Michael Ahearne, Son K. Lam, Babak Hayati, & Florian Kraus

Intrafunctional Competitive Intelligence and Sales Performance: A Social Network Perspective

Salespeople represent a primary source of competitive intelligence (CI), but the contextual factors that influence the performance impact of salesperson CI quality remain underresearched. The authors develop a framework to examine the performance impact of CI quality at the individual salesperson and sales district levels, with sales district CI quality diversity and sales managers' network centrality as contingencies thereof. The empirical results from multilevel data sets of two U.S.-based corporations reveal that district CI quality diversity weakens the positive performance effect of CI quality at both levels. Sales managers' centrality in within-district and peer advice networks buffers the performance losses created by district CI quality diversity, but salespeople's centrality does not have this buffering effect. The study uncovers conditions under which the positive performance impact of salesperson and district CI quality can disappear and even become negative, thus highlighting the role of managers as CI hubs.

Keywords: sales management, market intelligence, social network analysis, multilevel analysis

Competitive intelligence (CI) plays an important role in strategic marketing decisions and market-oriented organizations (Jaworski, MacInnis, and Kohli 2002). Although multiple sources for attaining CI exist, the richest source of CI comes from salespeople, because they frequently interact with customers and CI is an integral part of selling activities (Marshall, Moncrief, and Lassk 1999; Montgomery and Weinberg 1979; Moss 1979; Robertson 1974; Thietart and Vivas 1981; Webster 1965). Despite its widely recognized importance, prior research on CI has primarily been conceptual and anecdotal. Empirical research on the topic has also waned over the years. Our review of this literature reveals several important limitations.

First, prior research has primarily focused on the antecedents to individual salesperson CI behavioral effort (Le Bon and Merunka 2006) and largely ignored the multilevel nature of CI. Furthermore, little is known about the group-level influence on the performance impact of salesperson CI quality, defined as the usefulness of information about a firm's competition. This is surprising, because prior research suggests that the group-level average of an attribute, such as district CI quality, and group-level diversity, such as district CI quality diversity, can exert important effects on individuals (e.g., Blalock 1984; Fiol 1994; Firebaugh 1980; Jehn, Northcraft, and Neale 1999; Schneider, Salvaggio, and Subirats 2002; Van Knippenberg, De Dreu, and Homan 2004). We define district CI quality as the average CI quality across salespeople in a sales district and district CI quality diversity as the extent to which CI quality differs among salespeople in a sales district. Understanding the effects of these group-level constructs is important because it helps us explain why salespeople who have the same level of individual CI quality but work in districts with different district CI quality and/or with different district CI quality diversity can achieve differential performance.

Second, CI may circulate in both formal and informal networks (Jaworski, MacInnis, and Kohli 2002). However, as Van den Bulte and Wuyts (2007) point out, research on market information using social networks is still rare. In this vein, although prior research recognizes that managers can rely on the formal organization to motivate salespeople to collect CI (Le Bon and Merunka 2006), research on managers' informal role in managing CI quality through their informal networks, such as the advice network, is scarce. Unlike salespeople, managers are likely to play a critical role in managing CI quality because they are embedded in various networks at different levels (Balkundi and Harrison 2006). Therefore, it is important to investigate how sales managers use their unique position in the formal structure and informal networks to leverage or buffer the effects of district CI quality and CI quality diversity.

In light of this discussion, we develop a multilevel framework that (1) distinguishes the roles of individuals and groups (i.e., sales districts) in converting CI quality into performance and (2) incorporates two contingencies: district CI quality diversity and managers' in-degree centrality in their within-district advice network and in the peer

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advice network. In-degree centrality refers to the extent of a person's incoming connectivity with other network members (Freeman 1979; Van den Bulte and Wuyts 2007). The within-district advice network consists of a sales manager and all his or her subordinates in the unit, and the peer advice network includes all the sales managers at the same level. For theoretical development, we draw from the social network literature, the nature of the interactions within the two types of informal networks, and the recent shift from a single level to multiple levels in research on organizational learning (Crossan, Lane, and White 1999) and social networks (Brass et al. 2004).

We tested the framework using data from two large U.S. companies. The first data set includes 65 district managers who supervise 433 salespeople in a media company. The second includes 228 district managers and 1,437 salespeople in a *Fortune* 500 firm. We found that although individual or group CI quality can boost salesperson performance, district CI quality diversity can destroy this performance impact. We also found that managers' position in within-district and peer social networks can buffer that destruction.

This study contributes not only to the scarce empirical research on the role of CI quality and CI quality diversity in sales management but also to research on team diversity and social networks. First, we divert from the single level of analysis in prior research on CI and conceptualize CI as a multilevel phenomenon. We demonstrate the contextual effect of group-level CI quality on objective salesperson performance that goes beyond the effect of individual-level CI quality. This finding empirically demonstrates the importance of group norms in multilevel organizational learning frameworks (Crossan, Lane, and White 1999; Sinkula 1994). Second, we challenge the conventional wisdom that CI quality always leads to higher performance. We uncover situations in which the performance impact of CI quality at both salesperson and district levels can disappear or even become negative. In doing so, we extend previous research on team diversity by showing that CI quality diversity can be detrimental or beneficial, depending on two factors: the mean level of work group or individual CI quality and the manager's centrality in informal social networks. Third, we are among the first to empirically demonstrate the role of both formal and informal networks in CI. We shed additional light on the effect of network centrality and contribute to the emerging multilevel perspective in social network research. Specifically, we demonstrate that district sales managers who occupied central positions in within-district and peer advice networks were more successful at buffering the detrimental effects of district CI quality diversity at the individual and group levels, respectively. We also found that although a salesperson's centrality among peers directly improved salesperson performance, this parameter did not moderate the salesperson CI quality–salesperson performance relationship. In other words, we provide a more nuanced understanding of the benefits of network positions: they can be specific to the type of network (e.g., within-district vs. peer networks) and the position of the social actor in the formal structure (e.g., managers vs. salespeople). We summarize the research gaps and our contributions in Table 1.

Broadly, our study informs managers that although salespeople are suitably positioned to be CI agents—much like spokes—they rely on managers who can play a transformational role—much like hubs—in filtering, verifying, and integrating CI quality through their informal networks. Our study has at least four managerial implications. First, the effect of group-level CI quality represents a way for managers to improve salesperson performance and understand why performance differences exist among equally good salespeople who work in different districts. Second, managers should be aware that group-level CI quality diversity is not necessarily a bad thing. Indeed, such diversity can be useful to salesperson performance when the CI quality of a particular salesperson or the district is low. Third, to buffer the potential negative performance impact of CI quality diversity at the individual and group levels, managers must rely on their position in two different types of informal social networks. Fourth, managers can control group-level CI quality and its diversity by encouraging informal interactions and adjusting group diversity in sales experience and competitor orientation.

In the next section, we provide a brief literature review of prior research on salesperson CI and explain why social network analysis is appropriate for examining such a process. We then present the conceptual framework along with our hypotheses. This account is followed by two empirical studies. We conclude with a discussion of theoretical and managerial implications and directions for further research.

Background Literature

Research on Salesperson CI

Prior research on salesperson CI has developed along three major streams. First, the inter- and intrafirm stream focuses on market orientation (Jaworski and Kohli 1993; Slater and Narver 1995) and market research use (Deshpandé 1982; Deshpandé and Zaltman 1984; Moorman 1995; Moorman, Zaltman, and Deshpandé 1992). In general, this influential body of research treats competitor orientation as an important form of organizational learning. The second research stream examines the interfunctional level of market intelligence activities. Researchers in this stream draw from communication theories to examine market intelligence dissemination across functional boundaries (Fisher, Maltz, and Jaworski 1997; Maltz and Kohli 1996). Our study falls into the third category, which is the intrafunctional level of market intelligence activities (e.g., Evans and Schlacter 1985; Le Bon and Merunka 2006). This stream of research originates from early work on personal selling (e.g., Moss 1979; Robertson 1974; Webster 1965). Empirical findings in the intrafunctional level of market intelligence activities suggest that the majority of salespeople who collect CI are often left empty-handed, feeling as if their managers waste the CI they provide (Robertson 1974). We contribute to this conversation by examining three effects: (1) the main effects of CI quality at two levels (individual and group) on salesperson performance, (2) the negative moderating effects of district CI quality diversity, and (3) the buffering

TABLE 1
Research Gaps and Contributions

	Prior Research	Current Research
Salesperson CI Research		
Approach	Primarily conceptual and/or anecdotal (e.g., Jaworski, MacInnis, and Kohli 2002; Montgomery and Weinberg 1979; Moss 1979; Webster 1965)	Empirical, in two contexts
Level of analysis	Single level (e.g., LeBon and Merunka 2006; Moss 1979; Robertson 1974)	Multiple levels: individual salesperson, business unit (e.g., sales districts), and cross-level interactions
Focus	CI behavior (e.g., Evans and Schlacter 1985; LeBon and Merunka 2006; Robertson 1974)	CI quality and CI quality diversity
Organizational structure	Primarily formal structure (e.g., LeBon and Merunka 2006)	Both formal (managers vs. employees) and informal structures (advice social networks among peers and within district)
Performance outcome	Not examined (e.g., Evans and Schlacter 1985; Thietart and Vivas 1981)	Objective sales performance: the performance impact of CI quality can be nonsignificant, even negative.
Social Network Research		
Position of social actors	Centrality in informal networks is important, but the position of the social actor and the type of network have not received much attention (e.g., Balkundi and Harrison 2006; Burt 2000; Mehra et al. 2006)	Network centrality is important depending on •The formal position of the social actor (managers or salespeople) •Types of networks: managers' centrality in within unit and peer networks plays different roles at different levels of analysis
Social networks and CI	Conceptually discussed, but not empirically examined (e.g., Jaworski, MacInnis, and Kohli 2002; Üstüner and Godes 2006; Van den Bulte and Wuyts 2007)	CI is embedded in two types of informal social networks (within district and peer). Social network parameters function as important contingencies in the relationships among CI quality, district CI quality diversity, and salesperson performance.
Diversity Research		
Effect of diversity	Information diversity can be beneficial due to elaboration of different perspectives (e.g., Fiol 1994; Jehn, Northcraft, and Neale 1999; Van Knippenberg, De Dreu, and Homan 2004)	Information quality diversity can be detrimental or beneficial, depending on •The mean level of work group information quality •The manager's centrality in social networks

effect of sales managers' centrality in informal networks on these negative effects.

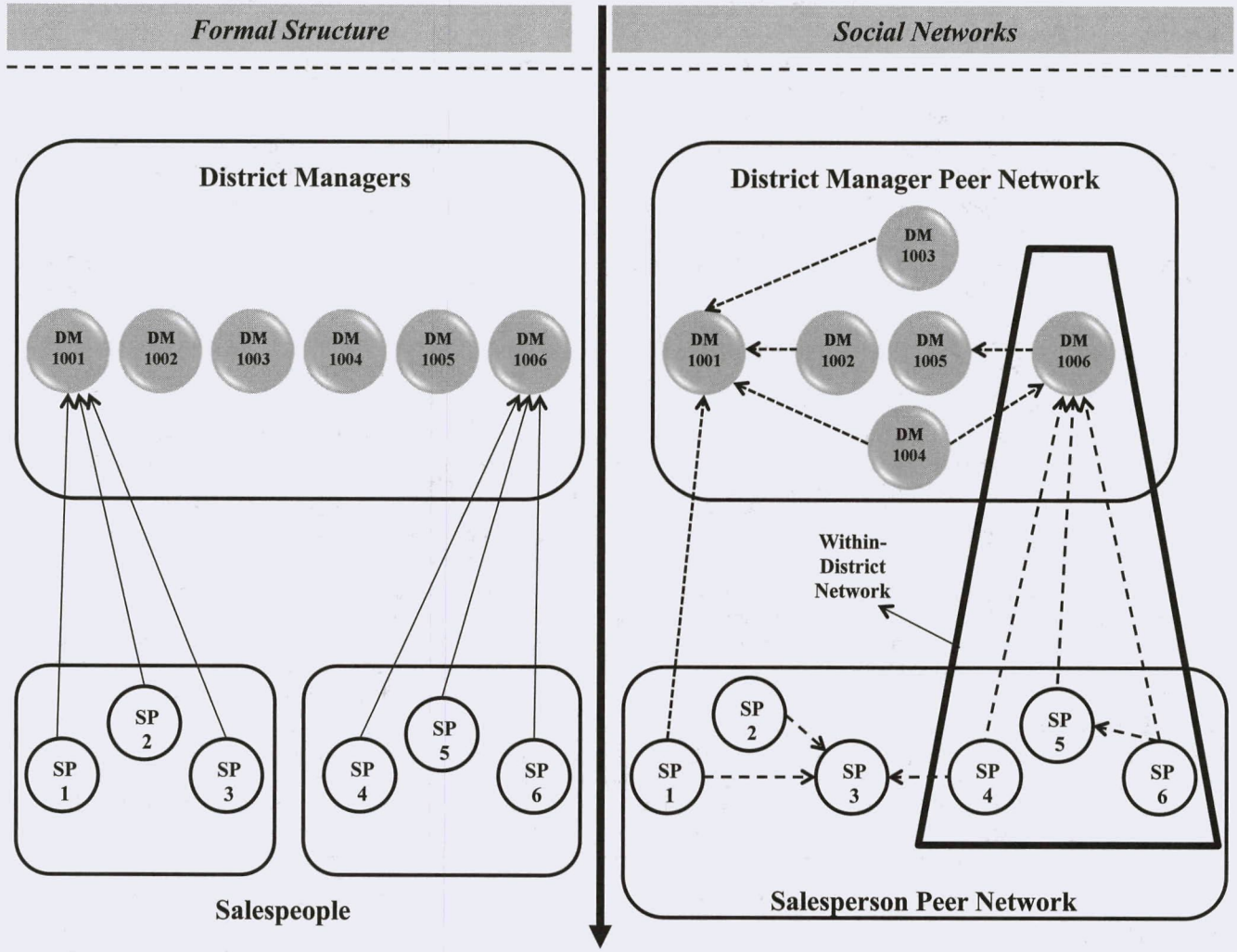
Social Networks as a Useful Lens to Examine Salesperson CI Behavior

Different types of function-level social networks. Our focus on informal social networks is in line with the view that managers thrive on informal, personal communications (Mintzberg 1973) and that "informal, personal media simply are capable of providing richer information to managers about certain problems" (Daft and Lengel 1984, p. 201). Although formal communication can provide useful information, information through formal channels of communication may be limited, too general, or even obsolete (Mintzberg 1973, pp. 73–74). Johnson et al. (1994) suggest that informal channels of communication can provide information that is specific to a situation and therefore can reduce information overload. Finally, Jaworski, MacInnis, and Kohli (2002) theorize that both formal (e.g., formal positions) and informal (e.g., interpersonal relationships) structures are important in studying CI.

A typical sales department in a firm includes multiple sales districts, which in turn are independently managed by district managers and comprise many salespeople. Therefore, although the sales function may only be a single entity in a larger organization, multiple social networks exist within its hierarchy. Within this organizational hierarchy, we focus on two types of informal networks: (1) a within-district network, which includes the district sales manager and his or her salespeople, and (2) a peer network, which includes the focal person and all his or her peers at the same level in the sales organization. Thus, the district manager peer network includes all district managers, and the salesperson peer network includes all salespeople. Figure 1 depicts the boundaries of these social networks.

Network centrality. Although there are many types of centrality (for a review, see Freeman 1979; Van den Bulte and Wuyts 2007), we focus on in-degree centrality in the advice network of an organizational member. Our focus is based on the social network literature, which suggests that people with high in-degree centrality have two key advantages: (1) information access (e.g., Freeman 1979) and (2) high visibility and prestige in the group (Freeman 1979; Knoke and Yang 2008). By providing advice to others, actors who are frequently sought after for advice (i.e., actors with high in-degree centrality) send out signals about their level of competence, creating a reputation of expertise (Burt 1992, 2000; Mehra et al. 2006). For the remainder of the article, to simplify the language, by "centrality," we mean "in-degree centrality." Although mounting evidence

FIGURE 1
Social Networks in a Multilevel Sales Organization



Notes: In this hypothetical sales organization, District Manager DM1001 manages three salespeople, SP1, SP2, and SP3. Similarly, District Manager DM1006 manages three salespeople, SP4, SP5, and SP6. In the formal structure, salespeople report to their managers only, and the managers are of equal rank. The line of reporting, represented by solid arrows, is confined within the district. In informal social networks, such as the advice network, salespeople and managers can go to their peers for advice (represented by dotted, unidirectional arrows). In this hypothetical example, in the within-district network, salesperson SP3 has a higher in-degree centrality than District Manager DM1001, who has the highest in-degree centrality in the district manager peer network. District Manager DM1006 has the highest within-district in-degree centrality but has low in-degree centrality in the district manager peer network. The weighted in-degree centrality scores use the frequency of interaction between advisers and advisees as the weight.

supports the benefits of centrality in advice networks, three research questions remain unanswered: (1) Does centrality help leverage the translation of intrafunctional CI quality into performance? (2) If centrality matters and there are multiple informal networks, in which network does centrality matter? and (3) Does the effect of centrality depend on the position of members in the formal organizational structure (e.g., a district manager vs. a salesperson)? Our research addresses these knowledge gaps.

Research Hypotheses

We propose that the performance impact of CI quality at the salesperson and district levels is contingent on two factors: (1) district CI quality diversity and (2) district managers' in-degree centrality in within-district and peer networks. We summarize the hypotheses and the distinct theoretical mechanisms for each of them in Figure 2.

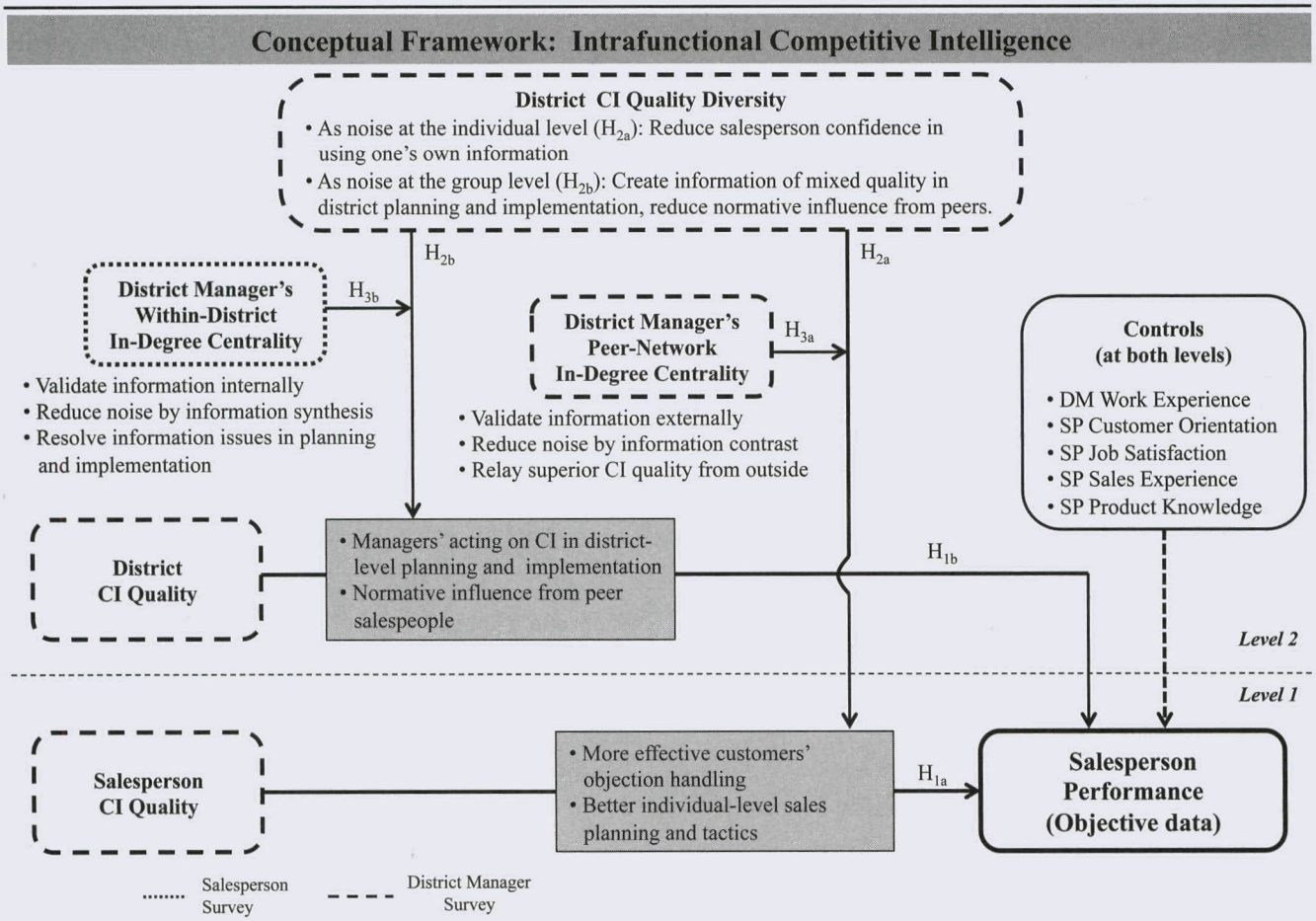
Disentangling the Individual- and Group-Level Relationships Between CI Quality and Salesperson Performance

Individual level. CI quality helps salespeople achieve higher performance in at least two ways. First, compared with salespeople who lack accurate competitive information, salespeople equipped with a thorough understanding of the competitive landscape can conduct competitor-centered assessments and thus have better knowledge of the firm's competitive superiority (Day and Wensley 1988). With a better grasp of the strengths and weaknesses of the firm

FIGURE 2
Intrafunctional CI and Salesperson Performance: A Social Network Perspective

Inter- and Intrafirm Marketing Intelligence Activities (e.g., Jaworski and Kohli 1993; Moorman 1995; Slater and Narver 1995)

Interfunctional Marketing Intelligence Activities (e.g., Fisher, Maltz, and Jaworski 1997; Maltz and Kohli 1996)



Notes: SP = salesperson, and DM = district sales manager.

relative to its competing alternatives, a salesperson can be more effective in overcoming customers' competitor-related objections (Weitz 1981). Second, prior research suggests that quality information is more likely to be used and acted on (e.g., Deshpandé and Zaltman 1984; Maltz and Kohli 1996). Jaworski, MacInnis, and Kohli (2002) suggest that CI quality leads to superior business performance because it enhances business planning and actions. Furthermore, quality information enables people to justify the basis of their decisions and actions (O'Reilly 1982). For salespeople, such a justification can be useful to acquire additional resources to close a sale. Therefore, we hypothesize the following:

H_{1a}: The relationship between salesperson CI quality and salesperson performance is positive.

Contextual effect. From a multilevel perspective (Chan 1998), CI quality can be conceptualized at various organizational levels. Prior work on work group climate suggests that the average level of work group characteristics (defined as the aggregation of individual work group members' characteristics) can exert a meaningful influence on a given work group member's performance (e.g., Grizzle et al. 2009). The sociology and multilevel literature refers to these effects as contextual effects (e.g., Blalock 1984; Firebaugh 1980).

The contextual effect is consistent with multilevel organization learning models that describe learning as a multilevel phenomenon that takes place at the individual, group, and organizational levels (Crossan, Lane, and White 1999; Sinkula 1994). Nonaka (1994, p. 15) posits that "although ideas are formed in the minds of individuals, interaction between individuals typically plays a critical role in developing these ideas. That is, 'communities of interaction' contribute to the amplification and development of new knowledge." In our context, such contextual effects represent the expected difference in performance of two salespeople who have the same level of individual CI quality but work in districts that differ in their average level of work group CI quality. More important, contextual effects may exist even after controlling for individual-level effects (e.g., Firebaugh 1980). Therefore, we also consider district CI quality,

which is the average of CI quality across salespeople in a sales district.

We propose that district CI quality exerts unique influences on salesperson performance for at least two reasons. First, consistent with the idea that quality information is more likely to be used and acted on (e.g., Deshpandé and Zaltman 1984; Maltz and Kohli 1996), managers are also more likely to use and incorporate high CI quality into strategy planning and implementation. Whereas use of CI quality at the individual level is based on intuition and interpreting information that results from individual solutions, managers' use of CI quality occurs at the group level and is based on the integration and institutionalization that lead to collective rules, coordinated procedures, and integrative solutions (e.g., Crossan, Lane, and White 1999). Therefore, a high level of work group CI quality should lead to effective competitive business strategies that improve the performance of all salespeople in the work group. Second, the contextual effect of district CI quality on individual salesperson performance can occur through normative influence, also known as peer pressure. Such a contextual effect is well documented in organizational sociology and social psychology (Firebaugh 1980; Raudenbush and Bryk 2002). Specifically, in districts with high district CI quality, a salesperson is more likely to interact with salespeople with high CI quality. These peers are likely to perform well, which creates a normative influence on the salesperson to achieve a high level of performance. Thus, we hypothesize the following:

H_{1b}: The relationship between district CI quality and salesperson performance is positive.

Moderating Effect of District CI Quality Diversity

An underlying assumption of contextual effects is that work group members are largely homogeneous on the attribute being evaluated (Blalock 1984). In this subsection, we examine how district CI quality diversity can change the direction of the performance impact at the individual and district levels. The literature on work group diversity suggests that it plays an important role in how group members process information in a group setting (Van Knippenberg, De Dreu, and Homan 2004). Equivocal information impairs information interpretation and strategic actions (Daft and Lengel 1984; Sinkula 1994). Similarly, CI quality diversity hinders the formation of a uniform competitive knowledge. We apply this logic to the context of CI to propose that district CI quality diversity functions as "information quality noise" that moderates the positive performance impact of CI quality at the salesperson and district levels.

Moderating effect on the relationship between salesperson CI quality and salesperson performance. Competitors are external stakeholders whose activities are not readily observable. Therefore, there is some level of uncertainty about the CI collected by a single person. In other words, a salesperson's CI quality represents only a single point of observation with some confidence intervals about what the competitors are *actually* doing. The salesperson can fine-tune these confidence intervals on the basis of social learning from peers, which consists of a larger number of observations about the competition. Research on the influence of groups on individual behavior (e.g., Sniezek and Henry 1989) and multilevel organization learning models both underscore the social aspect of learning (e.g., Crossan, Lane, and White 1999). In line with these models, we propose that a salesperson in a district is likely to (1) compare his or her own CI quality with district CI quality and (2) adjust confidence in his or her own CI quality, depending on how peers' CI quality differ from his or her own.

Specifically, in a district with high CI quality diversity, salespeople are likely to be confused by the mixture of good and bad CI. That is, the comparison of their own CI quality with other salespeople's CI quality leads to confusion rather than clarity. Even if sales managers decide to use their formal power to block CI of low quality from circulating, they may not be able to prevent salespeople from exchanging CI of mixed quality in informal social interactions. As a result, these salespeople become less confident in their analysis of competitors and use of their own CI in devising selling tactics, regardless of their actual CI quality. In contrast, salespeople who work in districts in which CI quality is more homogeneous have a clear group-level anchor point with which to compare their own CI quality. Salespeople whose CI quality falls below the group average will realize that their own CI quality is actually inferior and be less likely to use it. Conversely, salespeople whose CI quality rises above the group average will realize that their own CI quality is superior and be more likely to use it. Such adjustments of confidence in one's own CI quality should lead to higher performance for salespeople with high CI quality than for those with low CI quality. Therefore, we hypothesize the following cross-level interaction effect:

H_{2a}: The positive relationship between salesperson CI quality and salesperson performance is weaker when district CI quality diversity is high.

Moderating effect on the relationship between district CI quality and salesperson performance. District CI quality diversity also impairs the positive contextual effect of district CI quality on salesperson performance because it leads to less effective and efficient within-district planning and implementation. First, when CI quality varies significantly across salespeople in a district, managers are exposed to CI of mixed quality. Although these managers can rely more heavily on salespeople whom they think have high CI quality than those who have low CI quality, they are likely to be less confident in using the within-district CI. This situation occurs because such selective attention is focused on only a few salespeople in the district rather than many salespeople (e.g., Sniezek and Henry 1989), and the deviation from the mean level of within-district CI quality is large. Prior research suggests that the more managers appraise a situation as an opportunity, the greater is the magnitude and commitment of their response (White, Varadarajan, and Dacin 2003). However, when managers are faced with a wide distribution of CI quality within their districts, their lack of confidence in the CI collected by salespeople will make them less likely to act on an opportunity than those who manage districts with more homogeneous CI quality, even with the same high mean level of district CI quality.

Second, district CI quality diversity also influences the implementation of managers' plans for their business units. When district CI quality diversity is high, it is difficult for managers to secure commitment from all the salespeople to follow a uniform competitive plan. Prior research suggests that having shared organized knowledge structures about a firm's external environment can facilitate team communication and team strategy implementation (e.g., Marks, Mathieu, and Zaccaro 2001). However, such shared knowledge about the competitive environment collapses in districts with high CI quality diversity. Such a situation can lead to conflicts in work groups, which in turn may impair individual salesperson performance. Finally, the normative influence of a district's CI quality on a salesperson should be much weaker when there is high diversity of CI quality among salespeople. Together, these processes weaken the contextual effect of district CI quality that we described previously. Therefore, we hypothesize the following between-group interaction effect:

H_{2b}: The positive relationship between district CI quality and salesperson performance is weaker when district CI quality diversity is high.

Effect of Managers' Network Centrality

In the previous subsection, we predicted that district CI quality diversity destroys salesperson confidence in CI quality at the salesperson level and strategic planning and implementation at the district level. In this subsection, we propose that district managers can buffer these effects by relying on their central position in the peer and within-district networks, respectively.

Peer-network centrality. In the district manager peer network, a centrally located district manager can exchange and learn from multiple informal ties with district managers who manage different salespeople. This form of social learning is distal and creates novel insights because the information is extracted from interactions with people outside the regular task flow rather than within the district (Brass 1984; Sparrowe et al. 2001). Note that a centrally located district manager in the district manager peer network has access to unique information from district managers who are formal CI hubs themselves. Because the information from these peer district managers is more comprehensive, synthesized, and integrated from a large number of observations across multiple districts, its confidence interval about the truth will be narrower than observations from salespeople in a single sales district. In short, managers who are central in the peer network will possess CI whose quality is more objective (i.e., not extracted from salespeople within the district and contrasted with external sources) and superior (i.e., based on a larger sample). When CI quality in a group is diverse, managers who are central in the district manager peer network can buffer its negative effect in at least two ways. First, salespeople who are confused by district CI quality diversity will be in need of CI from people who have access to information from outside the district. Because managers who are central in the district manager peer network are able to contrast the CI in the group with the CI from outside the district, they are better at helping salespeople overcome the influence of information noise. Second, they possess superior CI quality, which supplements salespeople's CI quality and reinforces salespeople's confidence in using CI. Thus, we hypothesize the following:

H_{3a}: District managers' peer-network centrality buffers the negative cross-level moderating effect of district CI quality diversity.

Within-district network centrality. Prior research suggests that "formal leaders can benefit from being informal leaders as well" (Balkundi and Harrison 2006, p. 53). Although district managers have positional power over salespeople who report to them, they do not necessarily occupy a central position in informal district-level social networks. For example, salespeople may prefer to go to peers for advice rather than the district manager. In other words, the formal and informal organizational structures need not coincide (Soda and Zaheer 2012). Prior research also suggests that by giving advice, centrally located people are able to accumulate knowledge about task-related problems and form workable solutions (Baldwin, Bedell, and Johnson 1997). Note that centrality in the within-district network enhances managers' ability to synthesize local information, creating local knowledge that is useful for within-district planning and implementation of competitive tactics.

Specifically, when district CI quality diversity is high, managers who are central within the district possess district-specific knowledge that may help overcome an ambiguous situation. In contrast, managers who are not central may be confused by information of mixed quality. That is, managers' within-district network centrality helps them reduce equivocal information (Daft and Lengel 1984) created by district CI quality diversity. Furthermore, district managers who are more central among the salespeople within their respective sales districts will have not only formal power but also informal power (e.g., expert power, referent power, information power; French and Raven 1959) over salespeople in their districts. Compared with their less central counterparts, centrally located managers are more popular among subordinates in the sense that they are known as "go-to" people for advice. Through these informal, albeit personal, interactions, central managers have greater knowledge of their group members' preferences (e.g., task-related attitudes, concerns, needs) and the group's social structure (e.g., interpersonal ties among group members) (Greer, Galanter, and Nordlie 1954). Equipped with this interpersonal knowledge, these more centrally located managers are more effective at resolving mixed information frames and conflicts that arise from having diverse CI quality than are less central managers. These arguments lead to the following hypothesis:

H_{3b}: District managers' within-district network centrality buffers the negative within-district moderating effect of district CI quality diversity.

Study 1

In Study 1, we test H_{1a}, H_{1b}, H_{2a}, and H_{2b}. We collected data from a leading media company, which has a typical hierarchical structure of sales organizations, in which sales-

people work under the supervision of district managers. Moreover, the competitive nature of the media industry in the U.S. market makes it an ideal context in which to study CI. Before launching the quantitative survey, we conducted in-depth interviews with several district managers and salespeople in the company to gain an understanding of CI management inside the company and to ensure that our measures matched the research context. From this qualitative research, we defined the sample frame as the members of the sales organization who compete, in some form, for the customer's business. As such, the study's questionnaire was not distributed to members of the sales organization whose jobs pertained solely to after-sales customer services. From the qualitative interviews, we deemed these employees too far removed from the competitive aspect of the business, making CI secondary to their day-to-day activities and thought processes. Regardless of this exclusion, our sample frames still covered more than 75% of the sales organization. To match responses from different levels of the organization, we embedded individualized code numbers in each questionnaire. Our final data included 65 district managers (88% response rate) who supervised 433 salespeople (65% response rate). We tested for systematic differences in the responses of early and late respondents on both demographic variables and major constructs; unanimously, the results yielded insignificant effects. Table 2 provides a brief description of the sample.

Measures

In addition to attaining self-reported data from the salespeople and district managers, we gained access to objective data from the company's records for a three-month time span after the start date of data collection, providing us time-lagged salesperson performance metrics. We adapted all other measures from published scales in the literature and assessed them on Likert scales anchored by 1 ("strongly disagree") and 7 ("strongly agree"). Next, we briefly summarize these measures; Appendix A provides a complete list.

CI quality. For salesperson CI quality, we asked district managers to evaluate the content of the CI each salesperson collected in their sales districts. The measure we used for CI quality is a shortened version of Maltz and Kohli's (1996) multidimensional construct. In the original scale, CI quality has four subdimensions, including accuracy, relevance, clarity, and timeliness. Here, we selected one item from each subdimension that best suited our research context to form a four-item scale of CI quality. We calculated district CI quality as the average CI quality of salespeople within a sales district. For district CI quality diversity, we calculated the standard deviation of CI quality of salespeople within a sales district. This operationalization of diversity is consistent with research on climate strength (e.g., Schneider, Salvaggio, and Subirats 2002).

Salesperson performance. We used sales as a percentage of quota (i.e., sales quota achievement), which is calculated as dollar sales in a given month divided by the period's sales quota, to measure each salesperson's performance. Because we expected CI quality to influence salesperson performance after a time lag, we obtained salesperson performance data for three consecutive months after the survey was launched and used the mean level during this period as our dependent variable.

Covariates. We controlled for salespeople's sales experience (number of years working in the sales job) and district managers' work experience (number of years in the current position) using company objective data. In addition, to extract the effects of other possible determinants of salesperson performance, we controlled for salesperson cus-

TABLE 2
Description of Samples

Level	Experience in the Current Position (Years)	Work Experience (Years)	Experience with Company (Years)	Age (Years)
Study 1				
Level 2: District Managers (N = 65; 15.38% female)				
M	10.60	18.30	11.85	41.48
SD	2.93	7.13	6.19	6.87
Level 1: Salespeople (N = 433; 30.02% female)				
M	8.50	12.20	10.37	33.29
SD	2.78	6.77	4.30	7.15
Study 2				
Level 2: District Managers (N = 228; 12.28% female)				
M	7.11	15.90	12.13	44.23
SD	3.73	7.55	8.03	7.42
Level 1: Salespeople (N = 1,437; 25.61% female)				
M	5.51	13.31	8.49	34.18
SD	3.83	7.87	6.21	8.20

tomer orientation with an adapted six-item measure from Thomas, Soutar, and Ryan (2001). We also controlled for salesperson product knowledge by adapting a four-item measure from Behrman and Perreault (1982).

Analytical Strategy

Because salespeople were nested within district managers, we applied hierarchical linear modeling (HLM; Raudenbush and Bryk 2002) to account for the possible interdependence of observations in a sales district. To separate out within-level and between-level effects, we followed Raudenbush and Bryk's (2002) recommendation to add group-mean-centered predictors to Level 1 and the means of these predictors to Level 2. In this regard, coefficients of group-mean-centered variables at Level 1 determine within-group effects, and coefficients of the means of these variables at Level 2 determine between-group effects. We provide details of the model specification in Appendix B.

Measurement Model

Although all the scales were either adapted from or developed on the basis of previously tested measures in the literature, we conducted an exploratory factor analysis to validate the scales. The results showed that all items loaded on their corresponding factors. An additional confirmatory factor analysis on the focal constructs also resulted in acceptable fit indexes ($\chi^2 = 36.6$, d.f. = 13; comparative fit index = .97; Tucker–Lewis index = .95). Table 3 reports the descriptive statistics, average variance extracted (AVE), and correlation matrix of the focal constructs included in the factor analysis. As Table 3 and Appendix A show, all constructs in the study have Cronbach's alphas greater than .70 and AVEs greater than .50. These results indicate that our measures are highly reliable. Moreover, because the AVE values for all constructs exceeded the squared correlations between each respective pair, the constructs also exhibited discriminant validity (Fornell and Larcker 1981).

Before aggregating the CI quality variable from the salesperson level to the district level, we analyzed the appropriateness of data aggregation. Our analysis of the intraclass correlations justified aggregation to higher levels (ICC1 = .23, ICC2 = .81, median Rwg = .74). More specifically, the ICC(1) value, which represents between-group variance, is similar to that reported by previous researchers who justified data aggregation on this basis (Bliese 2000; Grizzle et al. 2009; Schneider, Salvaggio, and Subirats 2002). The ICC(2) value, which represents group mean reliability, is above .70, which exceeds the conventional threshold (Ehrhart, Bliese, and Thomas 2006). Finally, the median Rwg is also above that reported in the literature (James, Demaree, and Wolf 1984; Schneider, Salvaggio, and Subirats 2002).

Hypothesis Testing

Our test of the intercept-only model showed that 65% of the variance in sales performance resides between salespeople and 35% of variance can be attributed to between-sales district differences. Both variances are significant at $p < .05$, justifying the addition of predictors at Level 2.

Main effects. We analyzed the model using two-level HLM, with salesperson performance as the dependent variable. The results of the analysis appear in Table 4, which reports the main-effects-only model on the left-hand side for sales quota achievement as the dependent variable and the full model, including the interactions, on the right-hand side. We found that a salesperson's CI quality (Level 1) has a significant effect on his or her performance (H_{1a}: $\gamma = .17, p < .05$). District CI quality (Level 2) also has a positive influence on the performance of a salesperson working in the corresponding district (H_{1b}: $\gamma = .19, p < .05$).

Moderating effects. As we predicted, the positive relationship between salesperson CI quality and salesperson performance is weaker when district CI quality diversity is high (H_{2a}: $\gamma = -.17, p < .05$). Moreover, the positive relationship between district CI quality and salesperson performance is weaker when district CI quality diversity is high (H_{2b}: $\gamma = -.12, p < .05$). To probe the nature of the interactions further, we followed Aiken and West's (1991) recommendation and plot these interactions in Figure 3, Panels A and B.

Control variables. To rule out possible alternative explanations, we controlled for the effects of several variables on salesperson performance. First, we argue that salespeople who have greater sales experience or work under the supervision of highly experienced district managers have, on average, better sales performance. Our results (Table 3) show that salesperson sales experience ($\gamma = .13, p < .05$) and district manager work experience ($\gamma = .09, p < .10$) are positively related to salesperson quota achievement. Second, we controlled for salesperson customer orientation, product knowledge, and job satisfaction because these variables are important predictors of salesperson performance (e.g., Brown et al. 2002). We found a significant, positive effect for salesperson customer orientation ($\gamma = .10, p < .05$), product knowledge ($\gamma = .12, p < .05$), and job satisfaction ($\gamma = .15, p < .05$).

Discussion

In Study 1, all hypotheses were supported. More specifically, we found that salesperson CI quality is positively related to salesperson performance and that the contextual effect of district CI quality exists. However, district CI quality diversity impairs these relationships. Nevertheless, the sample size in Study 1 was relatively small at Level 2 (i.e., 65 district managers) and did not provide us with enough statistical power to simultaneously test the three-way interactions predicted in H_{3a} and H_{3b}. Furthermore, it is important to examine whether the findings, especially the interaction effects, are generalizable in a different context.

Study 2

Our goals in Study 2 were to replicate H_{1a}, H_{1b}, H_{2a}, and H_{2b} and to test the three-way interactions predicted in H_{3a} and H_{3b} in a different industry and selling context. We collected data from a *Fortune* 500 firm that operates in the industrial supplies sector. Again, the company has a typical hierarchical structure. Furthermore, the contexts are particularly suitable for a multilevel social network study insofar

TABLE 3
Means, Standard Deviations, and Intercorrelation Matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	M	SD	AVE
Level 1: SPs																		
1. PERF		.094*	.138**	.108*	.165**	.244**					.038	−.044		−.021	.048	.854	.191	—
2. SPCIQ	.066**		.100*	−.007	.155**	.130**					.089	.089		.030	.145**	4.98	1.13	.71
3. SPPKO	.101**	.096**		.089	−.057	.014					.040	.012		.096*	.106*	5.11	1.09	.67
4. SPEXP	.072*	−.055*	.037		.057	.023					−.073	−.036		.065	.129**	8.50	2.82	—
5. SPCO	.047	−.034	.024	.030		.043					.130**	−.043		−.027	.213**	5.37	1.26	.73
6. SPSAT	.146**	−.020	.060*	.020	.015						.158**	.103*		−.009	.002	5.03	1.19	.79
7. SPPNCEN	.138**	.013	.010	.030	.005	.053*												
Level 2: DMs																		
8. DCIQ	.164**	−.040	−.077**	.057*	.020	−.175**	−.026											
9. DMPNCEN	−.030	.012	.006	−.026	.062*	.139**	−.002	−.069**										
10. DMWDCEN	.113**	.011	.014	.027	.085**	.008	.030	−.005	.074**									
11. DCIQDIV	.035	.045	.036	−.019	−.022	.277**	−.032	.029	−.010	.027		.086		.161**	.364**	4.15	1.62	—
12. DMEXP	.030	.019	.004	.049	.048	.118**	.074**	.155**	.015	.006	−.055*			.188**	.124**	10.60	2.91	—
13. DNDEN	.021	.022	−.005	−.001	.003	−.446**	−.076**	−.021	.063*	.014	−.013	.041						
14. DEXPDIV	.071**	.105**	−.001	.031	.009	.075**	.097**	.024	−.59**	.067*	.202**	.025	.112**		.307**	5.05	2.06	—
15. DCODIV	.063*	.029	.093**	.035	.113**	−.040	−.034	.115**	.101**	−.048	.357**	.060*	.083**	.039		3.04	1.54	—
M	.867	5.04	5.08	5.95	5.77	4.72	19.98	5.11	21.10	4.28	4.05	7.09	1.16	5.51	2.87			
SD	.165	1.17	1.00	3.12	1.05	1.81	7.01	1.22	8.09	1.54	2.18	4.09	.086	3.04	1.57			
AVE	—	.66	.61	—	.66	.71	—	—	—	—	—	—	—	—	—			

*$p < .05$ (two-tailed).
**$p < .01$ (two-tailed).
Notes: Correlations based on scores disaggregated per employee: Study 1 (N = 433) is above and Study 2 (N = 1,437) is below the diagonal. SPs = salespeople, DMs = district managers, PERF = salesperson performance (sales quota achievement), SPCIQ = salesperson CI quality, SPPKO= salesperson product knowledge, SPEXP = salesperson sales experience, SPCO = salesperson customer orientation, SPSAT = salesperson job satisfaction, SPPNCEN = salesperson's peer-network centrality, DCIQ = district CI quality, DMPNCEN = district manager peer-network centrality, DMWDCEN = district manager within-district centrality, DCIQDIV = district CI quality diversity, DMEXP = district manager's work experience, DNDEN = district network density, DEXPDIV = district industry experience diversity, and DCODIV = district competitor orientation diversity.

TABLE 4
Study 1: HLM Results of Two-Level Models: District Managers and Salespeople

	Dependent Variables = Quota Achievement			
	Main-Effects-Only Model		Full Model	
Variables	**γ**	**SE**	**γ**	**SE**
Intercept	.83**	.136	.85**	.139
Controls				
SPCO	.09**	.028	.10**	.030
SPEXP	.13**	.043	.13**	.044
SPPKO	.11**	.035	.12**	.039
SPSAT	.14**	.022	.15**	.024
DMEXP	.10*	.051	.09*	.054
Simple Effects				
SPCIQ (H_{1a})	.16**	.032	.17**	.035
DCIQ (H_{1b})	.18**	.075	.19**	.081
DCIQDIV	−.21	.431	−.027	.490
Interaction Effects				
SPCIQ × DCIQDIV (H_{2a})			−.17**	.021
DCIQ × DCIQDIV (H_{2b})			−.12**	.036
Pseudo R^2	.112		.195	
−2 log-likelihood	1,843.39		1,801.22	
Change in fit index	42.17** (d.f. = 2)			

*$p < .10$.
**$p < .05$.
Notes: Two-tailed tests. SPCO = salesperson customer orientation, SPEXP = salesperson sales experience, SPPKO = salesperson product-knowledge, SPSAT = salesperson job satisfaction, DMEXP = district manager's work experience, SPCIQ = salesperson CI quality, DCIQ = district CI quality, and DCIQDIV = diversity of CI quality in a sales district. N = 433 (salespeople), 65 (district managers).

as specific social networks exist between employees and managers at different levels of the sales organization. As in Study 1, we conducted qualitative interviews with district managers and salespeople before the launch of the survey. The final data set includes 228 district managers (95% response rate) who manage 1,437 salespeople (71% response rate). Again, we found no systematic differences between the responses of early and late respondents on either the demographic variables or the major constructs. Table 2 briefly describes this second sample.

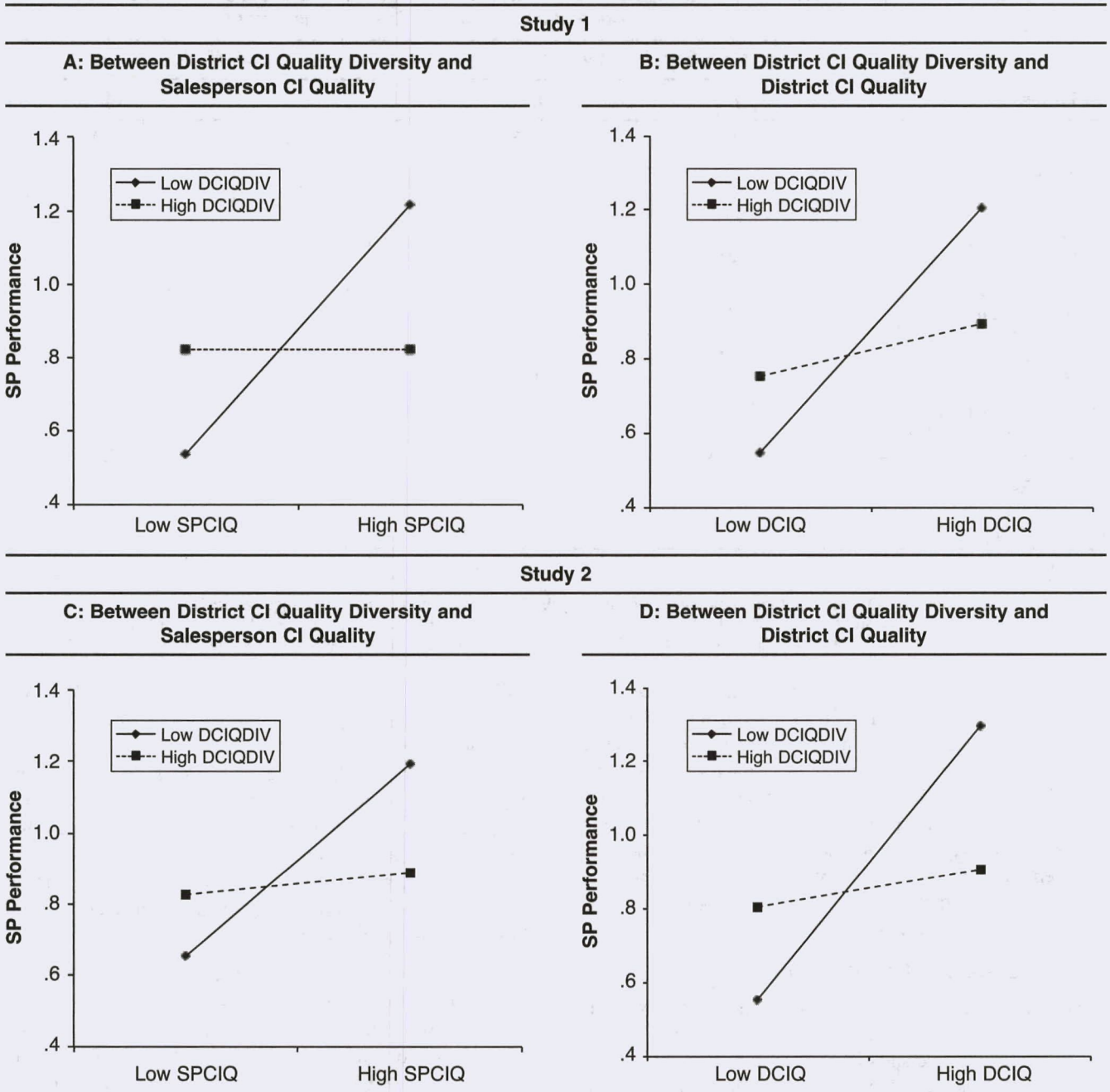
Measures and Analytical Strategy

In addition to the measures we describe in Study 1, we collected social network data using the nomination method. We asked salespeople and district sales managers to identify an exhaustive list of individuals in the company who were representative of the coworkers they go to for advice about work-related matters. The nomination method has long been known as a reliable means of measuring social networks (Marsden 1990) and has been used extensively by network scholars (e.g., Burt 1992; Ibarra 1993) to capture advice networks. We also measured the strength of the advice-seeking ties by asking respondents to indicate how often they interact with the nominated colleagues about work-related matters (1 = "seldom," and 7 = "very often").

District manager peer-network centrality. District manager peer-network centrality refers to a manager's centrality among peer district managers in the sales organization. Following Freeman (1979) and recent developments in the social network literature (e.g., Hanneman and Riddle 2005; Opsahl, Agneessens, and Skvoretz 2010), we weighted each manager's incoming ties by their strength, operationalized as the frequency of the interaction between the advice-giver and the advice-seekers. We adopt this approach because it adds explanatory power to the measurement of social networks (Granovetter 1973). Specifically, we calculated the weighted in-degree centrality of a given district manager among all district managers by summing the strength of incoming ties a district manager receives from peer district sales managers.

District manager within-district centrality. To measure the within-district centrality of a district manager in each within-district social network, we asked salespeople in each sales district to nominate their district manager if he or she was a source of help or advice with regard to work-related matters. We then asked those who nominated their district manager to indicate how often they interacted with the manager about work-related matters (1 = "seldom," and 7 = "very often") to capture the strength of network tie between these individuals. Using Freeman's (1979) approach, we calculated the weighted in-degree centrality of a district manager in the within-district social network. Therefore, we summed the strength of incoming ties a district manager receives from his or her salespeople and divided the result by the number of salespeople working for the district manager (i.e., the maximum possible number of incoming ties to the manager) to normalize the within-district centrality measure according to the size of each sales district (Wasserman and Faust 1994, p. 179).

FIGURE 3
Moderating Effects of District CI Quality Diversity (Two-Way Interactions)



Notes: SP Performance = salesperson performance as quota achievement (1 = 100%), SP = salesperson, DCIQDIV = district CI quality diversity, SPCIQ = salesperson CI quality, and DCIQ = district CI quality.

Covariates. In addition to the covariates we describe in Study 1, we included salesperson peer-network centrality and its interaction terms with salesperson CI quality and district CI quality diversity. Using the social network data, we calculated the weighted in-degree centrality of a given salesperson among salespeople in the sales organization (i.e., centrality in the salesperson peer network) using Freeman's (1979) approach by summing the strength of incoming ties a salesperson receives from peer salespeople.

Analytical strategy. Because the data also have a nested structure, we again used HLM (Raudenbush and Bryk 2002) and centered the variables in a way similar to Study 1. The model specification in Study 2 differs from Study 1 in that we added the centrality variables and the interaction terms (see Appendix B). We also wrote a MATLAB code to calculate the social network measures.

Measurement Model

Our exploratory factor analysis showed that all the items loaded on their corresponding factors. An additional confirmatory factor analysis also resulted in acceptable fit indexes (χ^2 = 30.5, d.f. = 13; comparative fit index = .95;

Tucker–Lewis index = .93). We report the descriptive statistics, AVEs, and correlation matrix of the focal constructs in Table 3. Again, all the constructs had Cronbach's alphas greater than .70 (Appendix A), all AVEs exceeded .50, and the constructs exhibited discriminant validity. We also conducted a few tests to justify aggregating the CI quality variable to higher levels. All our tests justified aggregation to Level 2 (ICC1 = .16, ICC2 = .72, median Rwg = .81).

Hypothesis Testing

The intercept-only model showed that 68% of the variance in sales performance resides between salespeople and 32% of the variance exists between sales districts. Both variances are significant at $p < .05$, justifying the addition of predictors at Level 2.

Main effects. We analyzed the data using two-level HLM, with salesperson performance as the dependent variable. The results appear in Table 5, which reports the main-effects-only model and models with two-way and three-way interactions. As in Study 1, we found that a salesperson's CI quality (Level 1) has a significant effect on his or her performance (H_{1a}: $\gamma = .15, p < .05$). District CI quality (Level 2) also has a positive influence on the performance of a salesperson working in the corresponding district (H_{1b}: $\gamma = .20, p < .05$).

Moderating effects. However, we found that the positive relationship between salesperson CI quality and salesperson performance is weaker when district CI quality diversity is high (H_{2a}: $\gamma = -.13, p < .05$). In addition, the positive relationship between district CI quality and salesperson performance is weaker when district CI quality diversity is high (H_{2b}: $\gamma = -.16, p < .05$). We plot these two-way interactions in Figure 3, Panels C and D. We also found support for the proposed three-way interactions. Our results show that a district manager's peer-network centrality buffers the negative cross-level moderating effect of district CI quality

TABLE 5
Study 2: HLM Results of Two-Level Models: District Managers and Salespeople

	Dependent Variables = Quota Achievement					
	Main-Effects-Only Model		Two-Way Interaction Model		Full Model	
Variables	**γ**	**SE**	**γ**	**SE**	**γ**	**SE**
Intercept	.88**	.154	.88**	.155	.89**	.158
Controls						
SPCO	.10**	.053	.10**	.056	.11**	.055
SPEXP	.09**	.050	.10**	.052	.10**	.054
SPPKO	.15**	.055	.16**	.56	.17**	.057
SPSAT	.12**	.031	.12**	.033	.12**	.033
DMEXP	.013	.50	.17	.45	.05	.046
Simple Effects						
SPCIQ (H_{1a})	.16**	.058	.15**	.058	.15**	.060
DCIQ (H_{1b})	.18**	.012	.19**	.010	.20**	.009
SPPNCEN	.10**	.030	.12**	.040	.12**	.040
DMPNCEN	.09	.077	.10*	.064	.11*	.065
DMWDCEN	.08	.079	.10*	.061	.10*	.063
DCIQDIV	−.022	.189	−.030	.162	−.034	.141
Two-Way Interaction Effects						
SPCIQ × DCIQDIV (H_{2a})			−.12**	.047	−.13**	.044
DCIQ × DCIQDIV (H_{2b})			−.15**	.052	−.16**	.052
SPCIQ × SPPNCEN			.05	.523	.04	.485
SPCIQ × DMPNCEN			.10*	.064	.11**	.051
DCIQ × DMWDCEN			.11**	.044	.11**	.048
SPPNCEN × DCIQDIV			.049	.074	.052	.071
DMPNCEN × DCIQDIV			−.07	.167	−.07	.154
DMWDCEN × DISCIDIV			.06	.858	.07	.755
Three-Way Interaction Effects						
SPCIQ × DCIQDIV × SPPNCEN					.089	.670
SPCIQ × DCIQDIV × DMPNCEN (H_{3a})					.14**	.046
DCIQ × DCIQDIV × DMWDCEN (H_{3b})					.10**	.051
Pseudo R^2	.159		.186		.219	
−2 log-likelihood	3,623.11		3,585.87		3,561.17	
Change in fit index			37.24** (d.f. = 8)		24.70**(d.f. = 3)	

*$p < .10$.
**$p < .05$.
Notes: Two-tailed tests. SPCO = salesperson customer orientation, SPEXP = salesperson sales experience, SPPKO = salesperson product knowledge, SPPKO = salesperson job satisfaction, DMEXP = district manager's work experience, SPCIQ = salesperson CI quality, DCIQ = district CI quality, SPPNCEN = salesperson peer-network centrality, DMPNCEN = district manager peer-network centrality, DMWDCEN = district manager within-district centrality, DCIQDIV = district CI quality diversity. N = 1,437 (salespeople), 228 (district managers).

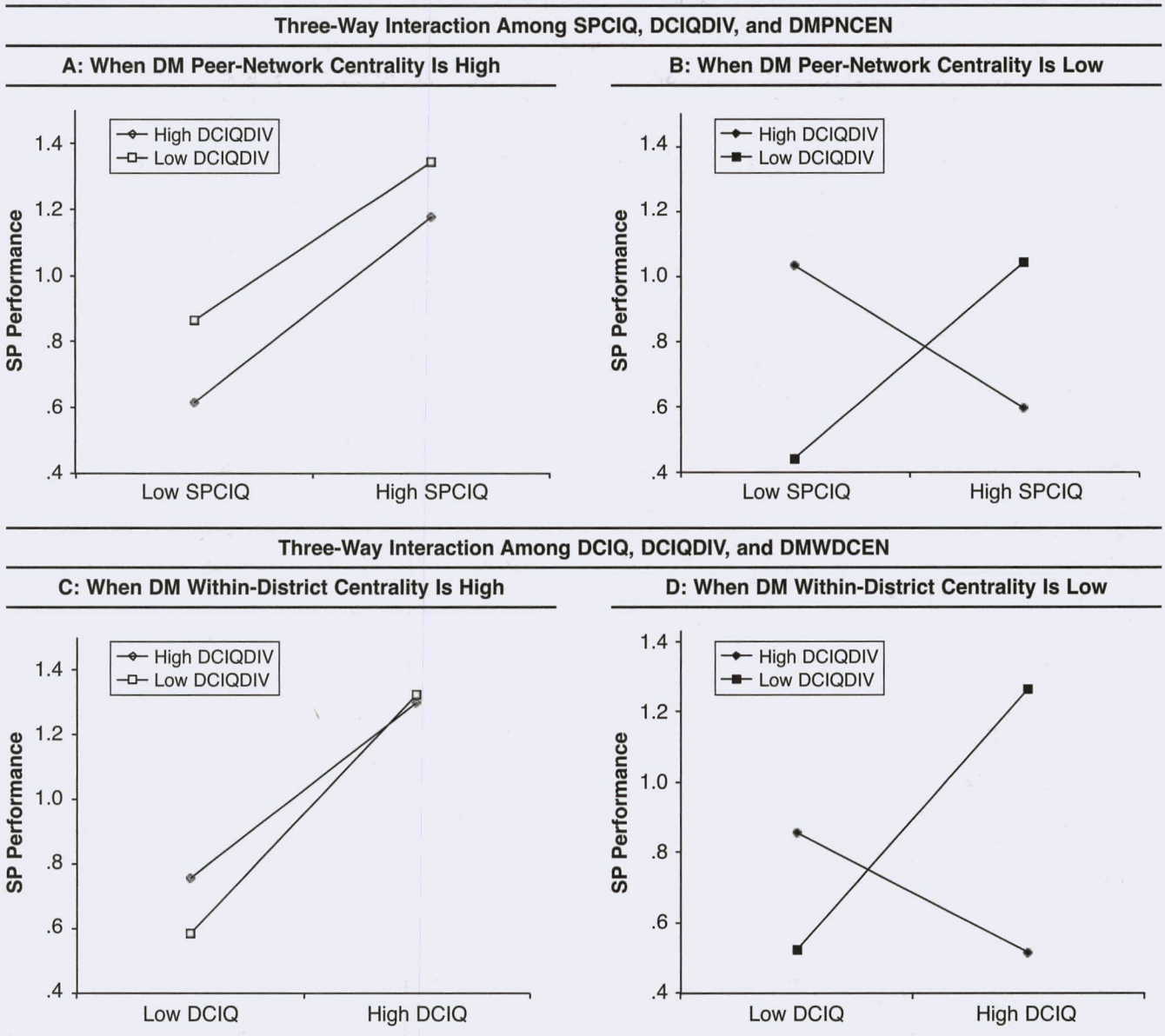
diversity (H_{3a}: $\gamma = .14$, $p < .05$). In addition, a district manager's within-district network centrality moderates the within-level moderating effect of district CI quality diversity (H_{3b}: $\gamma = .10$, $p < .05$). To illustrate these three-way interactions, we plot them in Figure 4. Panels A and C of Figure 4 show that when managers are central in the two networks, the positive performance impact of salesperson CI quality and district CI quality does not seem to change drastically, even when district CI quality diversity exists. In contrast, as Panels B and D of Figure 4 show, when salespeople in the district differ in CI quality but sales managers are not central in either network, the performance impact of CI quality at both salesperson and district levels can actually become *negative*.

Control variables. Our results show that salesperson sales experience has a positive effect on salesperson quota achievement ($\gamma = .10$, $p < .05$). However, district manager work experience does not significantly influence salesperson quota achievement ($\gamma = .05$, $p > .10$). Furthermore, our results indicate that customer orientation ($\gamma = .11$, $p < .05$), job satisfaction ($\gamma = .12$, $p < .05$), and product knowledge ($\gamma = .17$, $p < .05$) significantly influence salesperson quota achievement. Note that salesperson centrality among peer salespeople does not positively moderate the relationship between salesperson CI quality and salesperson performance ($\gamma = .04$, $p > .10$).

Discussion

Consistent with the findings in Study 1, we replicated the results related to the main effects of salesperson and district CI quality on salesperson performance and the within- and

FIGURE 4
Three-Way Interactions



Notes: SP Performance = salesperson performance as quota achievement (1 = 100%), SP = salesperson, DM = district manager, DCIQDIV = district CI quality diversity, SPCIQ = salesperson CI quality, DCIQ = district CI quality, DMPNCEN = district managers' peer-network centrality, and DMWDCEN = district managers' within-district centrality.

cross-level moderating effects of district CI quality diversity. Note that the patterns emerging from the two-way interaction plots are almost identical (Figure 3). The three-way interactions suggest that the two-way interaction effects arise when district managers' within-district centrality and peer-network centrality are at the average. As a robustness test, we also assessed whether district managers' centrality in the within-district network has a cross-level interaction effect and whether district managers' centrality in the peer network has a within-level interaction effect. These additional interactions were not significant, suggesting that district managers' within-district network centrality buffers the negative effect of district CI quality diversity at the group level whereas district managers' peer-network centrality buffers the negative effect of district CI quality diversity at the individual level.

Additional Analyses

Prior research suggests that several factors can be predictive of CI quality diversity. First, the level of competitor orientation can determine how closely salespeople track competitors' behavior. Thus, in districts in which salespeople vary in terms of their competitor orientation, district CI quality will also be higher. Second, because experienced salespeople can use prior knowledge to collect useful information selectively, the more diverse the district salespeople's experience, the more diverse the CI quality is in the district. Finally, network density, which refers to the proportion of actual to possible ties in a network (Blau 1977), can reduce CI quality diversity. This negative effect occurs because in a network with high network density, group members have a high level of interactions and are more cohesive, which in turn makes it easier to transfer knowledge among members and inhibit critical thinking (Blau 1977; Nahapiet and Ghoshal 1998; Rentsch 1990; Sniezek and Henry 1989).

Across both studies, we calculated sales district network density in accordance with Hanneman and Riddle's (2005) method by summing all the existing ties among salespeople in a focal sales district, with the frequency of interaction of each tie as the weight, and dividing the result by the maximum possible number of ties in that sales district ($n \times [n - 1]$, where n is the number of salespeople in a given sales district). We found that competitor orientation diversity (Study 1: $\beta = .34, p < .05$; Study 2: $\beta = .40, p < .05$), salespeople's sales experience diversity (Study 1: $\beta = .12, p < .10$; Study 2: $\beta = .16, p < .05$), and network density are predictive of district CI quality diversity (Study 2: $\beta = -.18, p < .05$). These standardized coefficients also suggest that competitor orientation diversity among salespeople is the strongest predictor of district CI quality diversity. The variance explained was .68 in Study 1 and .57 in Study 2.

General Discussion

Discussion of Findings and Theoretical Implications

Overall, the empirical findings indicate that although collecting CI from the field is part of salespeople's in-role behavior (Marshall, Moncrief, and Lassk 1999), the performance impact of CI quality is contingent on many group-level factors. Our findings underscore the role of information quality diversity as noise and confirm the role of managers as CI hubs. Our research also contributes to existing theories on social networks and knowledge management.

Contextual effect. By conceptualizing the performance impact of CI quality as a multilevel phenomenon rather than as an individual process, we are among the first to empirically show that although salespeople's CI quality improves their performance, CI quality as a group-level variable also significantly enhances the performance of group members beyond the individual-level effect. This contextual effect contributes to the current understanding of CI functionalities: individual-level CI is an isolated type of knowledge that must be shared, filtered, and organized through group processes to be transformed into a useful initiative that enhances sales performance. This finding resonates with prior theories about the importance of group norms and higher-order learning at the organizational level (Crossan, Lane, and White 1999; Sinkula 1994).

The role of group-level CI quality diversity. The negative moderating effect of district CI quality diversity extends prior research on team diversity and confirms that "knowledge generated by the individual does not come to bear on the organization independently. Ideas are shared, actions taken, and common meaning developed" (Crossan, Lane, and White 1999, p. 524). Prior research suggests that informational diversity can enhance performance because it provides multiple perspectives to a problem (e.g., Fiol 1994; Jehn, Northcraft, and Neale 1999), and this effect is mediated by elaboration of task-relevant information (Van Knippenberg, De Dreu, and Homan 2004). However, the findings across two studies consistently suggest that group-level information quality diversity can create informational noise that shakes salespeople's and managers' confidence in information utilization, thus nullifying the positive performance impact of CI quality at both the individual and the district level. This effect seems to indicate that elaboration of information of diverse quality may hurt rather than help. That is, the potential benefits of individual CI quality may be lost if its quality is in doubt (Sniezek and Henry 1989).

Social networks and formal structure. Little research has examined the interplay between social actors' position in the organizational hierarchy and their position in social networks (Soda and Zaheer 2012). Jaworski, MacInnis, and Kohli (2002, p. 303) conjecture that "the status of the network or individuals within it might bias the sense-making process" such that "greater weight might be given to the high status individual/network." Our empirical findings support and enrich this understanding in two respects. On the one hand, the findings suggest that managers who are more central among their subordinates are more effective than their less central counterparts at resolving district-level issues that district CI quality diversity creates. This finding contributes to the emerging theoretical discourse on the benefits of combining formal and informal power over subordinates when managers try to enhance the performance of their groups (e.g., Balkundi and Harrison 2006; Soda and

Zaheer 2012). On the other hand, we found that salespeople's peer-network centrality does not have the buffering effect that district managers' peer-network centrality does. It seems that networking with peers at the managerial level generates more status gains and a stronger impact on others than networking with peers at the salesperson level. It might be argued that salespeople with access to high CI quality are reluctant to share with peers because they treat CI as a tool to secure an individual competitive advantage and, as a result, gain personal prestige among peers. Employees may also perceive the cost of sharing knowledge with others as greater than what they might gain through reciprocal actions (Huber 2001). In contrast, managers might better understand the strategic and long-term benefits of exchanging CI with peers and thus actively share novel information about the competition with subordinates and defuse the negative effect of diverse information quality.

Managerial Implications

The findings provide managers with a more nuanced understanding of the relationship between CI quality and salesperson performance. By shedding light on the group-level effect and contingencies of the relationship between CI quality and salesperson performance, we demonstrate that the performance impact of CI quality is far from simple.

Managing CI quality: individual and group levels. First, our findings underscore the contextual effect such that group-level CI quality contributes to salesperson performance beyond individual salesperson CI quality. In terms of effect size, the results show that the main effect of group-level CI quality is as strong as that at the individual level. Such a contextual effect creates a significant difference in performance between two salespeople who have the same level of individual CI quality but work in districts that differ in their average level of CI quality. If sales compensation is based purely on performance, the two salespeople will have a significant pay difference. Therefore, this finding informs managers of the performance benefit of group-level CI quality but, more important, also informs them of situations in which inequity in compensation and reward systems can occur regardless of salesperson effort or ability.

Second, conventional wisdom suggests that CI quality creates better sales performance and that CI quality diversity is always detrimental. We show that both assumptions can be wrong. Specifically, as Figure 3 illustrates, when district CI quality diversity is high, there is no significant difference in salesperson performance between salespeople or districts with high and low CI quality. This result is important, because collecting CI takes time and effort that salespeople can otherwise spend on other selling activities. However, when the average CI quality in the district is low, having some CI quality diversity can actually benefit salesperson performance. Therefore, in managing CI quality, managers should pay attention not only to individual salesperson CI quality but also to the average level of CI quality across salespeople (i.e., district CI quality) and its diversity in their sales districts. Specifically, if managers believe that their district CI quality is high, they should attempt to reduce district CI quality diversity because a collective concurrence of high-quality CI enhances the confidence in using superior information at both the individual and group levels, thereby boosting salesperson performance in the entire district. However, if managers believe that their district CI quality is low, they should encourage and create district CI quality diversity, because a collective concurrence of low-quality CI in the district creates collective confidence in using inferior information, thereby worsening salesperson performance in the entire district.

Our additional analyses show that competitor orientation diversity, sales experience diversity, and network density of the district are the key drivers of district CI quality diversity. Therefore, managers can manage CI quality diversity by influencing these variables through formal (e.g., restructuring the district to achieve higher or lower levels of sales experience diversity, training programs on CI, formal newsletter on CI, periodical updates) and informal (e.g., encouraging more social interactions within and outside the workplace) mechanisms.

Managers' centrality in informal networks. Our results suggest that managers who are popular among their peers and subordinates help protect their teams from the potential negative effects of CI quality diversity. Two descriptive statistics of Study 2 are particularly informative to managers. First, approximately 20% of managers were not the most central members of their sales districts, and even when managers were named as the advisor on task-related issues, there were large variations in the frequency of informal interactions with managers. Thus, managers cannot assume that because they hold a formal position, they will be the de facto central person in the within-district advice network. Instead, they will need to invest time and resources in building that informal position. Second, the correlation between managers' centrality in the within-district network and their centrality in the peer network was significant but weak. This weak correlation informs managers that centrality in the within-unit network is not indicative of centrality in the peer network, and vice versa. That is, the two types of centrality require separate investments of time and resources.

Unique values of managers' centrality. We found that whereas a manager's within-district centrality buffers the negative effect of district CI quality diversity at the district level, a manager's peer-network centrality buffers it at the individual salesperson level. This finding is more important when we consider that salesperson centrality in the salesperson peer network does not have this buffering effect. This finding informs managers that they have two unique ways to buffer the potential negative effect of CI quality diversity. Managers who desire to buffer the negative effect of district CI quality diversity on the performance impact of group-level CI quality must invest resources to become central in the within-district informal network. In contrast, managers who aim to buffer the negative effect of district CI quality diversity on the performance impact of individual-level CI quality must devote resources to become central in the peer network. The building of each type of centrality requires different social tactics, and pursuing both can be prohibitively costly for managers. Finally, from an organizational

learning perspective, these two routes of managers' informal influence provide indirect evidence that local learning within the group enhances group efficiency through shared understanding and aligned collective actions, whereas distal learning with external individuals enhances innovativeness through access to novel information (Wong 2004).

Limitations and Further Research

The empirical findings in this study should be interpreted with their limitations in mind. First, our study focuses on salesperson CI quality. Further research could examine other types of salesperson market intelligence activities, such as customer-focused assessments of existing and potential customers rather than a competitor-centered approach (e.g., Day and Wensley 1988; Üstüner and Godes 2006). Because of the sensitivity of customer information, we expect it to be easier for salespeople to share and disseminate CI than customer information. In addition, firms such as those in our research generally compensate salespeople on the basis of outcomes (e.g., sales quota achievement) or activities (e.g., number of sales calls) that are not directly related to CI. Thus, future studies could examine the effect of incentive mechanisms on collecting and sharing CI inside a sales unit. Second, we examined only the advice network. Although our qualitative interviews with multiple salespeople and managers suggest that CI constitutes a significant percentage of the work-related advice exchanged, it would be useful to further investigate the roles of other types of informal social networks, such as friendship networks in CI processes. Research that delves deeper into networks beyond organizational borders, such as competitors' networks and types of resource flow (Borgatti 2005), would be useful.

Third, firms may vary in terms of their formalization of CI collection and dissemination, thus influencing sources of salesperson CI and CI quality diversity. At one end of the spectrum are firms that do not have formal programs to collect CI (e.g., a formal delineation of staff and resources for CI activities, a dedicated CI unit; Jaworski, MacInnis, and Kohli 2002), such as those in our empirical contexts. Here, although CI is discussed during reporting processes and meetings, salespeople collect and disseminate CI primarily through informal networks and are not remunerated for such activities. Perhaps it is because of this organizational structure that we observed high variation in salesperson CI quality. At the other end of the spectrum are firms that institutionalize CI behavior through more formal CI units with full-time directors and associated staff, such as IBM (Behnke and Slayton 1998) and 3M (Lackman, Saban, and Lanasa 2000).[1] In these firms, salespeople have a common source of CI in addition to their own CI. Further research is necessary to examine how the relationships we uncovered may change in these firms. We conjecture that because of the institutionalized information, redundancy of information may be reduced, but novel information may be more difficult to attain. Thus, although managers will probably still need to rely on social networks to leverage the performance impact of CI, their ability to bridge structural holes between networks to access unique information (e.g., ties with peers in other districts) rather than within-district centrality will play a more critical role.

Fourth, studies that measure the underlying process of CI collection and dissemination would provide useful insights. For example, salesperson motivation to share CI, information-sharing norms, and actual use of CI all might help further explain the process (e.g., Fisher, Maltz, and Jaworski 1997; Reinholt, Pedersen, and Foss 2011). Furthermore, prior research suggests that knowledge at the individual, group, and organization levels can be either tacit or articulated (Polanyi 1962). Tacit knowledge is nonverbalized, or even nonverbalizable, and intuitive, whereas articulated knowledge is specified either verbally or in writing (Hedlund 1994). Competitive intelligence can reside within experienced salespeople as tacit knowledge (Crossan, Lane, and White 1999) or can be documented and shared as articulated knowledge. Thus, further research that explicitly considers the distinction between tacit and articulated CI would be useful. Finally, further research could investigate how individual information evolves into organizational knowledge (Crossan, Lane, and White 1999; Jaworski, MacInnis, and Kohli 2002; Sinkula 1994).

Appendix A: Measurement Scales[2]

CI Quality

Rated by district managers. Cronbach's alpha = .76 (Study 1)/.86 (Study 2). Developed from Maltz and Kohli (1996).

For each salesperson, the district manager provides rating on the following statements:

1. This salesperson collects competitive information that is usually accurate.
2. This salesperson collects details about competitors that have strategic value.
3. This salesperson gathers competitive information in a timely manner.
4. This salesperson has clear ideas about the competition.

Product Knowledge

Rated by salespeople. Cronbach's alpha = .77 (Study 1)/.78 (Study 2). Adapted from Behrman and Perreault (1982).

1. I know the design and specifications of company products very well.
2. I know the applications and functions of company products very well.
3. I am able to detect causes of operating failure of company products.
4. I keep abreast of our company's production and technological developments.

[1]Most firms have formal reporting processes, especially from district managers to regional managers. Reporting processes can also be conducted through informal but mostly company-sanctioned conversations. Information flowing through informal social networks is a more voluntary process. We thank an anonymous reviewer for this point.

[2]All scales are measured on a seven-point Likert scale (1 = "strongly disagree," and 7 = "strongly agree").

Customer Orientation

Rated by salespeople. Cronbach's alpha = .67 (Study 1)/.77 (Study 2). Adapted from Thomas, Soutar, and Ryan (2001).

1. I try to figure out what a customer's needs are.
2. I have the customer's best interests in mind.
3. I try to help customers achieve their goals.
4. I take a problem-solving approach in selling products or services to customers.
5. I offer the product of mine that is best suited to the customer's problem.
6. I try to find out which kinds of products or services would be most helpful to customers.

Job Satisfaction

Rated by salespeople. Cronbach's alpha = .74 (Study 1)/.81 (Study 2). Adapted from Hackman and Oldham (1975).

1. Generally speaking, I am very satisfied with my job.
2. I am generally satisfied with the kind of work I do in this job.
3. I never think of quitting this job.

Appendix B: Model Specification

Because of the nesting nature of the data, we specify a two-level model for both empirical studies. For Study 2, we added the social network variables (in bold) to the model.

Level 1 (Salespeople)

$$\text{(1)}\quad PERF_{ij} = \pi_{0j} + \pi_{1j}(SPCIQ_{ij}) + \pi_{2j}(SPCO_{ij}) + \pi_{3j}(SPEXP_{ij}) + \pi_{4j}(SPPKO_{ij}) + \pi_{5j}(SPSAT_{ij}) + \pi_{6j}(\mathbf{SPPNCEN_{ij}}) + \pi_{7j}(\mathbf{SPCIQ_{ij} \times SPPNCEN_{ij}}) + e_{ij}.$$

Level 2 (District Sales Managers)

$$\text{(2)}\quad \pi_{0j} = \beta_{00} + \beta_{01}(DA\_SPCIQ_j) + \beta_{02}(DA\_SPCO_j) + \beta_{03}(DA\_SPEXP_j) + \beta_{04}(DA\_SPPKO_j) + \beta_{05}(DMEXP_j) + \beta_{06}(\mathbf{DMWDCEN_j}) + \beta_{07}(\mathbf{DMPNCEN_j}) + \beta_{08}(DCIQDIV_j) + \beta_{09}(\mathbf{DCIQ_j \times DMWDCEN_j}) + \beta_{10}(DCIQ_j \times DCIQDIV_j) + \beta_{11}(\mathbf{DMWDCEN_j \times DCIQDIV_j}) + \beta_{12}(\mathbf{DCIQ_j \times DMWDCEN_j \times DCIQDIV_j}) + \beta_{13}(\mathbf{DMPNCEN_j \times DCIQDIV_j}) + r_{0j}.$$

$$\text{(3)}\quad \pi_{1j} = \beta_{10} + \beta_{11}(\mathbf{DMPNCEN_j}) + \beta_{12}(DCIQDIV_j) + \beta_{13}(\mathbf{DMPNCEN_j \times DCIQDIV_j}),$$

$$\text{(4)}\quad \pi_{mj} = \beta_{m1}, m \in M = \{2, 3, 4, 5\},$$

$$\text{(5)}\quad \pi_{6j} = \beta_{50} + \beta_{51}(DCIQDIV_j),$$

and

$$\text{(6)}\quad \pi_{7j} = \beta_{60} + \beta_{61}(DCIQDIV_j),$$

where

SPCIQ = salesperson CI quality,
SPCO = salesperson customer orientation,
SPEXP = salesperson sales experience,
SPPKO = salesperson product knowledge,
SPSAT= salesperson job satisfaction,
SPPNCEN = salesperson peer-network centrality,
DCIQ = district CI quality,
DA_SPCO = average customer orientation of salespeople in a sales district,
DA_SPEXP = average work experience of salespeople in a sales district,
DA_SPPKO = average product knowledge of salespeople in a sales district,
DMEXP = district manager's work experience,
DMWDCEN = district manager within-district centrality,
DMPNCEN = district manager peer-network centrality, and
DCIQDIV = district CI quality diversity.

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