconsistent and opposing expectations with regard to the roles played by unit members. Earlier findings from socio-psychological research indicate that people who engage in boundary-spanning also experience significant role overload and role conflict, because they are subject to simultaneous and often conflicting pressures (Kahn et al., 1964; Katz & Kahn, 1978). As noted earlier, these costs of cross-unit boundary-spanning may extend to members other than the focal actor, with differences in terminology, perspectives and expectations leading to an overall lack of understanding (Mehra et al., 2006).

According to role theory (Kahn et al., 1964), individuals form perceptions of their organizational role, and these perceptions are shaped by role senders, including supervisors (Walker et al., 1975). When individuals are expected to behave in an inconsistent way, they experience stress and become dissatisfied, which has a negative effect on their performance compared to a more unequivocal expectation pattern (Rizzo et al., 1970). Thus, role conflict is defined as the degree of incongruity or incompatibility of the expectations associated with a given role (Rizzo et al., 1970).
Increased role conflict is consistently associated with higher stress levels, burnout and poor job performance (e.g. Ashforth & Lee, 1997).

Existing studies indicate that role conflict can occur across exchanges between individuals at different management levels (Floyd & Lane, 2000). As a result of differences in views and expectations, boundary-spanning on the part of TMT's may create significant gaps between what is planned or intended and what is perceived at middle management level. For instance, top managers who span a lot of boundaries may send confusing signals, demanding from MM's that they use existing resources efficiently, while at the same time developing new competencies, which requires a shift in the roles that MM's play, as well as the relationships between those roles (Floyd & Lane, 2000). Given MM's’ vital role in realizing cross-level synergy, a good execution of their roles becomes essential in their MM's efforts to reconcile the TMT's strategic directions successfully (Wooldridge et al., 2008). Coping with the contradictory demands originating from the TMT's boundary-spanning activities may cause MM's to experience greater role conflict (Ashford et al., 2003). Thus, MM's working in boundary-spanning units become particularly susceptible to role conflict arising from contradictory and inconsistent expectations among multiple constituencies (Kahn et al., 1964). Given that each unit has its own values and interests, MM's working in units that span more boundaries are likely to experience conflicting expectations on how to fulfill their role (Friedman & Podolny, 1992).

Furthermore, scholars have shown that the potential for role conflict experienced by managers is partly a function of the number of roles they are expected to play (Floyd & Lane, 2000; Nandram & Klandermans, 1993; Peterson et al., 1995). In large corporations, positions are defined as job roles and, accordingly, managers behave in ways that are consistent with the way their roles are defined (Kahn et al., 1964). Successfully executing each of these roles is time-consuming and may be difficult because of constrained resources. Because TMT's that span boundaries also access a wider range of different perspectives and expectations, they create additional pressure for middle management subordinates as it struggles to find a common ground to facilitate the integration and implementation of knowledge (Argote, 1999; Dougherty, 1992; Tortoriello et al., 2012). Recognizing that MM's have limited time, any time spent on making sense of the diverse information puts the effective implementation of functional tasks at risk (Donaldson & Hilmer, 1998). Because MM's have to mediate between different groups with different values and interests, they are routinely caught in the crossfire of competing expectations.
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(Mehra & Schenkel, 2008). As a result, it is likely that MM's working for TMT with boundary-spanning ties will be less able to tailor solutions and monitor information effectively, which in turn will generate role conflicts.

Overall, we expect that boundary-spanning of TMT will often result in role conflict and tension among middle managers, who will find it increasingly difficult to execute their roles successfully because of incompatibility among the different roles and constrained resources (e.g. time, energy) (Bolino & Turnley, 2005). Therefore, we expect that MM's operating in units that span more boundaries have to process and transmit a variety of information. Because they have to mediate between different groups, with different values and interests, MM's are routinely caught in the middle of competing expectations and subjected to high levels of conflict from intra-organizational and inter-unit influences (Kahn et al., 1964). Consequently, the following hypothesis is formulated:

**Hypothesis 2.** TMT's boundary-spanning is positively related to MM's role conflict

### Role Conflict and Exploratory Innovation

We have argued that role conflict occurs when top-level management is engaged in boundary-spanning activities. Because organizations are in effect role systems in which the social interactions between system members determine how the work is carried out (Katz & Kahn, 1978), it is to be expected that role conflict will have an impact on performance outcomes (Tubre & Collins, 2000), which is why we investigate how role conflicts of MM's relate to the exploratory innovation of their units.

Prior research has shown that exploratory innovation is built on a tacit knowledge base (cf. Katila & Ahuja, 2002) and involves a high level of knowledge generation (Grant, 1996), which requires the transfer and absorption of new knowledge. Exploration-related activities include searching for new organizational norms, routines, structures, and systems (Crossan et al., 1999; Mom et al., 2007; Nooteboom, 2000; Zollo & Winter, 2002), experimenting with new approaches (McGrath, 2001) and reconsidering existing beliefs and decisions (Floyd & Lane, 2000). By contrast, exploitation-related activities include creating reliability in experience (Bontis et al., 2002; Holmqvist, 2004), using and refining existing knowledge (Levinthal & March, 1993), and building on existing beliefs and decisions (Floyd & Lane, 2000). As such, middle managers are expected, with regard to MM's exploration, to facilitate adaptability, implement orders from above by championing
new initiatives and encourage an entrepreneurial mindset nurturing creativity and experimentation (Mantere, 2008). From this point of view, innovation and creativity depend heavily on the ability of middle managers to play their different MM's roles (Dopson & Stewart, 1990; Floyd & Wooldridge, 1997; Frohman & Johnson, 1993).

Scholars have shown that middle managers who are expected to carry out conflicting roles may respond in a way that is characterized by ‘reluctance’ (Goffee & Scase, 1992), ‘disillusionment’, ‘disaffection’ (Johnson & Frohman, 1989) or ‘paralysis’ (Westley, 1990). For instance, scholars have shown that middle managers can get caught between their traditional and innovative roles, and become uncertain about whether and what kind of change is appropriate, and, as a result, which strategic role they are expected to play (Currie & Procter, 2005; Floyd & Lane, 2000). As a result, they will tend to focus on exploiting existing resources rather than engage in exploration. While exploratory innovation requires MM's to experiment and adopt a long-term orientation (Tushman & O'Reilly, 1996), role conflict thus may limit their capacity to pursue these exploratory activities. Given that coping with conflict and stress requires time and dedication, MM's will reduce deviant behavior, limit their search scope and increase selective perception of alternatives (Rowley et al., 2000). Therefore, it is likely that MM's who are unable to deal with the presence of disparate and incompatible work-role related demands, fail to identify, let alone seize opportunities to enhance their units' exploratory innovation (Bolino & Turnley, 2005).

Taken together, the exploratory activities of middle managers will improve exploratory innovation. These exploratory activities involve innovating and adopting a long-term orientation, whereas exploitative activities focus on production and adopting a more short-term orientation (Duncan, 1976; Tushman & O'Reilly, 1996). Middle manager who experience role conflict will respond to problems in familiar ways, in order to save time and effort and increase their ability to carry out existing activities effectively and efficiently (Daft & Lengel, 1986; Galunic & Rodan, 1998), at the expense of their units' exploratory innovation. Consequently, we posit:

**Hypothesis 3.** MM's’ role conflict is negatively related to their units’ exploratory innovation

**The Role of Fit between Multilevel Ties**

While we expect MM's’ role conflict to be influenced by the extent to which TMT's span boundaries and manage to communicate priorities to MM's (Singh, 1993), MM's themselves can also play an active role in reducing the potential effects. As agents of
change, their activities include interacting systematically with other actors in different parts of the organization and linking actions and ideas between technical and institutional levels of organizations (Van Cauwenbergh & Cool, 1982). Because of their unique position in organizations, middle managers are nested in a diverse set of social relationships (Fourne et al., 2012) and are responsible for cross-unit synergy identification and realization of challenges (Raes et al., 2011). However, instead of assuming that these managers can become ‘stuck’, we propose that MM's can also develop similar relationships outside their focal unit that provide the protection they need to perform their roles.

The idea that network activity at one level of the system is related to network structures at another level matches Burts’ (2007) observation that opportunities for direct social capital disappear with the inclusion of indirect contacts. It also aligns with the work of Galunic et al., (2012) who highlight the importance of formal positions to unlock benefits of second-order social capital. Consequently, the configuration of MM's boundary-spanning and TMT's boundary-spanning ties determines how a network structure enables and disables the interaction between the two levels. Despite the potential importance of the theoretical rationale that TMT's boundary-spanning constrains MM's access to resources and creates a potential incompatibility between different roles, existing studies pay little attention to this tension, and the relationship remains untested. This is a promising research area, as shown by Hornsby et al., (2009), who distinguish several managerial levels and role perceptions, Moliterno and Mahony (2011), who have shown that the success of people's boundary-spanning activities depends on where they stand relative to the group, and Floyd and Lane (2000), who have suggested ways to solve role conflicts associated with strategic innovation.

To further investigate this multilevel perspective of social network theory, we propose that an MM's own boundary-spanning ties in the information network may serve as a key contingency protecting MM's from experiencing role conflicts. For instance, MM's may span boundaries themselves to provide access to the information and resources they need to fulfill the TMT's expectations and make it less hard to optimize performance (Coleman, 1990). In addition, when MM's and span TMT's the same ties, demands and expectations can become more aligned and the possible potential for role conflicts will decrease. Thus, by filling in the structural gaps created by TMT's boundary-spanning activities, MM's can span similar relationships outside their focal unit, to provide themselves with the protection they need to carry out their roles. We argue that the fit in terms of relative size and
overlapping ties between TMT's and MM's boundary-spanning ties will affect the way middle managers are able to carry out their tasks and reduce role conflict.

To illustrate what we mean when we talk about a fit between the boundary-spanning activities of TMT's and MM’s, we present a general model of cross-level effects for multilevel organizational theory in Figure 4.2. The triangles represent five units (A-F) and the dots (1-2) represent two hypothetical MM's, who work in unit A. The straight lines are the boundary-spanning ties of the TMT of unit A, while the dashed lines represent the boundary-spanning ties of the two MM's.

**Figure 4.2: Fit in terms of relative size and overlapping boundary-spanning ties between two hypothetical MMs and their TMT**

As demonstrated in Figure 4.2, the TMT of unit A spans boundaries with two other units (unit B and C), while MM 1 also spans two boundary ties and MM 2 spans three boundary ties. The fit in terms of the relative size of boundary-spanning ties
between MM 1 and the TMT is the same (both 2), while the relative size of the boundary-spanning ties of MM 2 is larger compared to their TMT (3 versus 2). Both MM's span two unit boundaries indirectly (via their TMT), but when we include their direct boundary-spanning ties, MM 2 spans more boundaries. We expect that this fit will influence the development of the MM's role conflict.

In line with Burt's (2007) 'secondhand brokerage', we propose that the benefits of boundary-spanning are concentrated in the immediate network around a given person. In our example, MM 2 spans more boundaries directly and has therefore access to diverse information and resources, needed to fulfill the TMT's expectations and make it easier to optimize performance (Coleman, 1990). Earlier studies, like Labianca et al., (1998), have shown that the number of relationships individuals have with external parties is positively related to the perceptions of inter-group conflict. In addition, Marrone et al., (2007) found that direct boundary-spanning benefits individual team members by reducing their role overload. Thus, direct boundary-spanning by MM's may provide them with emotional support from their peers or help prioritize tasks and devise strategies to cope with conflicting demands (Kohli & Jaworski, 1994). Also, by spanning boundaries, MM's create a broader view of the organization and the political environment in which TMT often operate, which means that boundary-spanning could help MM's in meeting the opposing demands, while core members of units who do not cross boundaries tend to host more rigid role expectations (e.g. Cattani & Ferriani, 2008). Therefore, we expect that MM's with a high fit in terms of the relative size of boundary-spanning ties with their TMT will reduce the potential development of role conflict. Consequently, we propose:

*Hypothesis 4a. Relative size fit between boundary-spanning ties of a MM and the TMT of the same unit will reduce MM's’ role conflict*

We extend the concept of fit by taking into account not only the relative size of boundary-spanning ties, but also the fit in terms of overlapping ties. Prior studies indicate that having a dense and redundant network of ties is often a precondition for internalizing a clear and consistent set of expectations and values in order to be effective in one’s role (Podolny & Baron, 1997). For instance, a dense network of personal contacts positively influences the speed and openness of spreading information among network members due to exchange-inducing social norms causing a sense of generalized exchange (Hansen, 1999; Uzzi, 1997). Consequently,
when MM's have boundary-spanning ties with the same units as their TMT, demands and expectations may become more aligned. Mutual ties of TMT's and MM's entail advantages in feeding information to MM's, which reduce the time and effort spent on differentiating and integrating contradictory work streams. We define the degree to which MM's boundary-spanning ties are the same compared to the TMT boundary-spanning ties as overlapping ties and propose that a fit in terms of overlap will reduce role conflict even further.

Hence, as demonstrated in Figure 4.2, although the relative size of boundary-spanning ties between MM 1 and unit A is the same, there is no overlap. By contrast, two of the three boundary-spanning ties of MM 2 do overlap with the TMT boundary-spanning ties, which may facilitate cooperation and integration of knowledge due to reduced friction and improved mutual understanding (Tortoriello & Krackhardt, 2010). Therefore, we expect that a fit in terms of overlap will reduce the relationship between TMT boundary-spanning and MM's’ role conflict. Accordingly, we propose:

Hypothesis 4b. Fit in terms of overlapping ties between boundary-spanning ties of a MM and the TMT of the same unit will reduce MM's’ role conflict

4.3 METHODS

Research Setting
We collected data from 72 top managers and 397 MM's working in 34 units of a Fortune 500 company in the transport and logistics service industry. Within the firm, each unit has its own autonomous decision entity, its own budget responsibilities with regard to several aspects of its operations and is geographically distinct, with its own TMT. As our research setting is a multinational organization consisting of several units with their own responsibilities, we expected to encounter variety in terms of the boundary-spanning activities of the TMT’s and MM's. In addition, due to the globally structuring and differences in client focus, we also expected variety in terms of the exploratory innovation.

Research Design and Data Collection
To prevent potential problems associated with single-informant bias and common-method bias (Podsakoff et al., 2003), primary and secondary data were collected at multiple levels within the firm. The primary data for this study was collected in 2010 by surveying the TMT's of each unit and the MM's working in these units. We first
conducted a series of interviews within the organization to better understand the context and to test the method and theoretical foundations. After the interviews, we constructed and pre-tested two surveys among twelve members of the organization. To ensure a high response rate, both surveys provided a cover letter from the chief executive officer (CEO) asking the participants to complete the survey.

The first survey was distributed among all MM’s who reported directly to the TMT’s. After completing a self-reported role conflict scale, MM’s provided information about their communication with other organizational units. The second survey, which was sent out to the TMT’s of each unit, contained questions about the unit’s exploratory innovation and their knowledge transfer relationships with other units. The top-level managers also reported on their communication relationships inside the organization. This allowed us to triangulate the network data obtained from the managers, enhancing the validity of the measures and reducing common method variance. To ensure confidentiality, we promised not to reveal the true names of the units and managers involved in this research.

Secondary data about the gender and job grade of the managers were gathered from internal company records. At the time of the survey, the human resource representatives provided us with a sample of 687 names representing the top managers and MM’s from the 34 units. In total, we received usable responses from 72 top managers and 397 MM’s. By gathering primary and secondary data at multiple levels, we established the validity of the measures and reduced common method variance and were able to prevent potential problems associated with single-informant bias and common-method bias (Podsakoff et al., 2003).

**Measures and Validation**

**Exploratory Innovation.** A six-item scale from Jansen et al., (2006) measuring the exploratory innovation of a unit was adopted. The TMT’s were asked to indicate the extent to which their unit departs from existing knowledge and skills or existing customers, markets and products, by rating the items between 1, 'strongly disagree', and 7, 'strongly agree'. Two example items are: “Our unit accepts demands that go beyond existing products and services” and “We commercialize products and services that are completely new to our unit”. All items loaded on a single factor with an eigenvalue of 4.07 and accounting for 68 percent of the variance (α = .90).

**Role Conflict.** This construct was operationalized using the eight-item scale developed by Rizzo et al., (1970). The MM’s were asked to what extent they experienced role conflict by rating the items between 1, 'strongly disagree', and 7,
'strongly agree'. Example items are: “I receive assignments without adequate resources and material to execute them” and “I receive incompatible requests from two or more people”. While earlier studies only used several items from the original eight-item scale to cover the full range of the construct (e.g. Coelho et al., 2011; Mehra & Schenkel, 2008; Schuler et al., 1977), we conducted exploratory analyses. The results of the exploratory factor analysis yielded cross loadings of one item. We then ran another exploratory factor analysis excluding one item and found all items loading on a single factor with an eigenvalue of 2.75 and accounting for 54 percent of the variance (α = .73). The seven items were averaged to form a single measure of role conflict.

**TMT Boundary-Spanning.** The top managers were presented with a list of all 34-business units and asked to indicate the units from which they regularly sought new knowledge or expertise (cf. Hansen, 1999). Following Tsai (2001), and which units came to their unit for new knowledge or expertise. Because there was more than one top manager in each unit, we calculated the total of their boundary-spanning ties to represent the variable ‘TMT boundary-spanning’. We considered the data valid if a knowledge transfer relationship (indicated by any top manager of the source unit) was confirmed by any top manager of the recipient unit. We thus confirmed the existence of a tie between TMTi and TMTj if a top manager i indicated his or her had provided knowledge to unit j and a top manager from unit j also confirmed receiving knowledge from unit i (cf. Hansen, 1999; Krackhardt, 1990; Tsai, 2001). Using validated data, we recording all 72 responses into a 34 x 34 one mode data matrix, in which cell Xij represents the number of confirmed ties if TMTi provided its knowledge to TMTj. Consistent with earlier research (Burt, 2004) we then calculated the number of boundary-spanning ties for each of the TMT's, using UCINET 6 (Borgatti et al., 2002). These values ranged from 1 to 23, with a mean score of 7.2 and a standard deviation of 3.2.

**MM Boundary-Spanning.** The MM's were presented with a list of the units and were asked to indicate which units provided them with new knowledge or expertise. Responses were recorded in a 397 x 34 two-mode network matrix in which cell Xij=1 when MMi indicated there was information exchange with unit j, and Xij=0 if that was not the case. Based on the egocentric network, boundary-spanning of each MM was constructed from the number of units to which it is connected. These values ranged from 1 to 30, with a mean score of 5.0 and a standard deviation of 4.6.

**Fit.** a) The relative size fit between boundary-spanning ties of TMT and MM's was calculated by subtracting the number of MM boundary-spanning from
the number of the TMT boundary-spanning. Relative size thus measured the number of boundary-spanning ties of MM’s relative to the number of boundary-spanning ties of their top managers, and is expressed as the absolute deviation, with a mean score of 4.5 and a standard deviation of 3.2.

b) Fit in terms of overlapping ties, was calculated by transforming the 34 x 34 unit matrix and the 397 x 34 MM’s matrix and applying Boolean combinations, using UCINET 6 (Borgatti et al., 2002). We combined the two matrices by recording all responses in a single data matrix under the condition that the both matrices had at least a value of 1. For each MM, we calculated the number of ties to units to which their TMT also had boundary-spanning ties, after which we calculated the proportion of overlap for each MM by dividing the number of mutual ties by the total number of MM’s’ boundary-spanning ties. These overlapping values ranged from 0 to 1. A high value indicates that a MM seeks knowledge from units that are connected through dense inter-unit knowledge relationships by their TMT, while a low value means that a MM seeks knowledge from units that have few or no knowledge transfer ties with their TMT.

**Control variables.** We controlled for possible alternative explanations by including four relevant control variables (two individual variables and two unit variables). At the individual level, we controlled for gender (female=1, male=0) and job grade. Research findings suggest that, compared to men, women are more likely to experience role conflict (Bolino & Turnley, 2005). Thus, gender could affect the heterogeneity of the units and, as such, the MM’s role conflict. Job grade was also included as a control variable, because there were two different job grades within the selected group of MM’s. Job grade reflects the position of a manager within the strategic hierarchy, which includes job complexity. Research shows that the relationship between general mental ability and job performance is stronger at higher levels of job complexity (Hunter & Hunter, 1984). Although the difference between the two grades was relatively small, we controlled for job grade (grade A=0, grade B=1) to make sure that it did not impact the findings.

At unit level, we controlled for group size and client focus. Earlier studies suggest that group size influences group dynamics and performance (Moreland & Levine, 1992). Larger groups tend to be less cohesive and have more members who can provide boundary-spanning ties. Therefore, we controlled for the number of MM’s and top managers in each unit. Finally, we controlled for client focus, because units may specialize in different markets and have different ranges of products and services, which will affect their exploratory innovation. We included a dummy
variable to indicate whether the unit provided products and services for business clients (coded 1) and for consumer clients (coded 0).

**Analytical Approach**

The top managers of each unit rated the measure of exploratory innovation. Because the level of measurement (individual top managers) differs from the level of analysis (units) for the exploratory innovation construct, it was necessary to establish the viability of the unit-level construct. To assess the viability of aggregating management level data to the unit level, we calculated both between-units variability and within-unit agreement (Hofmann & Stetzer, 1996; Naumann & Bennett, 2000). Therefore, ICC(1) and ICC(2) (Bliese, 2000; Shrout & Fleiss, 1979) were computed as an index of within-group and between group agreement. ICC1 and ICC2 were 0.56 and 0.90 for exploratory innovation. Furthermore, we calculated interrater agreement score (rwg; LeBreton & Senter, 2008) and used the interrater reliability to examine the agreement between two or more top managers on the assignment of the unit variable. The mean interrater agreement was .77 for exploratory innovation, suggesting adequate agreement for aggregation. Together, these statistics show acceptable levels of within-group agreement and between-groups variability in exploratory innovation as a unit-level variable. Because the ICC2 score was beyond the cut-off score of 0.50, and the rwg score was over 0.68 (LeBreton & Senter, 2008; Van Mierlo et al., 2009), there was enough evidence to justifiably aggregate the data to the unit level by using the mean score of the top managers within each unit (Klein & Kozlowski, 2000).

Furthermore, in Figure 4.3, we present an illustration of the network structure of the several units under study, as mapping the network contributes to a better understanding of the inter-unit network (Brass et al., 2004). The squares represent the units (total 34) and the lines represent the boundary-spanning ties of the TMT's with other units. We highlighted unit 11, in which the TMT spans a lot of boundary ties whereas the TMT of unit 33 spans only two boundary ties. There was a clear variation between the boundary-spanning ties of TMT's of the several units under study.
To test our hypotheses, we used several analyses. In order to test hypothesis 1c, we combined the two datasets of TMT and MM, and created a dummy variable for the two management levels (TMT=1 and MM=0). We calculated the interaction between boundary-spanning and management level and included this interaction term in our linear regression analysis. For hypotheses 2 and 4, we used hierarchical linear modeling (HLM) (Raudenbush et al., 2004) to obtain an accurate estimation of the relationship between the different levels, without the shortcomings of the aggregation or disaggregation approaches. For hypothesis 2, we first ran a null model for role conflict without predictors, to ensure that there was enough variance between the units. Next, we ran a model with the TMT predictor to test hypothesis 2, after which we included the fit in terms of relative size and overlapping ties to test hypotheses 4a and 4b. In all analyses, the level 1 predictors were group mean centered and the level 2 predictors were grand-mean centered, since centering reduces multicollinearity (Bryk & Raudenbush, 1992) and group mean centering of level one predictors is the recommended centering approach when level two
interactions are hypothesized (Hoffman et al., 2000). Although it is difficult to estimate precise effect sizes in cross-level models, Snijders and Bosker’s (1999) overall pseudo $R^2$ ($\sim R^2$) was calculated for the models; these estimates are based on the proportional reduction of level 1 and level 2 errors owing the predictors of the model.

Finally, because HLM does not provide bottom-up processes, we followed Marrone et al., (2007) to test hypothesis 3 and aggregated role conflict (mean ICC = .72) at BU level by averaging MM role conflict scores per unit. Next, we conducted linear regression analysis with exploratory innovation to test our third hypothesis.

4.4 RESULTS

Descriptive Statistics

Table 4.1 presents the means, standard deviations and correlations among the variables under study. We found that TMT boundary-spanning correlates positively with exploratory innovation ($r = .41$, $p<.01$). In addition, TMT boundary-spanning correlates positively with MM’s role conflict ($r = .13$ $p<.01$) and MM’s boundary-spanning ($r = .19$ $p<.01$). There was no significant correlation between boundary-spanning of MM's and exploratory innovation ($r = .09$, ns). Furthermore, MM role conflict is negatively correlated with exploratory innovation ($r = -.11$, $p<.05$) and overlapping tie fit ($r = -.11$, $p<.05$).

Hypotheses Testing

Hypotheses 1 and 3. Table 4.2 summarizes the results of the regression analyses for exploratory innovation. Model 1 contains TMT boundary-spanning effects, while Model 2 contains the MM boundary-spanning effects. As shown in model 1b, the coefficient for TMT boundary-spanning is positive and significant ($\gamma = .08$, $p<.01$), supporting hypothesis 1a. We then tested whether MM boundary-spanning was positively related to exploratory innovation (hypothesis 1b). As shown in model 2b we did not find a significant direct effect of MM boundary-spanning on exploratory innovation ($\gamma = -.02$, ns). In order to test whether the positive relationship between boundary-spanning and exploratory innovation is stronger for TMT than it is for MM’s, we combined both datasets and then included the interaction variable in model 3b. The results support hypothesis 1c, as the relationship between boundary-spanning and exploratory innovation is different for the two management levels and this interaction explains a small, although significant, amount of variance in exploratory innovation ($\Delta R^2 = .04$, $p<.01$).
Hypothesis 3 predicts that the role conflict experienced by MM's is negatively related to exploratory innovation. As shown in model 4b, MM role conflict is negatively related to exploratory innovation ($\gamma = -.12, p < .05$), which supports hypothesis 3.

**Hypotheses 2 and 4.** Table 4.3 summarizes the results of the HLM analyses for hypotheses 2 and 4. Control variables (including gender, job grade, client focus and unit size) were included in all analyses. As a first step, the control variables were entered in the model, after which we tested whether TMT boundary-spanning was positively related to MM role conflict (hypothesis 2). As shown in model 2, TMT boundary-spanning is significantly and positively related to MM role conflict ($\gamma = .04, p < .05$). Secondly, we tested whether relative size fit of MM boundary-spanning ties would reduce role conflict (hypothesis 4a). As shown in model 3, the relationship between TMT boundary-spanning and role conflict becomes weaker when there is relative size fit between the boundary ties ($\gamma = -.04, p < .10$). Finally, we added fit in terms of overlapping ties to the model and found a strong significant and negative coefficient ($\gamma = -.40, p < .05$), which supports hypothesis 4b.
<table>
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<tr>
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<td>.09</td>
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* n = 397 middle managers and 72 top managers working in 34 business units, two tailed tests.

* p < .05   ** p < .01
Table 4.2: Results of linear regression analyses of exploratory innovation

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<tr>
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<th>Model 1b</th>
<th>Model 2a</th>
<th>Model 2b</th>
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<td>-10(18)**</td>
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<td>-10(18)**</td>
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<td>.10(15)**</td>
<td>.47(23)**</td>
<td>.49(16)**</td>
<td>.49(16)**</td>
<td>.49(16)**</td>
<td>.49(16)**</td>
<td>.49(16)**</td>
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<td>.01(00)*</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
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<td>.01(00)*</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
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<td>.00(00)†</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
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<td>.01(00)*</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
<td>.00(00)†</td>
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<td>Boundary-spanning * Mngt Level</td>
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<td>.39(0.03)†</td>
<td>.36(0.01)**</td>
<td>.36(0.01)**</td>
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ª n=397 middle managers and 72 top managers working in 34 business units.

** p<.01    * p<.05    † p<.10
Table 4.3: Results of hierarchical linear modeling analyses of middle managers’ role conflict

<table>
<thead>
<tr>
<th>Control variables</th>
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<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
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<td>0.00(.00)</td>
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<tr>
<td>Fit</td>
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<td>0.19</td>
<td>0.22</td>
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</table>

* n = 397 middle managers (level 1) and 34 TMTs (level 2).
Coefficients (based on grand centering) are reported with standard errors in parentheses.
** p<.01  * p<.05  † p<.10
4.5 DISCUSSION AND CONCLUSIONS

Earlier studies have indicated that boundary-spanning activities of managers are an important driving force of exploratory innovation (Jansen et al., 2006). However, managers are often treated as a homogeneous group, which ignores the distinctive roles top-level and middle managers play in shaping unit level outcomes (Floyd & Lane, 2000). The introduction of role theory (Kahn et al., 1964) into the discussion of boundary-spanning and exploratory innovation led us to ask at least three key questions: (1) Do different managerial roles change the effect of boundary-spanning on exploratory innovation? (2) How does boundary-spanning at one level affect managers at adjoining levels? and (3) What are the effects of the fit between boundary-spanning activities across different levels?

We addressed these three questions by developing and empirically testing a multilevel model that takes top-level as well as middle management into account. In doing so, we emphasized both the benefits and the costs associated with boundary-spanning. This study contributes to existing literature by refining the distinction between TMT and MM, making it clear that boundary-spanning activities do not always translate into benefits. Indeed, our findings clearly show that, although boundary-spanning by top-level management is positively related to exploratory innovation, boundary-spanning by middle managers has no positive relation to exploratory innovation, contrary to what one would expect. Due to differences in authority, as well as other role-related aspects, TMT and MM also differ in the respective effects of their boundary-spanning activities on exploratory innovation. This finding suggests that information exchange across unit boundaries is more important for TMT than it is for MM's.

In addition to highlighting the positive effects of TMT boundary spanning, our study also reveals the potential costs. We found that TMT boundary-spanning may add pressure on MM who already have a very demanding role (Burgelman, 1994). This supports the notion proposed by Currie and Procter (2005) that inconsistent expectations and cues from key stakeholders, including top managers, make MM's reluctant to enact appropriate roles. In a similar vein, Mantere (2008) observed that role expectations can both enable and constrain MM behavior and identified eight top management micro-practices that clarify expectations and enable MM's to perform various strategic roles. By emphasizing the interplay between managerial levels our study helps to reconcile some of the mixed findings. Together, these results shed light on the ‘black box’ of boundary-spanning. We would argue that crucial insights can be gained by examining management roles in more detail.
Although previous research demonstrates the importance of boundary-spanning for an effective knowledge transfer within organizations (Allen, 1977; Hansen, 1999; Tsai, 2001), looking only at individual management levels may yield misleading results.

Furthermore, our findings indicate a negative relationship between MM’s role conflict and their units’ exploratory innovation. Taking into account the fact that the small unit sample size makes it possible to detect only strong effects makes this particularly interesting. To improve exploratory innovation, MM’s are required to look for new organizational norms, routines, structures, and systems (Crossan et al., 1999; Nooteboom, 2000; Zollo & Winter, 2002) and to experiment with new approaches. Recognizing that MM’s have limited time, any time spent on exploration activities may affect the way they carry out their tasks. Our findings suggest that MM’s who experience role conflict are likely to be less engaged in exploration activities. This is important because it emphasizes the fact that the presence of incompatible work-role related demands places the effective implementation by MM at risk (Donaldson & Hilmer, 1998). In addition, it underscores the variation in the observed value produced by TMT intra-organizational boundary-spanning and goes beyond existing studies that tend to highlight benefits at unit level, while considering the costs only at the individual level.

In literature on corporate entrepreneurship, the dominant idea is that middle managers and front-line managers are the key drivers of entrepreneurial action and exploratory innovation (Hornsby et al., 2009). This study shows that, at least with regard to boundary-spanning, TMT’s may play a key role in driving exploratory innovation. However, without the complementary boundary-spanning activities of MM’s, the positive direct effect of TMT boundary-spanning on exploratory innovation is weakened, due to the negative impact of role conflicts experienced by middle managers. Hence, it takes a particular configuration of interactions between boundary-spanning by TMT and MM’s to create a better result for the unit as a whole. This offers a significant contribution to network theory by differentiating between multiple levels of networks and examining how these may together influence the relationship between boundary-spanning and exploratory innovation. Whereas research efforts to date have approached boundary-spanning as a single-level construct, exploring how networks of individuals, groups or firms relate to organizational outcomes at the same level of analysis, we examined the interplay between boundary-spanning performed at multiple levels. Indeed, our study shows that considering boundary-spanning in terms of fit between TMT and MM’s is at
least as important as looking at them in isolation. The findings of our study demonstrate that, in order to fully understand how boundary-spanning leads to unit exploratory innovation, it is necessary to consider the fit, in terms of relative size and overlapping ties, between TMT and MM's boundary-spanning.

Relative size and overlapping ties in boundary-spanning at these two management levels enhances network closure, which reduces role conflict and facilitates the selection and implementation of exploratory innovation. MM's working in the same unit share perspectives and values, embrace overarching goals and develop a shared identity. When the TMT's span many boundaries, they may encourage their MM's to do the same. Social interaction then plays a critical role, both in shaping a common set of goals and values and in sharing those goals and values among unit members (Tsai & Ghoshal, 1998). As there may be fit in terms of relative size between TMT and MM boundary-spanning, actors will have familiar access to various resources that are available in the organization. The information derived from more aligned boundary-spanning efforts at the two management levels results in constructive interaction. This constructive interaction mechanism extends insight into the notion of interdependent innovation between different levels of management, as put forward by Kleinbaum and Tushman (2007). As stated by Tortoriello and Krackhardt (2010) when boundary-spanning MM's share common third party ties, cooperation and integration of knowledge are facilitated due to reduced friction an improved mutual understanding. Having more mutual ties will create better accrual of obligations and recognition of outstanding performance (Fourne et al., 2012). This idea suggests that combining the direct and indirect social networks of individuals improves insight into the potential risk of developing role conflict. By examining the effects of boundary-spanning of TMT's and MM's, we have addressed the research agenda advocated by Kleinbaum and Tushman (2007, p. 116): “This research might focus on the selection and shaping of boundary-spanning individuals and the structures that link these key individuals”.

**Limitations and Directions for Future Research**
Several limitation of this study should be acknowledged. First, the generalizability of the findings may be somewhat limited, since they are based on the analysis of a single organization. All information was collected within one multinational company operating in over 53 countries. The generalizability of any study is determined not by its setting but by how well it captures the necessary dimensions of that setting (Campbell, 1986). Although our multilevel research design allowed us
to map the entire organizational network structure among all units and managers, future studies should examine how network effects differ across different industry environments (Luo, 2003). In addition to different industries, cross-level linkages between within-level networks in different organizational systems will similarly vary as a function of organizational complexity introduced by distance and bureaucratic levels (Moliterno & Mahony, 2011). For example, we would expect different cross-level linkages between individual and organizational level networks between a high-tech start-up company and an established multinational. In the former, we would expect to see a considerable effect of individual level networks on network theoretic relationships examined at the firm level (e.g. Shane & Stuart, 2002), whereas in the latter, cross-level effects may be more nuanced (Moliterno & Mahony, 2011). There is a potential for future studies to examine the ways in which networks of relationships at one organizational level are embedded within networks at other levels (Kilduff & Tsai, 2003) and to conduct these in different industries and companies to test the robustness of our results.

Secondly, this study has focused on the direct performance effects of MM role conflict. Although the number of potential roles employees may take on at work is limitless (Welbourne et al., 1998), empirical evidence on how and under what circumstances managers are able to deal with seemingly paradoxical demands is still in its infancy (Gupta et al., 2006). Keeping in mind that role conflict is related to more primary and generic elements of individual and unit performance outcomes, it would be interesting to include coping mechanisms and personality traits, such as self-monitoring and self-efficacy, which act as mediators of the relationship between role conflict and performance. Dealing with conflicting choices can be intense and when attempts at resolving conflicting demands fail, people need to trust their own ability to find a new solution (Gibbons, 2005). For example, individuals with strong self-efficacy have shown to react less negatively to work overload and more positively, in terms of job satisfaction, to tasks with high significance (Jex & Bliese, 1999). In addition, job evaluation and job description are likely to affect role expectations and would be worth investigating. For instance, scholars have suggested using roles as the basis for job descriptions as well as to specify organizational expectations and performance requirements (Van Dyne et al., 1995). However, role theory only suggests roles as a way of conceptualizing multiple behaviors at work; it does not provide a way to determine which performance dimensions should be included or excluded. Future research should further address
this issue by investigating the boundary conditions for MM's to cope with the conflicting tensions of their organizational roles.

**Conclusion**

This study emphasizes the value of bringing together boundary-spanning literature and role theory. Differentiating between managerial levels our study provides new insights into the configuration of multilevel boundary-spanning that enables or constrains managers to maximize their units’ exploratory innovation. Like most phenomena being studied in organizational sciences, we believe that the boundary-spanning activities of managers and their outcomes are best approached from a multilevel perspective. Thus, the integration of role differences and contextual network effects enhances our understanding of the mechanisms that link boundary-spanning and exploratory innovation.