

**TASK CONTINGENCIES IN THE CURVILINEAR RELATIONSHIPS BETWEEN
INTER-GROUP NETWORKS AND PERFORMANCE†**

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Abstract

Based on data from 76 strategic initiatives in five multi-business corporations, this paper examines relationships between three dimensions of network relations on the inter-group level and the performance of strategic initiatives. Findings suggest inverted U-shaped relationships between performance and relational and structural dimensions of networks, and a linear, positive relationship for the cognitive dimension. In addition, exploration moderates relationships between performance and all three dimensions of inter-group networks. Compared to exploitation initiatives, negative consequences of strong ties and centrality are more pronounced in exploratory initiatives. Although exploratory groups appear to benefit less from increases in shared vision, shared vision is a positive influence on performance for both types of initiatives.

Previous research has shown that a network of social relationships produces a number of positive outcomes, including information benefits (Granovetter, 1985; Walter, Lechner & Kellermanns, 2007), heightened control and power (Brass, 1984), more efficient knowledge transfer (Hansen, 1999) and increased innovation (McFadyen & Canella, 2004; Tsai, 2001). Such networks have been characterized on three dimensions. The relational dimension describes the quality of relationships, including their frequency, degree of closeness and level of trust (Uzzi, 1996). The structural dimension refers to the position of the focal actor relative to others in the network and the combination of direct and indirect ties surrounding the focal actor (Zukin & DiMaggio, 1990). The cognitive dimension reflects the similarity of interpretations, mental models and worldviews between the focal actor and others in the organization and between the actor and the organization as a whole (Tsai & Ghoshal, 1998).

In addition to their positive effects, each of these dimensions of social networks may also have negative consequences. Uzzi (1997), for example, argued that firms can become over-embedded within a network structure. More specifically, when the structure of a network surrounding an actor is already dense -- that is, when it is comprised of many direct links -- it becomes less likely that additional ties will yield non-redundant information. Under such circumstances, further increases in the number of direct ties to an actor reduces performance because the cost of maintaining an additional tie exceeds the information benefits (Burt, 1992). Building on the idea that networks may have costs as well as benefits but focusing on the reverse proposition, Hansen, Podolny and Pfeffer (2001) found that network *sparseness* had an inverted U-shaped relationship to performance in new product teams. When teams engage in more exploitive projects, sparseness pays dividends in the form of information diversity, but only up to a certain threshold; after that point the problems of motivating knowledge sharing in a sparse

network overwhelm the benefits of increasing links to unconnected others. Paradoxically, then, it appears that the same network structures that help some actors achieve fit with their environment and accomplish goals may reach a point of diminishing returns, and at high levels, increasing the density or sparseness of networks for certain kinds of groups may have negative consequences on performance.

Questions about the outcomes of network relations are likely to be particularly salient in the context of teams pursuing strategic initiatives, defined as group undertakings intended to alter capabilities in the process of strategic renewal (Burgelman, 1991; Maritan, 2001). Typically, initiative groups are comprised of members from different functions and hierarchical levels. Links between such initiative groups and other units within an organization are therefore likely to be multi-dimensional and complex, leaving many questions about which network configurations are optimal for group performance. For example, a central position in a network of strong ties may provide a healthy social climate for the development of certain kinds of groups (Tsai & Ghoshal, 1998). If a group's performance depends on exploring new capabilities, however, a network of strong ties may not be optimal. Strong ties are less likely to provide access to the novel, diverse information (Granovetter, 1973). As a result, the positive influence of a network of strong ties may be weaker for more exploratory initiatives than for those where novel information is less important.

Thus, prior research shows that there is the potential for both positive and negative consequences from network structure (Burt, 1992; Uzzi, 1997) and that this principle extends to the kind of inter-group networks that are relevant in the development of strategic initiatives. Research also suggests that the direction of the relationship between network structure and group

performance depends on contingencies in the task environment, such as the degree of exploration inherent in a project's goal (Hansen et al, 2001).

These inferences create a framework for asking a number of interesting questions about how the social network surrounding groups pursuing strategic initiatives influences their performance. First, is the nonlinear relationship between networks and team performance limited to the structural dimensions? Does an inverted U-shaped relationship also characterize relationships between performance and the more socially constructed, relational and cognitive dimensions of network relations? Second, are these relationships contingent on the degree of exploration inherent in the initiative's goals and task environment? How do the network configurations of high performing groups differ in more versus less exploratory initiatives?

The purpose of this paper is to develop a more refined understanding of the relationship between the three network dimensions and the performance of strategic initiatives. Building on prior research, we argue that the relationship between each dimension and initiative performance is curvilinear. At lower levels, network relations help to provide initiatives with needed resources, but at higher levels, they undermine initiative performance. In addition, we maintain that the shape of the network - performance curve is moderated by the degree of exploration inherent in an initiative's goals.

THEORETICAL BACKGROUND

On the inter-group level, research starts from the premise that an organization can be conceptualized as a network in which organizational sub-units and other kinds of groups are nodes interacting with each other (Brass, Galaskiewicz, Greve & Tsai, 2004). These interactions take place as formal or informal relationships. Often, they are influenced by the relationships of individual members, as these individuals interact not only as representatives of their groups, but

also on the basis of interpersonal relations (Kilduff & Tsai, 2003). Thus, interpersonal linkages act frequently as antecedents for the formation of subsequent inter-group relationships (Rosenkopf, Metiu & George 2001).

Most studies on the inter-group level emphasize positive effects of networks. For example, Tsai and Ghoshal (1998) showed that innovation is fostered by greater centrality of units in the organizational network. Reagans and Zuckerman (2001) demonstrated that the productivity of organizational units is dependent on the density of relationships with other units. On the relational dimension, Hansen (1999) found that strong ties fosters the transfer of more complex knowledge between units.

Few studies have examined decreasing returns or negative outcomes from inter-group relations. Oh, Chung & Labianca (2004) studied the curvilinear effects of closure *within* groups and concluded that group effectiveness is optimized at moderate levels of group closure. Sparrowe, Liden, Wayne & Kraimer (2001) demonstrated negative relationships between the density of individual relations within groups and group performance. And Hansen et al. (2001) gathered inter-group data on a sample of 67 product development teams and discovered that a network structure with many strong and non-redundant ties was a positive influence on project completion time for teams whose task was more exploratory but a negative influence for teams whose task involved exploiting existing organizational expertise.

In sum, prior research suggests the need to refine our understanding of how network relations contribute to group performance. In particular, it is important to broaden our picture of how different dimensions of networks interact with the task environment to positively and/or negatively influence the performance of project teams, including those associated with strategic initiatives. The scope of explanatory variables is important because prior work shows that

network features combine to create particular configurations that foster actor performance. Hansen et al (2001: 21) concluded, for example: "that exploratory teams completed their projects more quickly if they had a social network comprised of many strong external ties that were non-redundant." Put differently, tie strength is important, but only if it doesn't compromise access to novel information. Given the explanatory power of such inferences, we would argue that more research is needed that incorporates all three dimensions of networks. Such studies are likely to produce a more complete explanation of how networks impact innovative behavior and lead to theory development that is both richer and more accurate. Accordingly, in this paper we employ measures of tie strength, centrality, structural holes and shared vision to examine the combined, task contingent performance effects of the relational, structural and cognitive dimensions of relations between strategic initiative groups and other organizational sub-units.

Strategic Initiatives, Embeddedness and Exploration/ Exploitation

As a principle means by which organizations accumulate new or modify existing capabilities, strategic initiatives have become a focal point in strategic renewal research (e.g. Bower, 1970; Birkinshaw, 1997; Burgelman, 1991; Zahra, Nielsen & Bogner, 1999). Theory suggests that such initiatives are subject to selection forces within the intra-organizational environment (Lova & Ghoshal, 2000). These internal selection mechanisms include formal administrative systems (such as resource allocation procedures) and informal socio-cultural forces within the organization (Burgelman, 1991). In part, these factors determine whether an initiative acquires the financial and other resources needed to sustain its development. Consistent with this, Pappas and Wooldridge (2007) hypothesized and found a positive relationship between a variety of centrality measures and the effectiveness of individual middle managers in the

strategic renewal process. Also consistent with this framework, Lovas and Ghoshal (2000) proposed human and social capital as key factors in initiative selection outcomes.

Following Hansen et al (2001), in this study we include the degree of exploration as a defining characteristic of strategic initiatives and as a task contingency governing how networks influence performance. This not only facilitates theoretical extension in the literature of social networks, it also resonates with the need for balance in an organization's portfolio of initiatives identified in the literature of strategic renewal (Burgelman, 2002), and more broadly, within the organizational ambidexterity literature (Raisch & Birkinshaw, 2008). In line with previous research (Benner & Tushman, 2003; March, 1991; McGrath, 2001) and consistent with the logic in Gupta, Smith and Shalley (2006), in this study we conceptualize the degree of exploration as a continuum, representing the extent that strategic initiatives draw on existing knowledge within the firm (more exploitive initiatives) or on knowledge that is new to the firm (more exploratory initiatives).

HYPOTHESES

Our conceptual framework is governed by three boundary conditions. First, we focus on inter-group relations, where the relevant network is composed of linkages between a strategic initiative unit and other organizational units. Strategic initiative units are temporary organizational forms that exist until the project has accomplished its objectives or is judged to be a failure and terminated. Second, we focus on work-related, inter-group relationships rather than friendship networks, as these are likely to be more relevant to the performance of initiatives (Hansen, 1999). Third, as argued by several researchers (Powell, Koput, & Smith-Doerr, 1996; Miller, 1996), the three forms of embeddedness are too broad to lend themselves to the development of refutable hypotheses. Therefore, our hypotheses and empirical analysis are based

on three specific measures: relational embeddedness is operationalized as tie strength, structural embeddedness as degree centrality, and cognitive embeddedness as shared vision. Following Dacin et al. (1999), we treat these types of embeddedness as continuous and not dichotomous variables. In the following paragraphs, we examine relationships between each of these dimensions and initiative performance.

The Impact of Relational Embeddedness (Tie Strength)

The quality of relationships unfolds over time. As a result, the relationships of initiative units to other organizational units are partly a function of relationships of individual members of the initiative. Especially in the early stages of development, links between an initiative and other groups depend on the strength of ties between individuals. Subsequent increases or decreases in tie strength between initiatives and other units will evolve from this platform and be influenced by behavior of individual members. As resource needs develop, however, initiatives are likely to require the cooperation of other organizational units. Accomplishing this requires that individual ties grow into inter-group relationships.

Several arguments speak for the positive consequences of increasing the strength of these ties. First, strong ties facilitate the transfer of fine-grained information and tacit knowledge (Uzzi, 1996); they create a channel through which knowledge and information flow easily. The mutual understanding associated with strong ties permits initiative units to exchange knowledge and information more easily than those who have fewer such links or whose links are not as well developed. This is likely to refine and enhance substantive ideas (Wielemaker, Volberda, Elfring, & Baden-Fuller, 2003) and increase the likelihood that initiatives receive favorable treatment in the formal resource allocation process. Hansen (1999) shows, for example, that new product development teams with strong ties to other actors are more efficient in transferring non-codified

(tacit) knowledge. Strong ties to other organizational actors, therefore, enable an initiative unit to develop the information and knowledge base associated with performance.

Tie strength is also likely to be associated with higher levels of trust between the initiative unit and other organizational units (Krackhardt, 1992; Gulati et al., 2000). Higher trust further facilitates successful transfer of information and knowledge (Szulanski, 1996) and reduces the search costs involved in such transfers (Gulati et al., 2000). Levinthal and March (1993) argue that trust enhances the capacity of actors to learn from one another. Similarly, Rangan (2000) asserts that exchanges between actors with strong, trusting ties are more efficient because more information leads to better resource allocation and because trust reduces the need for formal contracts.

Strong ties are also likely to be associated with increased levels of support from other organizational units. Strong ties to other units increase the unit's connections to key stakeholders (e.g. top management groups), thereby enhancing the perceived desirability and acceptability of the initiative within the organization. As tie strength increases, fears of opportunistic behavior and conflicts of interest diminish, and groups are more likely to behave loyally and cooperatively toward one another (McAllister, 1995). Nelson (1989) found that low-conflict organizations are characterized by higher numbers of inter-unit strong ties as compared to high-conflict organizations. Therefore, strong ties are likely to lead to higher levels of support for initiatives within the organization (Floyd & Wooldridge, 2000). This is likely to reduce resistance to the initiative and increases the probability that the initiative will survive (Krackhardt, 1992).

At very high levels, however, further increases in the strength of ties are likely to have diminishing returns to the information or knowledge base of an initiative. The more information exchanged between the initiative unit and other organizational units, the higher the probability

that additional exchanges produce decreasing marginal benefits (Gulati, 1995). In their study of US investment banks, Chung, Singh, and Lee (2000) found that the marginal information benefits of a partnership decreased at a certain level of tie strength. This argument suggests a decreasing slope in the positive relationship between relational embeddedness and initiative performance in initiatives where the degree of tie strength exceeds a certain threshold.

Moreover, initiative units that are tied very closely to other units may be less likely to search for new information (Hansen, 1999). Strong feelings of familiarity and trust create over-reliance on well-known partners and reluctance to seek new ones, leading to stability in a unit's partner portfolio (Gulati, 1995). Reliance on a stable portfolio of partners, however, is likely to diminish an initiative unit's access to novel information and hence its flexibility in the face of change. In short, the relational stability that comes with high levels of tie strength may blind an initiative unit to new knowledge or information that could be critical to performance.

In addition, a high level of support received from other organizational units puts pressure on initiative units to reciprocate past favors (Marsden & Campbell, 1984). This requires time and resources, even for relationships where the benefits may be relatively low (Hansen, 1999). Feelings of friendship and obligation can become so strong that effective actions are constrained or original goals derailed (Gimeno & Woo, 1996; Uzzi, 1997). Portes and Sensenbrenner (1993) argue that the embeddedness of a partnership can stifle economic action if the social aspects of exchange supersede economic imperatives. Partners may become locked into endless mutual exchanges that have little economic value (Gargiulo & Benassi, 2000).

The investments of time and other resources required to reciprocate strong ties reduce an initiative unit's flexibility and ability to form new ties. As already observed, this limits access to new information. It may also limit the initiative unit's willingness or ability to seek out new

sources of support. Thus, should the need for new sources of support arise, the ability to cultivate such support may be limited. In other words, a high level of tie strength reduces the dynamism of the information and support that may be gleaned from relationships with other units; this is likely to diminish the adaptiveness of an initiative to dynamism in the intra-organizational environment and thus decrease the likelihood of the initiative unit's success. These arguments suggest that at high levels of tie strength, the relationship between embeddedness and initiative performance may be negative.

Summing up, we have argued that tie strength is associated with increased trust, knowledge and support for developmental initiatives. At very high levels, however, the benefits from increasing tie strength begin to diminish. Existing ties may discourage the formation of new ones, and an initiative may not be able to gain access to new information or establish new sources of support.

Hypothesis 1: In relationships between strategic initiative units and other organizational units, there is an inverted u-shaped relationship between the degree of tie strength and initiative performance.

The Impact of Structural Embeddedness (Centrality)

Network research defines centrality as the position of an actor in the network, meaning “the extent to which the focal actor occupies a strategic position in the network by virtue of being involved in many significant ties” (Wasserman & Faust, 1994: 172). Centrality provides initiative units with several advantages. First, it may increase the access to diverse information available from other units (Burt, 1992; Gnyawali & Madhavan, 2001; Koka & Prescott, 2002). Apart from sheer volume, diversity of information is important because it is associated with enhanced information processing capacity, increased creativity and requisite variety within

groups (Hoffman & Maier, 1961; Morrison, 1992; Nemeth, 1986; Weick, 1979). These associations, in turn, mean that the initiative unit is likely to consider a broader range of alternatives and make higher quality decisions. More generally, access to more diverse information means that the initiative unit is likely to think “in more realistic and complex ways about its context” (Milliken & Martins, 1996). Exposure to a more diverse information base also enhances the capacity to understand and use new knowledge (Szulanski, 1996). Finally, being in a position to access a large number of information sources including those that interact with the customer, more central actors are likely to gain information about new developments and external changes sooner than others (Valente, 1995). This is likely to lead to a qualitatively better knowledge base and produce superior performance.

Another consequence of centrality is related to its importance in attaining influence and control within the organization (Burt, 1992; Brass & Burckhardt, 1992; Ibarra, 1993). More central units have more power, and having more power may allow initiative units to pursue ideas with less resistance and more support within the organization. Moreover, more central and powerful initiative units may be able to acquire resources from other organizational units more readily, and this is a critical factor in the successful evolution of initiatives (Bower, 1970).

On the negative side, however, at high levels of centrality, increasing access to information and resources may constrain the initiative unit’s ability to perform. Managing all of the different issues and obligations resulting from a large number of contacts consumes time (Stevenson & Greenberg, 2000), and this may take time away from other important issues. Further, being in a highly central position provides access to a large quantity of information and assets, but large volume says nothing about the quality of the resources. Due to time constraints, information-processing limitations, and over-confidence, the highly central unit is more likely to choose

poorly from the large amount of diverse information available and select information which is wrong, redundant or obsolete (Koka & Prescott, 2002).

Further, in an environment where initiatives compete for resources, high centrality may raise the initiative's profile to the point that other units attempt to intervene in the initiative's development. Even if intentions are benign, such interventions may cause an initiative unit to lose focus and lead to compromise against a set of increasingly heterogeneous demands by other organizational units. In some cases, such intervention may even be malicious. Other units may see the initiative as a threat or as a waste of resources. Consistent with this, research suggests that maintaining a low profile and limiting ties to those units that are really important may be important. Burgelman (1983 a/b), for example, emphasizes that information about an autonomous initiative should be managed carefully and brought to the attention of others in a gradual way. More explicitly, Mintzberg and Westley (1992) argue that enclaving may be crucial to the success of strategic initiatives. Maintaining a low profile is difficult or impossible, however, for an initiative unit that is highly central, and thus, high levels of centrality may impede an initiative's progress. Consistent with this, Wood and Tushman (2003) describe a new product development unit that deliberately cut off contacts to other organizational units in order to reduce the risk of losing valuable information and to increase time for the development process.

Based on the premise that positive effects occur at low and moderate levels of centrality and that negative effects occur at high levels, we propose a curvilinear relationship between an initiative unit's centrality within the inter-group network and its performance.

Hypothesis 2: In relationships between strategic initiative units and other organizational units, there is an inverted u-shaped relationship between the level of centrality and initiative performance.

The Impact of Cognitive Embeddedness (Shared Vision)

Shared vision refers to the degree that members of an initiative unit share goals and aspirations with other organizational units and with the organization as a whole (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998; Simsek, Lubatkin & Floyd, 2003). If the initiative unit and other key actors share a common understanding of the environment, the company, and strategic issues, the goals of the initiative are more likely to be understood and gain legitimacy within the firm (Baum & Oliver, 1991; Gavetti & Levinthal, 2000).

Another positive effect of shared vision is increasing communication efficiency (Tsai & Ghoshal, 1998). Common perceptions about how to do business and how to interact reduce the likelihood of misunderstanding. Scott (2001) argues that shared beliefs enable different actors to quickly acquire a common definition of the situation. Szulanski (1996) maintains that knowledge transfer across units is more efficient in partnerships with similar perceptions and understandings. More efficient communication allows the initiative unit to transfer information more rapidly and capture small nuances, thereby increasing opportunities to import tacit components of other units' know-how. Thus, for example, a new business development initiative may develop ideas based on a richer, more complex information base. Assuming that such complexity is mirrored in the intra-organizational and extra-organizational environment, this is likely to enhance the adaptiveness of the initiative and therefore improve its performance.

There are drawbacks to high levels of cognitive common ground between an initiative and other units of an organization, however. A high level of shared vision may represent "group think" within the initiative unit relative to other organizational units or the organization as a whole (Janis, 1972). Group think in this context is the risk that groups who strongly share the views of other units fail to recognize the need to integrate new or discrepant information from

marginal actors into their decision-making. Hart and Sharma (2004), for instance, note the risk of ignoring “fringe” stakeholders in the development of responses to change. Mental models limit the search for new information and reduce the number of alternatives considered (Barr, Stimpert, & Huff, 1992). When the mental model shared within the initiative is the same as that of other organizational units, factors that are objectively relevant to the initiative but not to the broader organization may not be recognized within the unit, leading to a form of cognitive “lock-in” (Abrahamson & Fombrun, 1994) or “sunk costs” (DiMaggio & Powell, 1983). The number of alternatives considered may not be adequate because unit members fail to think “outside the box” of what is already well known within the organization (Oliver, 1996; Leonard-Barton, 1992). When this happens, initiative units are likely to ignore important information and make poor choices.

Moreover, without regard to group think, an initiative unit too focused on integrating input that is similar to what is already known is not likely to be creative (Hurst, Rush, & White, 1989). As a result, when an initiative encounters unanticipated obstacles, novel solutions may not be forthcoming (Simsek et al, 2003). Drawing on these arguments, the relationship between cognitive embeddedness and initiative performance is likely to be positive at low to moderate levels and negative at high levels.

Hypothesis 3: In relationships between strategic initiative units and other organizational units, there is an inverted u-shaped relationship between the level of shared vision and initiative performance.

The Moderating Impact of Degree of Exploration

Research on strategic renewal has emphasized that organizations require a balance of exploitative and exploratory initiatives for their long-term survival (Burgelman, 2002). Balancing these demands and preventing a shift toward one at the expense of the other is

considered a fundamental challenge (Crossan & Berdrow, 2003). If firms put too much emphasis on exploratory initiatives, they may neglect improvements in existing capabilities; if they become stuck in only exploiting current capabilities, they may fail to adapt to changing market conditions. As both types of learning are needed (March, 1991), it is important to examine how the degree of exploration inherent in the task of an initiative influences the relationships between embeddedness and initiative performance (Hansen et al. 2001; McGrath, 2001).

Exploratory initiatives are about “search, variation, risk-taking, experimentation, play, flexibility, discovery, innovation” (March, 1991: 71). They focus on tasks that deviate from the current knowledge base of an organization. In contrast, exploitive initiatives refer to “refinement, choice, production, efficiency, selection, implementation, execution” of existing capabilities (March, 1991: 71). More exploitive initiatives require a deeper understanding of existing organizational knowledge and specific information, while more exploratory initiatives focus on a wider grasp of new knowledge. In line with previous research, we conceptualize the degree of exploration as a continuum, representing the extent that strategic initiatives draw on existing knowledge within the firm (more exploitive initiatives) or on knowledge that is new to the firm (more exploratory initiatives) (McGrath, 2001).

With respect to relational embeddedness, we expect more exploratory initiatives to benefit from a higher degree of tie strength than more exploitive initiatives. Previous research has shown that exploratory initiatives face substantial organizational inertia (Huff, Huff & Thomas, 1992). "Core rigidities" arise from the core capabilities associated with current and past performance. Components of these rigidities may be found in established processes and structures (e.g. monitoring and reporting processes that measure performance according to existing priorities), skills and knowledge (e.g. engineering skills based on the existing product mix) and values and

norms (e.g. beliefs about what is important to the success of the organization) (Leonard-Barton, 1992). Because exploratory initiatives are aimed at developing *new* capabilities, they are likely to be seen as competing for resources with activities linked to one or more of these elements. As a result, units associated with these activities are less likely to support and cooperate with the goals of exploratory initiatives. Ties to other units based on reciprocity and closeness, however, may help an initiative unit overcome this inertia by increasing the unit's ability to gain support for new ideas and approaches. Informal support is especially important if there are exploitive initiatives in the organization pursuing objectives that are more consistent with the status quo and potentially incompatible with goals those of the initiative (Narayanan & Fahey, 1982). Under such circumstances, strong ties to other organizational units create an important base of political support.

Exploratory initiatives are also more likely to encounter unforeseen challenges during their development (e.g., new market events) (Hansen et al. 2001). This requires speedy and substantive backing from other units, and such responses are more likely to be forthcoming from units with whom the initiative unit has strong ties (Krackhardt, 1992). Also, due to their novelty, exploratory initiatives may experience unanticipated financial and human resource needs. Again, resources are more likely to be provided by units where there are strong ties. For example, an exploratory initiative in an insurance company we studied struggled to solve technical difficulties for a web-based pilot project. Because of the strong relationship between the initiative and her department, the head of information management decided to "help out" by informally assigning people to the project. The costs of these employees were covered within the budget of the department and therefore did not affect the initiative's budget.

Because they direct resources at improving existing arrangements, more exploitive initiatives are less likely to encounter the political resistance associated with core rigidities. Indeed, other organization units who contribute to the existing capability base are likely to have a vested interest in the initiative's performance. Similarly, because they are grounded in a knowledge base that is familiar to the organization, such initiatives rely less on new information, are easier to plan and are less likely to face unanticipated challenges or unforeseen resource requirements. As a result, strong ties are likely to pay fewer dividends in an exploitive initiative's ability to acquire information, resources and political support. This is because the overhead in time and attention that results from reciprocity increases with strong ties, and since more exploitive initiatives are less dependent on other units to gain new information and support, the negative influences of reciprocity are likely to develop at lower levels of tie strength. Thus:

Hypotheses 4: The degree of exploration moderates the curvilinear relationship between relational embeddedness and initiative performance. Negative influences develop at lower levels of tie strength in exploitive initiatives than in exploratory initiatives.

With respect to structural embeddedness, the degree of exploration has the opposite moderating influence on the performance of strategic initiatives. In this case, exploratory initiatives experience negative influences at lower levels of centrality compared to exploitive initiatives. There are two reasons for this.

First, because the priorities implicit in exploratory initiatives are inconsistent with the status quo, they are more likely to confront the effects of "core rigidities." This means that they are less likely to appear successful when measured against established control parameters and more likely to advocate for approaches that are inconsistent with the organization's norms and values (Leonard-Barton, 1992). Thus, in order to avoid measurements that would lead to the premature withdrawal of resources and political resistance that would arise from challenging organizational

values and norms, enclaving and "flying under the radar" is more important to exploratory initiatives (Burgelman, 1991). Exploitive initiatives, on the other hand, are likely to stand up well to scrutiny in the formal control system and are less likely to be seen as challenges to established norms and values.

Second, because they draw less on existing organizational practices, exploratory initiatives are likely to benefit less from the knowledge and skills of other organizational units (Burgelman, 1991). Certainly, some number of inter-group links are needed, but as an exploratory initiative becomes more central, it is more likely to experience the diminishing returns from increasing centrality and its negative influences, i.e. demands to spend more time and resources on fostering a larger number of relationships. Maintaining connections with a large number of other units, particularly if they disagree with the initiative's goals and approaches (which disagreement is more likely for exploratory initiatives), may reduce coherence and focus for any initiative, but the level of centrality at which this occurs is likely to be lower for more exploratory initiatives (Bower, 1970).

The positive influences on the performance of exploitive initiatives are experienced at higher levels than for exploitive initiatives. Their success depends on accessing knowledge that already exists in the organization. They can benefit from the specific input of other organizational units about details and refinements to existing practices. Indeed, inputs concerning operational details may be crucial in achieving the exploitive initiative's goal to improve on established approaches. Thus, although exploitive initiatives may experience negative influences from increasing centrality, this is likely to develop at higher levels of centrality than for exploratory initiatives.

Hypotheses 4b: The degree of exploration moderates the curvilinear relationship between structural embeddedness and initiative performance. Negative influences develop at higher levels of centrality in exploitive initiatives than in exploratory initiatives.

With respect to cognitive embeddedness, we expect exploitative initiatives to benefit from increases in the extent of shared vision at higher levels than exploratory initiatives. Exploratory initiatives are likely to experience negative influences at lower levels of shared vision than exploitive initiatives. This is because more exploratory initiatives rely more on new information and creativity than exploitive initiatives and less on information and knowledge available in the organization. Put differently, they are more likely to experience the negative influences of established mental frameworks that are represented in the shared vision. The need for thinking beyond established frameworks and creative problem solving is greater for exploratory initiatives (Simsek et al 2003). In addition, the positive influences of shared vision on the efficiency of communication and other interactions diminish sooner for exploratory initiatives because their performance depends less on information and knowledge that already exists in the organization. Although more exploitive initiatives are likely to experience these negative influences at some levels of shared vision, the level of shared vision is likely to be higher before such influences set in. Thus:

Hypotheses 6: The degree of exploration moderates the curvilinear relationship between cognitive embeddedness and initiative performance. Negative influences develop at lower levels of shared vision in exploratory initiatives than in exploitive initiatives.

METHODS

Data and Sample

The research was conducted in five large multinational corporations, here given the code names of Lux (5,000 employees and 2.8 billion dollars in revenue), Ino (31,000 employees and

6.5 billion dollars), Enex (9,800 employees and 2.4 billion dollars), Baln (1,800 employees and 0.30 billion dollars) and Helix (4,600 employees and 4.8 billion dollars). The organizations compete in the air cargo, automotive, semi-conductor, machine tool and insurance industries. We sought initiatives from a diverse group of companies competing in different industries in order to increase the external validity of the research. The organizational structure of each corporation is the typical multi-business form, with a corporate headquarters and several business units.

To identify strategic initiatives, we used an approach similar to McGrath (2001). The CEO or a member of the top management team of each company was approached with a list of criteria to identify strategic initiatives on the corporate level. In particular, we asked them to identify all initiatives that were considered strategic in terms of renewing competitive advantage by conducting new business activities. Also, we asked for initiatives that had been completed within the last twelve months to avoid biases due to incomplete memory of past events. We specifically admonished them to include not only “successful”, but also “unsuccessful” initiatives - or in other words, all relevant strategic initiatives. Subsequent discussion between us and top management made clear that some of the proposed initiatives did not fit the sample in terms of their strategic relevance. Therefore, some of them were dropped from our final list. Overall, we analyzed 76 new business activities (Lux 18, Ino 10, Enex 11, Baln 15, Helix 22). Each initiative received a specific name, such as wearable electronics, grasshopper, optima, 55plus, wearable technology, etc. For example, "55plus" was an initiative in the insurance company to gain new business by marketing tailor-made products and services for the elderly generation.

"Grasshopper" was an undertaking by a machine tool company to tap into the Australian market with its coating-business for heavy machinery. "Wearable technology" was the initiative of the semiconductor firm to design and produce chips for intelligent clothing that might be used for

skiing (avalanche identification) or running (measuring speed, heart pulse, etc.). The diversity of goals of sampled initiatives (e.g. product innovation, market expansion, process transformation) was intended to further enhance the study's generalizability.

Studying either the development of strategic initiatives or inter-group social networks independently may be challenging, but designing a study that combines observations on both these factors is a particularly complex endeavor. Related work (e.g., Podolny et al. 2001, Tsai & Ghoshal, 1998; McGrath, 2001) offers some guidelines, but no previous research has analyzed comprehensively embeddedness variables for strategic initiative units, such as those studied here. It was therefore necessary to develop a specific methodological approach in order to conduct valid tests of the hypotheses.

The underlying logic for the approach is that strategic initiatives form a relatively independent unit within the inter-group social network. Such undertakings are generally pursued by autonomous teams, which consist of people from various organizational units. Some group members work full time on these initiatives; others take on initiative tasks and responsibilities in addition to their other duties. These initiatives are generally equipped with the authority to make critical decisions and use corporate resources within pre-set guidelines in order to reach their objectives. Hence, initiatives may be considered independent, albeit temporary, units within the inter-group network.

To define network boundaries we followed the realist approach (i.e. we asked the network members to identify the boundaries) and traced the whole network (i.e. we included each organizational unit in the network) (Wassermann & Faust, 1994; Laumann, Marsden & Prensky (1983). Therefore, we first asked the senior executive contact (all were members of the top management team) to name all organizational units relevant to the development of an initiative.

The types of organizational units identified were similar across the five companies, including: the Corporate Executive Team, Corporate Controlling, Strategy Development, Communications, Quality, Purchasing, Sales, Information Management, the top management team in charge of the initiative's parent business unit and the top management teams of other business units. Next, we conducted semi-structured interviews with the leaders of each initiative to get a better picture of the processes within the firms and to identify which were the relevant organizational units for the development of initiatives. Third, we used secondary data such as the organization chart to get additional objective information about the company structure. Based on these information sources, the network boundaries were defined. The network was discussed and refined with top management and the initiative managers in several rounds until we established the final definition of the network. The five networks ranged from eleven to eighteen organizational units (excluding initiative units).

After the relevant network was defined, questionnaires were developed and data was collected. We used two different questionnaires, one for the initiative units and one for the other organizational units. Questionnaires asked initiative units and organizational units to assess social relationships using socio-metric techniques (relational measures). Following the roster method (Marsden, 1990), we listed the names of the relevant organizational units in the questionnaire. The questionnaire further asked initiative units to assess the characteristics and the performance of the initiative using multi-item scales (non-relational measures). Consistent with previous research, multiple respondents (the initiative leader, the initiative sponsor and an initiative member) were approached for each initiative in order to reduce single respondent bias (Tsai & Ghoshal, 1998; Tsai, 2001; McGrath, 2001).

We sent out questionnaires by email. A reminder was sent three weeks later and another after five weeks. Because we selected respondents in consultation with top management – a fact that was known to our respondents' – all of those who were asked to do so completed and returned the questionnaires (100% response rate). To reduce social desirability bias, we promised that we would keep all individual responses completely confidential, confirmed that our results would be limited to aggregate statistics and guaranteed that we would prevent the identification of any individual or organizational unit. We arranged for all completed questionnaires to be sent directly to the researchers and their assistants.

Measures

In this study we relied on existing measures, mostly employing 7-point Likert-type scales. We had two different types of measures: relational and non-relational measures. For the non-relational measures we used multi-item scales and applied a factor analysis with varimax rotation in order to examine dimensionality of measures and appropriateness of items. Items were dropped to improve the internal consistency of the scales where necessary. Further, because the data included multiple respondents, we aggregated responses into an initiative unit measure for each of the variables. We calculated item means across the three respondents and summed these to form scales, thus obtaining an aggregate value for each construct and each initiative. This approach is similar to that of Gresov, Drazin, and Van de Ven (1989) and McGrath (2001). An advantage of this approach is that it tends to average out the bias of individual responses and to compress the overall amount of variance in the measure – resulting in a more conservative interpretation of the results. Normality assumptions are also more easily justified for such data.

The relational data, on the other hand, was transformed into locational properties, such as for our measure of relational and structural embeddedness, using network analytic technology. To

capture dyadic social relationships between initiative units and organizational units and among the organizational units themselves, we adopted the question from Hansen (1999) that measured the frequency and closeness of a relationship on a 7-point Likert-type scale, ranging from 1 to 7. We added an additional box with the value of 0 at the beginning of the scale to allow for the non-existence of the contact. A value of 0 indicated no contact, while a value between 1 and 7 indicated different contact frequencies and levels of closeness between units.

After the relational data was collected, we calculated the mean-percentage agreement and cross-validated the network data. Since we had data from both parties of the relationship, we ascertained that a tie was valid if unit i indicated it had contact with unit j , and unit j at the same time indicated it had contact with unit i . As we had multiple respondents for the initiative units, we further considered data on the relationship between organizational units and initiative units valid if the contact indicated by any respondent of the initiative unit was also indicated by the respondent of the organizational unit. Then, we took the mean value of the respondents from the organizational units as well as the initiative units. Such an approach for validating social network data has been used by several previous researchers (Krackhardt, 1990; Hansen, 1999; Tsai, 2001). Based on the validated network data, we constructed socio-matrices for each initiative, which formed the basis for the calculation of the locational properties as detailed below. Finally, we checked the appropriateness of merging our data from five firms by using the Chow F-test, and subsequently pooled our data into one dataset.

Performance. To assess performance, we adopted a measure from prior research in strategic renewal (McGrath, 2001; McGrath, MacMillan, & Venkataraman, 1995). Items focus on the extent to which several goals and objectives are achieved, and responses were obtained from each of the three respondents of the initiative unit. Principal component analysis yielded one

factor and a scale of nine items with an alpha of 0.88. The following question was asked using a 7-point Likert scale: "Please assess the success of the initiative over the last three months, on each of the following dimensions: 1. Meeting staffing goals, 2. Meeting time expectations, 3. Meeting quality parameters, 4. Meeting reliability parameters, 5. Meeting cost parameters, 6. Meeting efficiency parameters, 7. Meeting user/client satisfaction expectations, 8. Meeting service expectations, 9. Meeting objective expectations

Tie strength (relational embeddedness). Previous research conceptualized tie strength as a combination of the amount of time, the emotional intensity, the intimacy and reciprocity characterizing social ties (Marsden & Campbell, 1984). We acknowledge these multiple dimensions of tie strength and measure it in congruence with previous studies (Hansen, 1999) as the average of frequency and closeness scores reported on 7-point Likert scales. We asked the following questions for frequency: "1. How frequently do/did people in your team interact with the following functional units for issues related to the daily job? 2. How frequently do/did people in your team interact with the following functional units for social support?" And the following questions for closeness: "1. How close is/was the working relationship between your team and the following functional units? 2. How close is/was the social support relationship between your project team and the following functional units?"

Both measures for each initiative unit were calculated on the basis of the validated socio-matrices. Each socio-matrix incorporated values on frequency and closeness between individual initiative units and the organizational units, as well as among the organizational units themselves. To arrive at the initiative unit's score, we took the average score for all its ties to other organizational units (Hansen, 1999). We used the average of the scores as indicated by the organizational units (in-tie-strength) instead of the ones indicated by the initiative units (out-tie-

strength). This decision was based on the fact that in-tie-strength scores were likely to be more comparable, since the organizational units were required to judge the strength of ties between their own unit and all existing initiative units. Relying on organizational units for this measure also reduces the potential for socially desirability bias on the part of members of initiative units.

Centrality (structural embeddedness). We used *degree centrality* for this study, as we wanted to capture the extent to which the initiative unit has direct relationships and access to other organizational units. This measure sees a focal unit as more central if it has a larger number of ties to other units in the network. As this measure depends on the network size n , it is important to standardize the measure across networks. This can be done by dividing the measure for a given initiative by its maximum value, which is $n-1$. The measure calculates the proportion of units out of the total network with which the focal unit has direct relationships (Wasserman & Faust, 1994). The normal degree centrality measures ($C_D(x_i)$) and the standardized degree centrality measure ($C'_D(x_i)$) are presented in the following equation:

$$C_D(x_i) = d(x_i) = \sum_j x_{ij} = \sum_j x_{ji} \qquad C'_D(x_i) = \frac{d(x_i)}{n-1}$$

X_i stands for the focal unit, x_{ij} and x_{ji} is the existing tie between unit x_i and unit x_j , $d(x_i)$ is the degree of initiative unit centrality and n is the network size. The standardized index ranges from 0 to 1. We calculated the standardized centrality index for all 76 initiatives in UCINET 6.0 (Borgatti et al., 2002) based on the validated socio-matrices. To compute the centrality measures the socio-matrices were coded 0 and 1 to represent the presence or absence of a tie.

Shared vision (cognitive embeddedness). To assess shared vision we adopted the measure of Tsai and Ghoshal (1998), who assessed the level of shared vision between different

organizational units and between the focal organizational unit and the whole organization. On a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree), the following two questions were asked: "1. Our initiative team shared the same ambitions and vision with other organizational units at work. 2. People in our team were enthusiastic about pursuing the collective goals and missions of the whole organization." The correlation index between those two items was significant at the 0.01 level and the Pearson's coefficient was 0.76. As this value exceeds the commonly used threshold of 0.6 for integrating two items in one measure, and as the validity and reliability of this measure had been established by Tsai and Ghoshal (1998), we gained confidence in using the composite measure.

Degree of exploration. We employed the degree of exploration, i.e. the degree to which the goals of an initiative focus on developments that are new to the organization, as a moderator in our analysis. We adapted a six-item measure from McGrath (2001), asking the following questions: "To what extent were the following characteristics or factors of your initiative new to your company? 1. The systems used. 2. The know-how of our initiative team. 3. The skills of our initiative team. 4. The technology used in the initiative. 5. The products and services. 6. The informal norms and how things are done." This measure captures the extent to which the knowledge associated with an initiative is new to the organization, i.e. in products, technologies, skills, systems etc., and therefore represents the degree of exploration (McGrath, 2001).

Control variables. Based on prior research, we identified a number of variables that could affect the relationships anticipated in the hypotheses. They included the perceived impact of the initiative and the size of the initiative. (Bryson & Bromily, 1993; McGrath, 2001). In addition, we believed that the organizational and industry contexts could play a role, and therefore,

controlled for firm- and industry-specific effects. Data on these potentially confounding variables was captured by observation, in the questionnaires and in publicly available data.

Initiative impact. Initiatives considered more important tend to have more management attention and more support and thus are more likely to succeed. Further, perceived initiative impact may also influence the embeddedness of the initiative unit. To measure initiative impact, we adapted the measure in Papadakis, Lioukas, and Chambers (1998), who assessed the impact of strategic decisions. A principle components analysis with varimax rotation extracted two factors from this multi-item scale. Based on the need for a uni-dimensional measure, we selected items loading on the first factor as best representing this variable.

Initiative size. Large initiatives have more resources at their disposal, and this may enhance their ability to succeed. Also, size and the resulting complexity of an initiative may impact its embeddedness. Large initiatives, for example, may become more central by virtue of the fact that the number of potential links between it and other units is a function of the number of members associated with an initiative. Thus, we measured initiative size as the logarithm of the number of people formally identified with the initiative, a number that was provided by the initiative members themselves and scrutinized for accuracy by corporate headquarters.

Company and industry. Initiatives in smaller companies may be more successful because they face less competition from other initiatives, and it may be easier to gain top management attention and support. Further, size may affect formal structure and network size, which in turn may influence the embeddedness of initiatives. The industry in which a company competes may also influence the potential for initiative success. In particular, industries where there is a greater degree of technological or market uncertainty may experience fewer successful initiatives. In

order to measure and thereby control for company and industry effects, we used dummy variables to represent the organizations in our sample.

Adequacy of the Measures

We took several steps to examine the reliability and validity of our measures. First, in order to validate our use of aggregated individual responses on the initiative level of analysis, we examined inter-rater agreement for both the relational and non-relational measures. Based on Burke and Dunlap (2002), we calculated the intra-class correlation index as the principal reliability indicator for the non-relational data. Further, following the suggestions of Jones, Johnson, Butler, and Main (1983) we also compared responses across individuals at the item and scale level, including t-test of mean differences and correlations across scales. Overall, these tests confirmed that inter-rater agreement was well above accepted norms. The standard tests of inter-rater convergence for the relational data could not be applied, as the measures were binary (existent or non-existent relationships). To measure the inter-rater agreement for those ratings, therefore, we calculated the “mean percentage agreement”, as suggested by Tsai and Ghoshal (1998). The mean percentage agreement index is defined as $C_x = A_x/B_x$, where C_x is the index of consistency for initiative unit x , A_x is the number of other organizational units selected by at least two of the three respondents of initiative unit x , and B_x is the number of units selected by at least one of the three respondents of initiative unit x . The value of the mean percentage agreement can range from 0.0 (perfect inconsistency) to 1.0 (perfect consistency). In this study the mean percentage agreement is 0.81 for Lux, 0.71 for Ino, 0.91 for Enex, 0.71 for Baln and 0.82 for Helix. We considered these values acceptable for all networks.

Second, we tested for early and late respondent bias. Following the suggestions by Armstrong and Overton (1977), we formed two sub-samples to assess this bias: one comprised of

those who answered early and one comprised of those who answered after the first reminder. T-tests conducted on the responses found no significant differences between these two groupings.

Third, we applied the Harmon's single factor test to check for mono-method bias with respect to the questionnaire data (Podsakoff & Organ, 1986). The common factor had an eigenvalue of 2.1 and accounted for 26 percent of the variance. Loadings for the other factors (eigenvalues > 1.0) were consistent with theory and accounted for an additional 33.2 percent. This mitigated concerns for mono-method bias with respect to the non-relational measures.

Finally, for the relational measures we took several steps to improve validity and reliability. First, we used the roster method (Marsden, 1990), thereby providing respondents with a list of the identified organizational units and initiative units as a recognition aid to be used in filling out the network items. Research has shown that such recognition aids improve the reliability of network measures. Second, the network question was very specific, which is another way to improve the reliability of network measures (Bandura, 1986; Rogers & Kincaid, 1981). Third, we asked about links that were related to the respondent's day-to-day work. Prior research has shown that people are remarkably accurate in reporting their typical patterns of relations (Freeman, Romney, & Freeman, 1987). Finally, we cross-validated the network measures as outlined above.

RESULTS

Table 1 presents means, standard deviations, correlations and reliabilities for each of the study variables. Their distributions were examined for normality using the Shapiro-Wilks test as well as a modified version of the Kolmogorow-Smirnow test. All values for kurtosis and skewness were below the level of twice its standard value that is taken to indicate a departure

from symmetry (Hair, Anderson, Tatham & Black, 1998). To check for multi-collinearity, we first examined the correlations among the independent variables. This revealed no evidence of multi-collinearity. The largest correlations with embeddedness variables occur between firm dummy 2 and centrality (-.415, $p < 0.01$), initiative impact and tie strength (-.404, $p < 0.01$) and tie strength and exploration (-.450, $p < 0.01$). Correlations among independent variables were non-significant. Second, we calculated the variance inflation factor and conditioning index for the variables. The average VIF for all direct variables was 2.6, with a maximum of 4.1. Thus, we were below the recommended ceiling of 10 (Cohen et al., 2003). There were also no violations of assumptions concerning the normality, linearity or homoscedacity of residuals. A Durbin-Watson test produced satisfactory results regarding the independence of error terms.

Insert Table 1 about here

We used multiple-hierarchical-regression to test our hypotheses, as this technique allows one to examine statistical tests for evidence of nonlinearity. We centered all independent variables before entering them into the regression models in order to allow for a meaningful comparison of the variables measured along different scales. We centered the variables for the interaction terms prior to creating the respective cross products. This procedure improves the interpretability of the data, but does not affect the significance levels of the beta coefficients. The nonlinear components are represented by squared variables. Entering the independent variables in one block and the squared variables in a second block enables one to determine the significance of curvilinear relationships over and above any linear relationships. In regression models, a curvilinear relationship is evident if the addition of the nonlinear predictor results in significant incremental variance after the linear relationships have been taken into account

(Cohen, Cohen, West & Aiken, 2003). Multiple hierarchical regression is widely used to assess curvilinear relationships in the organization and management literature (e.g., Chung et al., 2000; Miller and Shamsie, 2001; Wu, Leviats, and Priem, 2003; Golden and Veiga, 2003). In our analysis, we examine several sub-models, reporting standardized coefficient estimates (beta), the significance of the estimates, adjusted R^2 , F value, and change in R^2 and F-values. The results are shown in Table 2.

Insert Table 2 about here

In the first step, we included the six control variables (M1): initiative impact, log of initiative size, and four dummies to control for firm and industry effects. Among the controls, initiative size and dummy for firm 4 were slightly significant. Because our data set contained several significant correlations between company dummies, initiative impact, degree of exploration and the embeddedness variables, we retained these controls in subsequent analyses.

In step 2 we added the three embeddedness variables (Model 2): tie strength for relational embeddedness, degree centrality for structural embeddedness, and shared vision for cognitive embeddedness. Results show that all three variables are significantly and positively related to initiative performance. The strongest relative association is observed for shared vision, followed by centrality and tie strength. The overall model is significant (adjusted $R^2 = .281$), and shows a significant change of R^2 (.219) in comparison to model 1.

In order to test for curvilinear relationships for the three embeddedness variables as proposed in hypotheses H1, H2, and H3, the quadratic terms of tie strength, centrality, and shared vision were added to the regression equation in step 3 (Model 3). To support an inverted U-shaped relationship, the coefficient estimates for their quadratic terms should be negative and

significant. As shown in the table, the squared term coefficients for tie strength and centrality are negative and significant ($\beta = -.276, p = .024$ for tie strength, and $\beta = -.226, p = .043$ for centrality), while their direct relationships remain positive. The change in R^2 between the linear and the curvilinear model is significant as well, supporting the salience of curvilinear effects (Cohen & Cohen, 1983). However, we could not detect a curvilinear association for shared vision, as the quadratic term is non-significant ($\beta = .103; p = .334$). Thus, we find support H1 and H2 but not for H3.

In Step 4, we added the degree of exploration as an independent variable (Model 4). Results for exploration are non-significant, and there is little improvement of the overall model. Based on the procedures proposed by Baron and Kenny (1986) and Aiken and West (1991), we introduced the interaction terms composed of the direct effects and the moderator "exploration" (Model 5). Results are significant for all three interaction terms.

Finally in step 6, we entered interaction terms composed of the quadratic terms of tie strength and centrality and our moderating variable (M6). We entered these two interaction terms together as a block in order to account for their simultaneous effects in which perhaps one might cancel out the other. This approach is conservative and offers a realistic approach (Kohler & Mathieu, 1993). We omitted shared vision from this analysis since the curvilinear relationship was not supported in Model 4. Evidence of moderation is represented by significant incremental variance in addition to significant coefficients of the cross product terms. Results show significant and negative associations for both the interaction of squared tie strength and exploration ($\beta = -.304, p = .047$) and for squared centrality and exploration ($\beta = -.1.313, p = .000$). The overall model shows a significant change of R^2 (.134) in comparison to the previous model. Thus, we find support for H4 and H5. That is, the degree of exploration appears to moderate the

curvilinear relationships between tie strength and initiative performance and between centrality and initiative performance. There is no evidence to support H6.

To further examine these moderating results, we conducted several simple slope regressions (with exploration at the mean level, one standard deviation below the mean and one above the mean) and plotted our findings (Aiken & West, 1991). Please see Figures 1a and 1b. The first chart shows the interaction of tie strength squared and exploration on initiative performance. The curvilinear relationship remains intact in this graph; however, it shifts to the right at higher degrees of exploration. More exploratory initiative units reach the optimal point at higher degrees of tie strength, as compared to more exploitative ones. The second graph shows the interaction of degree centrality squared and exploration on initiative performance. Here, the curvilinear relationship remains intact only for more exploitative initiatives, although the curve becomes relatively flat. However, for more exploratory initiatives the relationship turns around into an u-shaped form. In other words, exploratory initiatives benefit from lower levels of structural embeddedness in the inter-unit network, as compared to more exploitative initiatives.

 Insert Figures 1a and 1b about here

Although the curvilinear influence is not evident in the results, there is evidence of a positive direct influence for shared vision, and judged by the significant cross product term in Model 5 ($\beta = -.195, p < .05$), this linear influence appears to be moderated by the degree of exploration. A plot of the relationships is shown in Figure 2. As the figure shows, the positive slope between shared vision and initiative performance is steeper for more exploitative initiatives where the degree of exploration is low. While the arguments for the hypotheses assumed a curvilinear

direct influence, a moderated linear influence is consistent with the theory that exploratory initiatives benefit less from increases in shared vision than exploitive initiatives.

Insert Figure 2 about here

Robustness Tests. In order to examine the robustness of the results we conducted several additional analyses. First, we conducted regressions with different measures of the variables. This is especially important for studies on inter-group network embeddedness, as the embeddedness variables are often operationalized differently (Tsai, 2001). We substituted our measure of degree centrality with other measures of centrality. In particular, we ran regressions with "betweenness centrality" and "closeness centrality". Betweenness centrality (Freeman, 1979) is based on the idea that a unit is central if it lies between other actors. Closeness centrality includes not only the direct contacts but also the indirect contacts. Although these measures varied in terms of their statistical significance, they yielded similar results. Also, we split our aggregate measure of tie strength into its two components, frequency and closeness. We found weaker and partly non-significant results in subsequent regressions where frequency alone was used as a measure of tie strength, thus indicating the relative importance of closeness for the relationship of tie strength and initiative performance.

Second, we employed a range of other control variables beyond initiative impact and initiative team size, namely initiative investment, initiative duration and the average tenure of respondents within initiative units. None of these additional controls were significant and they were less correlated with our independent variables than those identified above. In order to preserve degrees of freedom due to our sample size, we therefore did not include them in the analysis.

Third, following Hamilton, Nickerson and Owan (2003), we constructed two-stage models with correction for endogeneity. In the first stage, we regressed relational and structural embeddedness on the remaining independent and control variables. We computed the mill ratios from the first stage and included them as control variables in the second stage models. The control variable correcting for endogeneity was insignificant. Overall, the consistency of the results of the two-stage models reduces concerns of endogeneity or omitted variable bias.

Fourth, in order to validate the measure of initiative performance, we cross-checked it against a binary measure that we obtained from contacts in the corporate headquarters of each organization. Specifically, we asked contacts in the chief executives' office to judge the success or failure of initiatives. In this context, success was defined as an initiative that was implemented on a widespread basis, launched on the external market and/or that reached pre-set goals. In several cases the judgment of corporate headquarters informants on the performance of initiatives was supported by financial measures such as profit, return on investment, and realized cash flow. Initiatives were considered failed when they were stopped in advance of widespread implementation and no longer provided with corporate resources. Based on these parameters, contacts in corporate headquarters felt they could judge quite easily the success and failure of the initiatives. We ran our analysis with a logistic regression using the binary performance measure, and the results did not differ significantly from those reported above. This result underscores previous studies that have found that subjective, self-reported performance measures are highly correlated with objective measures of firm performance (Dess & Robinson, 1984; Robinson & Pearce, 1988).

Fifth, we conducted ex-post analyses by interviewing five executives to gain further insights into the causal mechanisms that drive our results, focusing especially on the effects of tie

strength and centrality. Overall, these interviews confirmed our results and provided us with further insights. For example, with regards to tie strength, the interviewees emphasized the usefulness of strong relationships especially in "critical moments". As an executive remarked: *"...one team was really alertthey had good contacts to guys in the finance department that keeps a tight hand on our profitability ... They were one of the first who recognized that potential budget cuts were coming, before we had officially declared them. This enabled them to search for new sources of funding and tap into these, before other initiative teams were able to do so ..."*. With regard to centrality, managers pointed toward the necessity of sheltering initiatives from the demands and rigidity of established practices. An initiative leader expressed this as follows: *"I moved my team for some time into a remote hotel in order to decrease access to the organization and limit the impact of our quite conservative insurance mentality. In doing so, other units could not permanently influence us in doing what we were charged to do."* Another executive described the importance of cognitive embeddedness: *"our initiative required that we place certain quality standards in each organizational unit in order to strengthen our position as a quality leader; it was substantially strengthened by the fact that in our organization quality plays a very important role."*

DISCUSSION

The main contributions of the study are that the shape and direction of the relationship between embeddedness and the performance of an initiative depend on (1) the specific form of embeddedness under consideration, (2) the extent of such embeddedness and (2) the degree of exploration inherent in the initiative task. Put differently, the network architectures associated with initiative performance can be described as relatively complex combinations of structural, relational and cognitive embeddedness. Because the slope of the relational and structural

relationships to performance are curvilinear, the optimal network architecture is best described as contingent on both the degree of exploration and the level of the two network variables.

Thus, for more exploratory initiatives where the level of embeddedness is relatively low, increasing tie strength, decreasing centrality and increasing shared vision are likely to enhance performance. For exploratory initiatives where the level of embeddedness is relatively high, however, increasing tie strength and decreasing centrality are likely to have a modest or no influence on performance while increasing levels of shared vision will continue to make moderate improvements in performance more likely. For more exploitive initiatives where the level of embeddedness is relatively low, increasing tie strength is likely to have moderate to no positive influence, increasing centrality a moderate positive influence and shared vision a stronger positive influence on initiative performance. For exploitive initiatives where the level of embeddedness is relatively high, however, increasing tie strength even further is likely to have a negative influence, increasing centrality no influence and shared vision a stronger positive influence on initiative performance. Table 3 summarizes these profiles.

Insert Table 3

Contributions to Theory on Inter-group Relationships

This picture of embeddedness - initiative performance relationships builds on and extends theory from prior work on inter-group relationships. In a study of fifteen business units within a single firm, Tsai and Ghoshal (1998) concluded that structural social capital in the form of closer, more frequent interactions and relational social capital in the form of trusting relationships facilitates resource exchange with other units and enhances product innovation within the focal unit. In the present study, measures of the frequency and closeness of

relationships (i.e. tie strength) between strategic initiatives and other units showed that at higher levels these network variables negatively influence performance and that this negative influence is most likely to appear in exploitive initiatives where tie strength is already relatively high. One obvious explanation for the difference in these findings is that Tsai and Ghoshal's (1998) did not measure or investigate curvilinear influences.

From a theoretical perspective, however, the findings in this study suggest that as the level of tie strength approaches high levels further increases are not likely to lead to exchanges that have much benefit to the performance of strategic initiatives. Moreover, at some point, the time devoted to maintaining an existing network of strong ties is no longer worth the effort relative to the information and other resources obtained. These influences are more pronounced in more exploitive initiatives where the degree of innovation required is relatively low and where investments in strengthening existing ties are likely to pay fewer dividends in terms of resource exchange. In more exploratory initiatives, the positive influence of increasing strong ties endures at significantly higher levels. Thus, two conclusions can be drawn from comparing findings in this study with Tsai and Ghoshal (1998). First, tie strength does not appear to be monotonically related to innovation within units whose tasks are more exploitive; they are particularly likely to suffer from over-investments in tie strength. Second and consistent with Tsai and Ghoshal's (1998) use of innovation as a dependent variable, the influence of tie strength on unit performance may be more positive when performance depends on exploration and innovation than when it depends on exploitation.

In a later study of 60 business units in two organizations, Tsai (2001) hypothesized and found a positive relationship between unit centrality and innovation. The present study revealed a curvilinear influence of centrality for strategic initiative units and found that the negative

influences were greater in exploratory initiatives. Tsai (2001) reasoned that more centrality would increase a unit's access to resources. This logic is supported by the present study up to a point. As the level of centrality increases and the task becomes more exploratory, however, results here show that the performance an initiative declines with increases in centrality. In this case, the difference between the two studies may have more to do with context. Strategic initiatives, especially more exploratory ones, face an intra-organizational environment comprised of forces that are indifferent or even hostile to their objectives. In contrast to established business units, the task of exploratory initiatives is not closely related to the tasks of units that are involved in on-going operations and may include goals that threaten established interests (Burgelman, 1983 a/b; Mintzberg & Westley, 1992). Under such conditions, the value of information and other resources available from other units is likely to be lower and increasing centrality may expose exploratory initiatives to unwanted scrutiny and influence. Thus, with respect to centrality, one can conclude that what is good for business unit innovation may be bad for the performance of exploratory strategic initiatives. Put differently, the role of embeddedness and social capital in performance may differ between established business units and more temporary project groups.

Hansen et al's (2001) study of new product development teams provides the best comparison to this study with respect to context. Like strategic initiatives, new product development teams are temporary, project groups. Hansen et al (2001) hypothesized and found curvilinear effects for network sparseness (the inverse of network density) and uncovered exploration / exploitation as a moderating variable of this relationship. Like the finding for centrality in this study, more exploitive projects did not benefit as much from the increased information access created by greater network sparseness. Unlike sparseness however, where Hansen et al (2001) found that

more is better in exploratory cases, centrality's *negative* influence on performance increases for more exploratory projects -- largely for the reasons of enclaving mentioned above. These contrasting findings highlight the fact that the influence of structural embeddedness depends crucially on which structural variable is under consideration.

Hansen et al (2001) did not examine curvilinear effects for network richness (a combination of tie strength and reciprocity). Still, their finding that richer networks are generally an asset for exploratory projects and a liability for exploitive projects is consistent with our results for tie strength. What is different in our study, however, is that when the starting point for tie strength is already relatively high, further increases appear to have diminishing or negative returns to performance, even for exploratory initiatives. Again, the reason for the difference may be the difference between the tasks of new product development groups and exploratory strategic initiatives. To the extent the former are defined and carried out in the context of existing capabilities, relationships with other units whose tasks draw on the same capabilities are likely to be continuing conduits of useful information. For exploratory initiatives where the task falls outside the boundaries of existing capabilities, however, increases in the strength of ties to other units whose tasks are defined by such capabilities are less likely to pay additional dividends, particularly when the level of tie strength is already high.

Cognitive embeddedness or shared vision was introduced in Tsai and Ghoshal's (1998) study but not examined in Tsai (2001) or Hansen et al (2001). Interestingly, Tsai and Ghoshal (1998) failed to find an hypothesized relationship between shared vision and resource exchange between units but did find that shared vision positively influenced trust and trustworthiness, thereby potentially making an indirect contribution to resource exchange and value creation. In our study, despite the predicted curvilinear influence, shared vision plays a positive role in initiative

performance across all observed levels, although the linear influence is somewhat less pronounced in exploratory initiatives. Taken together, the findings in the two studies suggest that shared vision is an important network variable and that this and other measures of cognitive embeddedness should be included in future research. In addition, the fact that this variable is apparently more closely associated with productive exchanges between units in the present study may be a function of the need for strategic initiatives to avoid losing sight of the strategic vision shared by other units and the organization as a whole. Even when the task is to explore beyond the boundaries of existing capabilities, a common vision appears to increase acceptance and enhance communication with other units.

Contributions to Theory on Strategic Renewal

Prior research on strategic renewal has identified isolation from the formal organizational structure (Bower, 1970; Burgelman, 1983) and autonomy from supervisory relationships (McGrath, 2001) as important to the development of strategic initiatives. This study of informal network ties offers an important complement to studies of formal structure. Consistent with the logic in these prior studies, our findings with respect to centrality suggest the need for a degree of isolation from the informal network in the case of exploratory initiatives. Exploratory initiatives seem to be best served by concentrating on relatively few links with those units with which they have been able to establish strong ties, and too much centrality may limit their performance. Very well connected individuals who are often sought after to lead or participate in initiatives (Sharma, 1999) may therefore be less effective if their personal relationships make the initiative too central in the organization's informal social network.

To be successful as a social broker, however, an initiative must be seen as legitimate (Baum & Oliver, 1991; Gavetti & Levinthal, 2000), and the results of this study suggest that sharing a

vision with other organizational units may be an important source of such legitimacy. One reason for the lack of a downside to shared vision may be that the goals of the initiatives we studied were not sufficiently radical to encounter the limitations of the collective mind set suggested by theoretical reasoning in the entrepreneurship literature (Simsek et al, 2003). On average, however, the degree of exploration in the initiatives we studied was relatively high (Mean = 4.1 on a seven point scale), and based on the standard deviation (SD = 1.3), some of the initiatives were highly explorative. In addition to the increased legitimacy and communication already mentioned, it may be that limits to creative thinking may not be salient when cognitive similarities are assessed according to broad visions, ambitions and goals (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998). More specific forms of similarity between initiative units and other units in the network, such as common mental frameworks and belief systems, may, on the other hand, undermine exploratory thinking (Barr et al., 1992). Future research might examine this question.

Our findings also complement research on corporate entrepreneurship as seen through the theoretical lenses of evolutionary theory. Prior theoretical work (Floyd et al, 2007; Floyd & Woodridge, 2000) argues that social networks are an important dimension of the intra-organizational ecology (Burgelman, 1991). Network relationships comprise the social fabric within which strategic initiatives develop, and the information, support and legitimacy provided by strong ties, centrality and shared vision appear to play an important role in how and whether initiatives survive. Importantly, our results suggest that certain configurations of these social ties are more compatible with initiative performance than others.

Our study also extends work on entrepreneurial search behavior (Cyert & March, 1963; Bhardwaj, Camillus & Hounshell, 2006; Venkataraman, 1997). Behavioral theory argues that a

firm's search behavior is triggered by the difference between aspired goals and expected performance (Greve, 2003). For both local as well as non-local search this behavior is continued until a satisfactory solution can be found. Our results highlight the role of the social context in which search activities are embedded. Given that local search may be equated with exploitation and non-local search with exploration (Baum and Dahlin, 2007), our findings on the role of embeddedness in the performance of exploitive and exploratory strategic initiatives may allow behavioral theorists to develop better explanations and more accurate predictions of search outcomes.

Limitations, Future Research and Implications for Practice

There are at least three important limitations to be considered. First, the results may be biased by the use of retrospective accounts. We explicitly asked for initiatives that were completed recently in order to be able to assess their performance. We tried to counter retrospective biases by taking considerable care with regard to the reliability and validity of questionnaire measures, using a second data source to validate the performance measure and drawing on multiple knowledgeable respondents, thereby decreasing subjective biases and creating inter-subjectivity. Second, additional controls might have changed the interplay observed among study variables. In particular, while we did control for initiative size, duration of initiatives and average tenure among respondents within each unit, other controls such as the degree of full time vs. part time managers working in initiative units, the origin of the initiative members, or the involvement of the same individuals across multiple initiatives were not included. Third, the use of cross-sectional data does not allow us to directly observe changes in our independent variables over time.

One fruitful direction for future research would therefore be to track the development of all three types of embeddedness across the life cycle of initiative development. Theory would suggest that early stage initiatives do better when they are more sheltered from organizational scrutiny (Mintzberg & Westley, 1992), but at later stages, closer relationships would appear to be important to gaining political support within the network, i.e. when seeking approval for substantial resources. Future studies might also examine interactions across individual and group levels of analysis. It would be interesting to know, for example, the extent that individual relationships play a role in forming inter-group relations and precisely how one translates into the other. For example, at early stages one would expect that initiative units are dependent on the social relations of their individual members, but that as time passes, this dependence may dissipate. In addition, rather than examining the effects of embeddedness in isolation, it may be useful to incorporate other explanatory variables into research. For example, theory suggests that controls are important to learning and innovation. Thus, research should study the impact of embeddedness on the use of input-, process- and output controls in organizations (Cardinal, 2001; Cardinal, Sitkin, & Long, 2004). To what degree does limiting centrality really shelter initiatives from formal control systems? Are embedded initiative units able to influence control systems in a way that favors evaluations of their performance? Finally, it may be important to examine complementarities across strategic initiatives. From a content perspective, the goals of one strategic initiative may be related those of another. Studying interdependencies among such bundles of initiatives may lead to theory on how organizations manage portfolios of strategic initiatives.

The study offers several useful implications for managerial practice. First, the positive influence of social embeddedness on initiative performance suggests that managers should pay

attention to the level and type of social capital leaders and members of an initiative unit bring to the project. Second, however, managers should be aware that the "more is better" approach cannot be taken for granted. To the contrary, over-embeddedness in the form of too much centrality or too many strong ties may undermine performance. Moreover, there seem to be "tipping points" for these variables beyond which additional investments are unproductive. Third, managers are well advised to recognize the influence of degree of exploration on the relationships between embeddedness and initiative performance. There is a need to make clear assessments about the degree of exploration inherent in a new initiatives and manage network relationships accordingly. Exploratory initiatives prosper in a context characterized by strong ties, low centrality and shared vision, while exploitative initiatives should strive for weaker ties, higher centrality and even higher degrees of shared vision.

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TABLE 1
Means, Standard Deviations, Cronbach Alpha, Correlations and Reliabilities

Variables	Mean	s.d.	a	1	2	3	4	5	6	7	8	9	10
1. Firm 1				-									
2. Firm 2				-.217									
3. Firm 3				-.229*	-.160								
4. Firm 4				-.276*	-.193	-.204							
5. Initiative Impact	3.9	1.3	.77	-.028	.055	-.025	-.241*						
6. Initiative Size Log	11.9	13.6	-	-.175	-.231*	.269*	.085	-.007					
7. Tie Strength	4.2	.87	-	-.221	-.149	.040	-.024	-.404**	.320**				
8. Centrality	.72	.13	-	.310**	-.415**	.013	-.033	.125	.063	-.105			
9. Shared Vision	4.9	.99	.70	-.047	.144	.081	.272*	.274*	.107	-.111	-.099		
10. Exploration	3.9	1.3	.81	.213	.143	-.207	.250*	.348**	-.295**	-.450**	.009	.401**	
11. Performance	4.5	1.1	.88	.100	-.167	-.027	.219	.121	.248*	.158	.277*	.406**	.028

N=76

* p < 0.05

** p < 0.01

TABLE 2
Results of Regression Analysis for Initiative Performance

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Step 1: Control variables						
Initiative Impact	.074	.042	.095	.110	.054	.067
Initiative Size Log	.261*	.135	.316*	.290*	.111	.127
Firm 1	.206	.132	.133	.161	.148	.185†
Firm 2	-.022	.008	.061	.073	.063	.014
Firm 3	-.005	-.051	-.124	-.133	-.177†	-.141
Firm 4	.231†	.129	.042	.071	.050	.058
Step 2: Direct s						
Tie Strength		.244*	.155	.120	.034	-.103
Centrality		.297*	.210†	.209†	.148†	-.547**
Shared Vision		.410***	.423***	.465***	.675***	.505***
Step 3: (Hypotheses 1-3)						
Tie Strength 2			-.276*	-.278*	-.694***	-.561**
Centrality 2			-.226*	-.225*	-.170	.781
Shared Vision 2			.103	.099	-.001	-.090
Step 4: Exploration						
Step 5:						
Tie Strength*Exploration					-.651***	-.681***
Centrality*Exploration					.222†	.643***
Shared Vision*Exploration					-.195*	-.087
Step 6: (Hypotheses 4a, 4b)						
Tie Strength2*Exploration						-.304*
Centrality2*Exploration						-1.313***
Adjusted R ²	.075	.281	.334	.336	.498	.650
F	2.011†	4.264***	4.133***	3.913***	5.641***	8.344***
Change in Adjusted R ²	.149	.219	.073	.010	.154	.134
Change in F	2.011†	7.612***	2.733†	1.158	7.661***	9.602***

N=76; standardized values of beta are reported;

†p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001

Table 3:
Likely Performance Influence of Increasing Embeddedness in Exploratory and Exploitive Strategic Initiatives at Low and High Levels of Embeddedness

Degree of Exploration Level and Type of Embeddedness	Exploratory		Exploitive	
	Low	High	Low	High
Tie strength	++	+ or 0	+ or 0	--
Centrality	--	0	+	0
Shared vision	+	+	++	++

Note: ++ = strong positive influence; + = moderate positive influence; 0 = little/no influence; - = moderate negative influence; -- = strong negative influence

Figure 1a: The relationship between tie strength and initiative performance at low and high degrees of exploration

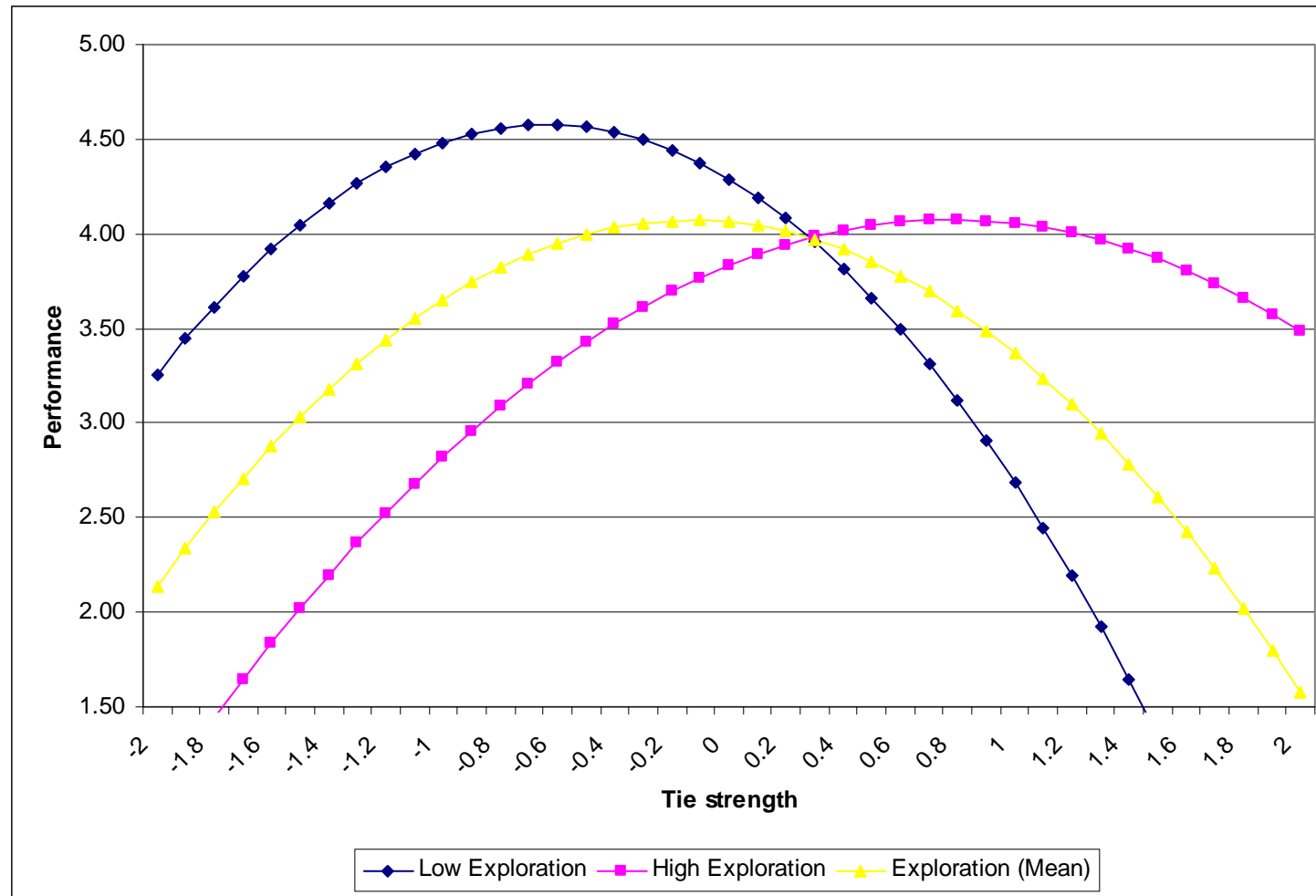


Figure 1b: The relationship between centrality and initiative performance at low and high degrees of exploration

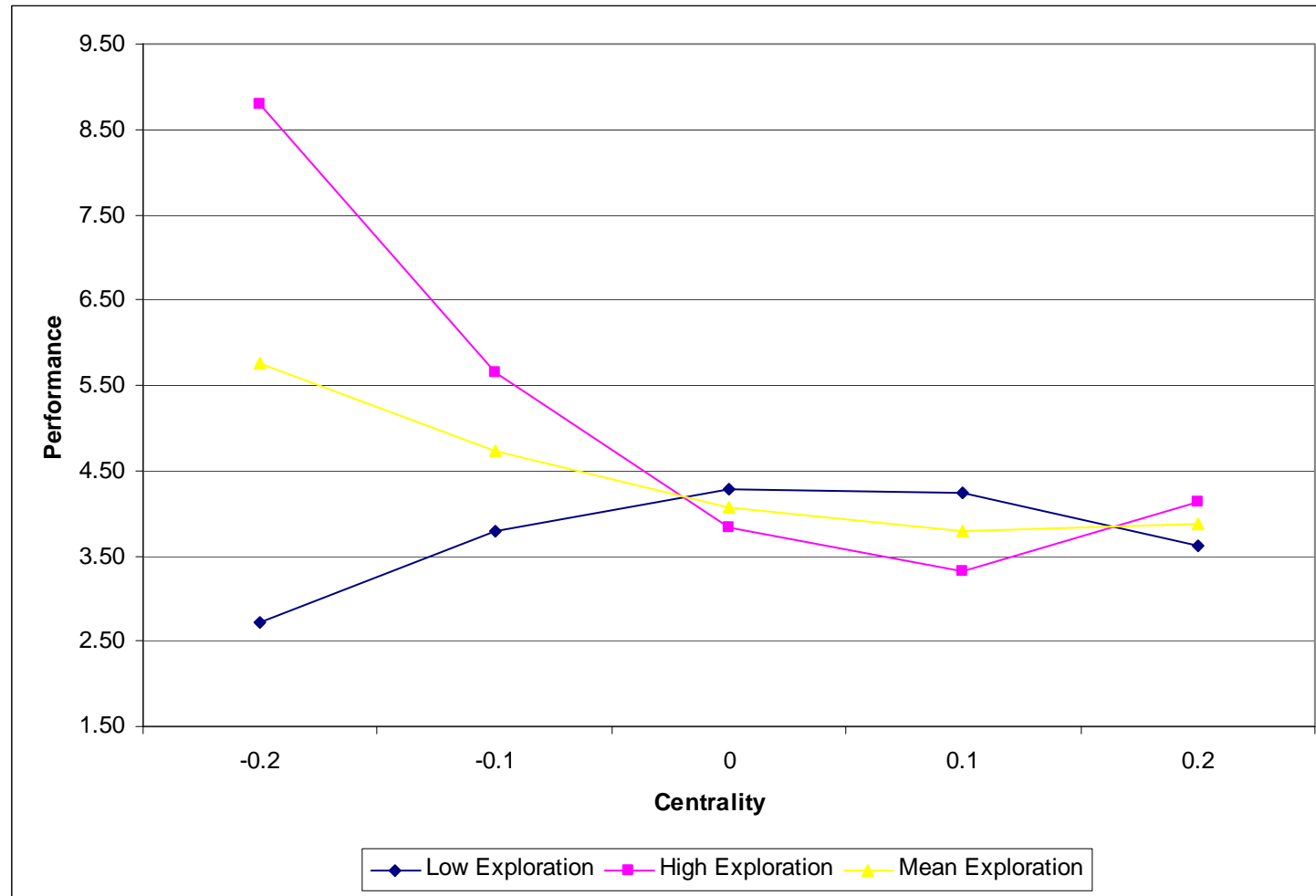


Figure 2: The relationship between shared vision and initiative performance at low and high degrees of exploration

