HOW RELATIONAL CAPITAL AND KNOWLEDGE COMBINATION CAPABILITY ENHANCE THE PERFORMANCE OF WORK UNITS IN A HIGH TECHNOLOGY INDUSTRY

ABRAHAM CARMELI1* and BENNY AZEROUAL 2
1Graduate School of Business Administration, Bar-Ilan University, Ramat Gan, Israel
2School of Political Science, University of Haifa, Haifa, Israel

The defense industry in Israel has long been considered a critical platform for the development of the high-technology sector. This study examines the importance of knowledge combination capability work units build through social relationships to enhance their performance. Specifically, we probe how both intraunit relational capital (within a unit) and interunit relational capital (across units) enable units to build knowledge combination capabilities and how such capabilities affect their performance. Data collected from senior managers in 122 knowledge units indicate that: (1) both intra- and interunit relational capital are positively related to knowledge combination capability; (2) knowledge combination capability is positively associated with enhanced unit performance; (3) knowledge combination capability fully mediates the relationship between interunit relational capital and unit performance; and (4) intraunit relational capital impacts both directly and indirectly (through knowledge combination capability) on unit performance. The findings suggest that interunit relational capital entails greater variation in knowledge stocks and thus may lead to more radical innovation than intra-relational capital that entails more similar knowledge bases and, thus, produces more incremental innovations. Copyright © 2009 Strategic Management Society.

INTRODUCTION

Knowledge is a strategically important intangible asset that can enable and enhance a firm’s competitiveness (Grant, 1996b). With the advent of the knowledge era, intangible knowledge assets have become increasingly crucial. Both the resource-based view (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984) and its derivative, the knowledge-based view (Grant, 1996b; Kogut and Zander, 1992; Nonaka and Takeuchi, 1995; Spender, 1996), underscore the primacy of intangible assets as a source of value creation and appropriation. Unlike tangible assets, intangible assets are less flexible (Chatterjee and Wernerfelt, 1991), hard to accumulate, and not easily transferred. They serve multiple uses simultaneously, act simultaneously as inputs and outputs of corporate activities (Itami and Roehl, 1987), and are not consumed when in use (Collis and Montgomery, 1998). As Hitt et al., (2001: 14) put it, ‘intangible resources are more likely than tangible resources to produce a competitive advantage.’

Given the strategic role of knowledge assets, researchers have directed efforts to better understand the ways organizations manage existing knowledge, both implicit and explicit. Knowledge management
scholars tend to conceptualize organizational knowledge as static—as a source of current viewpoints on how existing resources should be configured and exploited to generate a competitive advantage and enhance firm performance (Smith, Collins, and Clark, 2005). Specifically, specialized knowledge cannot, on its own, be a source for sustained innovation and competitive advantage because such specialized knowledge resides in individuals. Individuals are transferable between firms and thus specialized knowledge is more likely to be appropriated by individuals than by firms (Grant, 1996a). In addition, organizational knowledge building occurs by combining employees’ distinct knowledge skills and a set of particular organizational activities because ‘it is this combination that enables innovation’ (Leonard-Barton, 1995: 8). Furthermore, firms need to combine flexibility and specialization (Cohendet et al., 1999). The capacity of firms to innovate is gauged by their ability to systematically exploit the effects produced by combinations of existing stocks of knowledge (Soete and Weel, 1999). Henderson and Clark (1990) pointed out that a key to a firm’s ability to innovate lies in the capability of its managers to combine knowledge within the firm. Hence, knowledge combination has long been considered a vital combinative capability for continuous innovation in technology-intensive industries (Schumpeter, 1934).

Nevertheless, there is a need to further explore how new knowledge is discovered and combined in organizations. This process is an important anchor for a firm’s position (Argote, 1999; Argote and Ingram, 2000), since maintaining a market edge depends substantially on a firm’s ability to innovate, defend intangible assets (e.g., knowledge), and use these assets (Teece, 2000). Nonaka and Takeuchi (1995: 50) noted that ‘understanding how organizations create new products . . . is important. A more fundamental need is to understand how organizations create new knowledge that makes such creations possible.’

Research efforts have been directed toward a better understanding of how and why some units are better able to combine and exploit knowledge bases residing either within (or in other parts of) an organization (Hansen, 2002). Realizing that the full use of the knowledge residing in different parts of organizations is crucial for developing a competitive edge (Argote, 1999; Grant, 1996b), researchers have begun to examine the importance of ties for discovering and transferring knowledge. However, this line of research has mainly focused on the strength of these ties and has shown the importance of both strong and weak ties for effective knowledge management (e.g., Hansen, 1999; Levin and Cross, 2004; Szulanski, 1996; Uzzi, 1997). Despite this considerable body of research on ties and knowledge exchange, little is known about the ways relational ties cultivate and build knowledge combination capability. Specifically, past research has tended to concentrate on the closeness and frequencies of ties, but has relatively overlooked the need to clarify substantive relational ties (Levin and Cross, 2004). While much research has studied networks of structural ties that range from weak to strong and are determined by the amount of time, emotional intensity, intimacy, and reciprocity actors within a network develop (cf. Burt, 1992; Granovetter, 1973), only a handful of studies have documented the importance of relational ties that manifest the quality of relationships between parties. Furthermore, studies of social capital have mainly focused on ties between either parties within a particular organization (Hansen, 2002) or organizations and businesses (Lane and Lubatkin, 1998; Yli-Renko, Autio, and Sapienza, 2001), neglecting the need to investigate how relational ties within and between work units in a particular organization can facilitate effective knowledge management. Furthermore, studies that have examined interunit ties (such as knowledge sharing) in a particular company have taken a knowledge network approach and have yet to gain a complete picture of the importance of substantive relational ties. Finally, and most importantly, to the best of our knowledge, no study has examined relational ties and knowledge combination capability jointly.

This study addresses the above issues and attempts to contribute to the literature on relational ties and knowledge management. We go beyond weak or strong ties that characterize studies of social capital and focus on relational capital within and between units in a particular organization, thus shedding light on how and why quality relational ties are important for effective knowledge management. As Hitt et al. (2006) noted, relational capital refers to the joint benefits embedded in the relationship between two or more parties that is highly important to those parties (Dyer and Singh, 1998); ties that include the knowledge and understanding of the other party provide shared meaning, commitment, and norms of reciprocity (Granovetter, 2005; Zucker and Darby, 2005). Relational capital—defined here as quality
relationships formed and maintained between people and entailing shared meaning, commitment, and norms of reciprocity within a particular work unit and between people of one unit with people in other units in an organization—has been shown to play a role in both explaining level of internationalization (Hitt et al., 2006) and effective knowledge management (Uzzi, 1997). We expand this line of research by highlighting the importance of relational capital for building knowledge combination capability in a high technology setting. Specifically, we address the question of how intra- and interunit relationships help people in these units absorb and combine information that has been exchanged. In so doing, we present a first examination of relational capital and knowledge combination capability. Finally, our study aims to contribute to the literature by examining the mediating role of knowledge combination capability in the link between relational capital and unit performance. We tested our model on work units in organizations that engage in the development of innovative and advanced technological products in the defense industry in Israel, which has long been considered a critical platform for the development of the high technology sector. In sum, we examine the relational underpinnings of the knowledge combination capability and the performance of work units in a knowledge-intensive setting where organizations must develop and apply cutting-edge technological know-how capacities.

THEORETICAL BACKGROUND AND HYPOTHESES

Knowledge combination capabilities

New knowledge creation involves an incessant, non-recursive, iterative process of assessment, search, interpretation, and integration. This goes beyond merely generating innovative ideas or trying new ways of doing things in that it requires individuals to: (1) assess existing knowledge and identify specific new knowledge needs; (2) form a plan for generating this requisite new knowledge; (3) consolidate new knowledge with past knowledge and routines; and (4) determine how this new knowledge should inform subsequent searches for new knowledge (Lee et al., 2003).

The capacity to develop and introduce innovative products to the marketplace resides in the ability to exchange and combine knowledge (Collins and Smith, 2006; Nahapiet and Ghoshal, 1998). Thus, the key to effective knowledge management is to facilitate knowledge combination, thus enabling organizational systems to build and sustain a competitive position in their respective industries. Consistent with Smith et al. (2005), combination capability refers to individuals’ ability to absorb and combine information that has been exchanged. Combination capability is akin to absorptive capacity, which is defined as a firm’s ability to identify, assimilate, and exploit knowledge from external sources (Cohen and Levinthal, 1990). However, knowledge combination capability mainly concerns the ability of individuals to absorb and integrate exchanged information. In what follows, we discuss the relational underpinnings of knowledge combination capability.

Relational capital and knowledge combination capability

Studies on social capital focus on either structural ties that manifest closeness and frequent interactions or relational ties that manifest such relational aspects as trust and trustworthiness (Levin and Cross, 2004). We first discuss the conceptualization of social capital and then turn to a related construct known as relational capital.

Over the years, there have been various attempts to define social capital (Adler and Kwon, 2002). These definitions can be broadly categorized into two groups: external social capital and internal social capital. External social capital generally focuses on the direct and indirect relationships an actor or a participant establishes and maintains with other actors or participants in a social network. An illustrative definition of this category is ‘friends, colleagues, and more general contacts through whom you receive opportunities to use your financial and human capital’ (Burt, 1992: 9). Internal social capital focuses on the relationships among actors (i.e., individuals or groups) within a social collectivity (organization, community, nation, and so forth). Fukuyama’s (1995: 10) definition illustrates this view as ‘the ability of people to work together for common purposes in groups and organizations.’ Some theorists define social capital as integrating both the internal (collectivity) and the external (network) elements. An illustrative example of this combined view can be found in Nahapiet and Ghoshal (1998: 243), who define social capital as ‘the sum of the actual and potential resources
embedded within, available through, and derived from the network of relationships possessed by an individual or social unit.

Social capital has attracted much research attention in the last 20 or so years in such areas as organization and management science, strategic management, and sociology. The notion of social capital serves as a contextual complement to human capital in explaining why some people do better than others. While human capital explains inequality by arguing that some people do better than others because they are more intelligent, more skilled, more articulate, or more attractive, social capital explains that people do better because they are somehow better connected with other people (Burt, 2005). The literature on social capital has put forward several mechanisms to account for its creation and benefits (Cappelli, 2004). Blyler and Coff (2003) classify research into two orientations: the first focuses on the role of social capital in generating rent (Leana and Van Buren, 1999; Nahapiet and Ghoshal, 1998), and the second—mainly pursued by sociologists—typically views social capital in terms of benefits that actors obtain through their social ties (Bourdieu, 1986; Burt, 1992; Coleman, 1990; Portes, 1998).

In addition, studies on social capital stress closeness and interaction frequency of ties between two parties. However, a relatively new line of research focuses on relational ties that reflect high-quality interactions between parties. Our study concentrates on relational capital because it is the building block of learning, as well as knowledge exchange and combination in high technology work settings. Specifically, we focus on two forms of relational capital. The first form, intraunit relational capital, is defined as the extent to which people in a particular work unit form high-quality relationships resulting in the exchange of knowledge and learning from each other. The second form, termed interunit relational capital, refers to the quality of the relationships people from one unit form with people in other units in a particular organization.

We posit that both intraunit relational capital and interunit relational capital are keys to the development of a knowledge combination capability in organizational work units that develop innovative technological products. This is because critical assets, such as knowledge exchange and combination inhere to and flow through networks of relationships (Baker, 2000). Specifically, we theorize that through the connections people form with each other in a unit and with others outside the unit, they have access to specialized and important information. First, this enables them to assess current knowledge and identify those specific types of knowledge that are needed for development. Second, through these relationships, they may find new and improved ways to combine knowledge by learning from others’ experiences and becoming more familiar with routines in the unit and outside it. Third, through a web of relationships, people make sense of reality and may better understand the significance that emerges from the exchange and combination processes.

Quality relationships are likely to foster experimentation and learning from failures as well as help-seeking behaviors (Carmeli, Brueller, and Dutton, 2009; Carmeli and Gittell, forthcoming; Lee et al., 2003), because relational capital enables people to seek feedback and help without fearing criticism or embarrassment (Edmondson, 1999). Experimentation is about a trial and error process in which each trial and associated failure help the individual acquire new insights into a problem (Clark and Fujimoto, 1989; Lee et al., 2003). For example, Thomke (1998) reported that the ability to run more diverse experiments and learn more effectively than with alternative methods can lead to higher quality R&D output. Research has shown that when the nature of people’s relationships enables them to feel psychologically safe to engage in trial and error, this facilitates learning and, by implication, the acquisition of new knowledge (Carmeli, 2007; Carmeli et al., 2009; Edmondson, 1996, 1999). Relational capital facilitates help-seeking behaviors that enable people to seek out expertise and knowledge from others to generate new insights on how to solve a problem (Lee, 1997; Lee et al., 2003; Leonard-Barton, 1995). Von Krogh (1998: 136) said ‘effective knowledge creation puts particular demands on the way people relate to each other in a company . . . Once good relations have been established, the organization’s members will then have the confidence and freedom to satisfy their needs and aspirations to explore unknown territories.’ Thus, quality relational ties help people better understand knowledge bases which reside within and across units in a particular organization, thus facilitating the absorption and integration of existing, as well as new, knowledge.

Relational capital enables members to use their interactions with others to: (1) more fully assess current knowledge and pinpoint new issues that need further attention; (2) exploit the cognitive arsenal that members muster in the network so better plans can be made; (3) find ways of more effectively
consolidating new knowledge with past routines; and (4) better define the ways in which this new knowledge can lead to new endeavors for the uptake, implementation, and combination of the next generation of knowledge.

We posit that both intraunit and interunit relational capital are important mechanisms for cultivating knowledge combination. Relational ties between people within and across units enable the flow of useful information as to how things are done as well as the way parties integrate and combine both existing and new knowledge bases. High-quality work relationships enable people to seek knowledge and expertise from others without fearing that their status or image will be damaged. Through these quality relational ties, people are able to comprehend new knowledge, but also learn efficient and effective ways to combine and integrate knowledge to achieve desired ends. Hence, the following hypothesis is suggested:

**Hypothesis 1. There is a positive connection between relational capital and knowledge combination capability.**

**Knowledge combination capabilities and work unit performance**

The resource-based view argues that gaining and preserving superiority in a competitive market depends on valuable, rare, and imperfectly imitable assets that a firm has developed, acquired, and deployed in the competition arena (Amit and Schoemaker, 1993; Barney, 1991; Wernerfelt, 1984). Research indicates that organizational assets are ‘the substance of strategy, the very essence of sustainable competitive advantage’ (Collis and Montgomery, 1998: 27), and that intangibles play a significant role in maintaining a competitive edge and in value-added creation (Chatterjee and Wernerfelt, 1991; Collis and Montgomery, 1998; Hitt et al., 2001; Itami and Roehl, 1987; Teece, 2000). The resource-based view derivative—the knowledge-based view—posits that knowledge is a strategic capability that enables a firm to generate, deliver, and capture more value than focal rivals.

In addition to these theories, research on innovation has shown that a new knowledge capability has a positive effect on such outcomes as the development of new products and services. The literature on innovation indicates that the latter is based on the kindling of creative insights and new knowledge (Dougherty, Munir, and Subramaniam, 2002). Nonaka and Takeuchi (1995) suggest that thinking and addressing one issue or image by thinking representatively of another issue or image increases understanding that can enable the production of new models. Smith et al. (2005) found that a firm’s knowledge capability impacted the level of new products and services it offered. In a more recent study, Collins and Smith (2006) showed that knowledge exchange and combination predicted a firm’s revenue from new products and services and one-year sales growth. In addition, research on absorptive capacity has pointed to the importance of identifying, assimilating, and exploiting knowledge for enhancing innovation and effectiveness of joint ventures and business units (Tsai, 2001; Lane, Salk, and Lyles, 2001). Finally, research has documented the importance of combinative capabilities (Kogut and Zander, 1992) in enabling units to integrate existing and new knowledge (Eisenhardt and Martin, 2000; Jansen, Van Den Bosch, and Volberda, 2005; Kogut and Zander, 1992; Van Den Bosch, Volberda, and De Boer, 1999). We argue that relational capital is crucial for building combinative capabilities that are idiosyncratic and path dependent but at the same time exhibit common features (Eisenhardt and Martin, 2000). This is because high-quality relationships cultivate a context in which people engage in ways to integrate knowledge that are specific to the type of ties that have been formed. This specificity, through quality interactions, lays down common patterns and shared routines of doing things, thus developing combinative capabilities, such as the ability to mesh and integrate current and new bases of knowledge.

Resource-based and knowledge-based theories and research pointed to the significance of strategic capabilities (Eisenhardt and Martin, 2000) that are intangible in nature (Carmeli and Tishler, 2004a, 2004b), such as distinctive HR capital (Carmeli and Schaubroeck, 2005; Hitt et al., 2001) and in particular knowledge combinative capabilities (Jansen et al., 2005; Kogut and Zander, 1992). Consistent with this view, we posit that knowledge combination capabilities built up in work units are critical for enhanced performance. Knowledge combination capability enables them to better cope with challenges, neutralize threats, and seize opportunities. Instead of competing against each other, members of different units are willing to collaborate in a way that enables members to access critical information and find better means of transferring and combining...
knowledge, thus contributing to creative solutions and enhanced effectiveness (Collins and Smith, 2006; Szulanski, 1996). Thus, we suggest the following hypothesis:

Hypothesis 2. There is a positive relationship between knowledge combination capability and unit performance.

The mediating role of knowledge combination capability

We also posit a mediation model in which relational capital builds knowledge combination capability that, in turn, results in enhanced unit performance. This is because relational capital manifests high-quality ties through which members can access important information and the expertise of others in an organizational system. This also facilitates a better understanding of how knowledge should be integrated into existing routines. This capability of combining current and new knowledge bases is likely to improve the performance of the unit because it enables better coping mechanisms that the unit can deploy to create improved alignment with its environment. Collins and Smith (2006) provide empirical support for this theoretical reasoning. Their findings show that knowledge exchange and combination fully mediated the effects of social climates (climate for trust, cooperation, and shared codes and language) on a firm’s revenue from new products and services. In addition, they found that knowledge exchange and combination fully mediated the relationship between cooperation, shared codes and language and one-year sales growth, and that there was a direct and indirect effect (through knowledge exchange and combination) of climate of trust on one-year sales growth. Thus, we suggest the following hypothesis:

Hypothesis 3. The link between relational capital and unit performance will be mediated by knowledge combination capability.

METHOD

Research setting

This study was conducted in work units in the defense industry in Israel. Israel’s defense industry is one of the most influential sectors in the country’s economy (Kagan, Setter, and Tishler, 2008). About 70 percent of Israeli defense industry sales are exports (Shefi and Tishler, 2005) and the market share of the Israeli defense industry’s exports in terms of total Israeli exports in 2002 was about 7.5 percent, compared to about 1.5 percent in the U.S. and 2 percent in the U.K. (Kagan, Tishler, and Weiss, 2005). Israel has long been striving to develop and maintain its superiority in technological know-how. Thus, it has invested heavily in the development of an independent defense R&D capability that serves as a very productive incubator for the development of the high-tech sector (Ben-Israel, 2001; Kagan et al., 2005). The industry is also characterized by several Israeli firms that compete fiercely among themselves for the same international markets by generating and proposing advanced technological products (Shefi and Tishler, 2005). Despite a decline in arms sales of slightly more than one-third in real terms from 1988 to 1997, the world defense market has turned into a buyer’s market characterized by stiff competition among producers (Kagan et al., 2008). Estimates suggest that disproportionate to its size, the defense field employs about half the scientists and engineers working in the industrial sector (Lifshitz, 2003; Peled, 2001). Although the share of Israel’s defense budget in the GDP decreased from 14 percent in 1982 to 6 percent in 2002 (due to the relatively fast growth of the country’s GDP) (Blech and Davidson, 2002), this budget (in constant prices) has remained the same over the last 20 years, except for a temporary plunge due to the economic rehabilitation program of 1985–86 (Kagan et al., 2005). Finally, according to the Dun and Bradstreet Israel index, the four organizations in our research sample are listed among the 19 largest industrial companies by sales volume in the industrial sector, which generates about a quarter of Israel’s GDP. As such, the defense industry and the knowledge work units that are responsible for generating cutting-edge technological know-how constitute an important and suitable research setting for investigating our research model and hypotheses.

Sample and data collection

This study was conducted on 122 knowledge work units in Israel’s defense industry. A knowledge work unit was defined as a unit that consists of at least three members and has a common goal and identity. It is recognized by the organization as an autonomous unit whose contribution to the system as a
whole is under constant evaluation. Finally, these organizational units engage in the development of advanced technological products. Our choice to concentrate on the defense industry was also based on the need, when analyzing various industries, to control for context and other exogenous factors associated with the respective markets.

Data collection took place in two phases. We first made presentations to senior managers of the companies, including CEOs, SBU and division heads, and directors of human resource management, as well as several managers of work units. The purpose of these meetings was twofold to provide a general explanation about the research project and procedures and to motivate them to participate in the study. In addition, we administered the pilot survey to each person we met and asked her/him to complete it and provide us with comments regarding the clarity and suitability of the questionnaire for the potential sample units. Overall, we received 14 surveys with minor comments, especially regarding its length of about 20 minutes. This process took two months to complete.

In the second phase, we finalized the structured questionnaire. We drew on the literature and used validated and established measures to examine our research variables. In accordance with common wisdom for wording and translation (Brislin, 1986), the measures were translated into Hebrew and then retranslated back into English by a professional copy editor. Further, since we were interested in evaluating relational capital, knowledge combination capabilities, and performance at the unit level (considering the unit as the level of analysis), we solicited responses from the unit manager and the deputy manager (these managers form the management team of these work units). We sent the surveys via mail with a self-addresses stamped enveloped and a cover letter in which we promised full confidentiality. To further encourage the participants to fill out the survey, we made friendly reminder telephone calls to participants who did not return the survey.

Overall, we received usable data from 244 respondents in 122 units, yielding a response rate of 76.7 percent. The average unit size was 19.4 (s.d. 25.8) employees. The average age of the individual respondents was 47.5 (s.d. 8.3).

Measures

In this study, the unit was considered to be the level of analysis. Hence, all measures were specified at the unit level. Respondents were asked to evaluate the relational capital, knowledge combination capabilities, and performance of the unit.

Unit performance. Following previous research (Gemünden and Lechler, 1997) as well as interviews we conducted with senior and unit managers in the sampled organizations, we used an eight-item scale to assess knowledge unit performance. The items were:

(1) ‘The unit performs its tasks well;’ (2) ‘The unit completes its tasks on time;’ (3) ‘The unit executes its tasks in compliance with organizational norms and procedures;’ (4) ‘The unit completes its projects in a low-cost manner and within the budget constraints;’ (5) ‘There is a high level of satisfaction with the way the unit functions;’ (6) ‘Compared to other units, the contribution of this unit to the organization is high;’ (7) ‘There is a high degree of employee satisfaction in this unit;’ and (8) ‘Overall, the performance of the unit is good.’ All responses were on five-point scales ranging from 1 = ‘not at all’ to 5 = ‘to a large extent.’ All items were factor analyzed. The results of this factor analytic procedure yielded a one-factor solution which explained 52.5 percent of the variance. It had factor loadings ranging from 0.59 to 0.88 with an eigenvalue of 4.20. The Cronbach’s alpha for this measure was 0.88.

Knowledge combination capability. As part of a scale developed and validated to assess knowledge creation capability, Smith et al. (2005) provided five items constructed to measure knowledge combination capability, which refers to the extent to which unit members are able to absorb and combine information that has been exchanged. We adapted these items to the unit level. The items pertaining to combination were: (1) ‘Employees in this unit are proficient at combining and exchanging ideas to solve problems or create opportunities;’ (2) ‘Employees in this unit do not do a good job of sharing their ideas to come up with new ideas, products, or services’ (reverse coded); (3) ‘Employees here are capable of sharing their expertise to bring new projects or initiatives to fruition;’ (4) ‘The employees in this company have learned to effectively pool their ideas and knowledge;’ and (5) ‘It is rare for our employees to exchange and combine ideas to find solutions to problems’ (reverse coded). All responses were on five-point scales ranging from 1 = ‘not at all’ to 5 = ‘to a large extent.’ As reported below, all items together with those measuring relational capital were subjected to a factor analysis.

Relational capital entails shared meaning, commitment, and norms of reciprocity that emerge...
through ties that enable understanding and knowledge of other actors (Hitt et al., 2006). We assessed the interactions among members within and between units so as to capture the sense of relationship commitment, norms of exchanges, and reciprocity. Like previous studies (e.g., Youndt, Subramaniam, and Snell, 2004; Reed, Lubatkin, and Srinivasan, 2006), we followed Adler and Kwon’s (2002) work to conceptualize relational capital and measured both intra- and interunit ties. Thus, to measure intraunit relational capital and capture relationships among members, we adapted seven items from Reed et al. (2006), four of which were originally used by Youndt et al. (2004). The items measuring intraunit relational capital were: to what extent do the members in the unit (1) ‘. . . share information and learn from one another?’; (2) ‘. . . interact and exchange ideas with each other in the unit?’; (3) ‘. . . apply knowledge from one area of the unit to problems and opportunities that arise in another?’; (4) ‘. . . have the capacity to partner with each other to develop business solutions?’ (items which were originally used by Youndt et al., 2004); (5) ‘. . . share information about competitors with each other?;’ (6) ‘. . . share information about customers with each other?’; and (7) ‘. . . share resources with each other in the unit?’ (items which were originally used by Han, Kim, and Srivastiva, 1998).

To capture interunit relational capital that refers, in our study, to the ties between one unit and other units in the organization, we constructed seven items as follows: to what extent do the members in the unit (1) ‘. . . conduct meetings with members from other units to exchange ideas?’; (2) ‘. . . develop relationships with members from other units that enable them to exchange ideas;’ (3) ‘. . . share information with members of other units;’ (4) ‘. . . establish good reciprocal relationships with members of other units;’ (5) ‘. . . have quality collaboration with members of other units;’ (6) ‘. . . experience quality interactions with members of other units;’ and (7) ‘. . . enjoy open relationships with members of other units?’ All responses were on five-point scales ranging from 1 = ‘not at all’ to 5 = ‘to a large extent.’

All items measuring intraunit relational capital, interunit relational capital, and knowledge combination capability were subjected to a factor analysis. This analysis produced three factors that together explained 68.1 percent of the overall item variance. The first factor, comprised of the intraunit relational capital items (eigenvalue = 4.81), had factor loadings ranging from 0.70 to 0.82. The second factor, comprised of the interunit relational capital items (eigenvalue = 4.58), had factor loadings ranging from 0.62 to 0.83. The third factor, comprised of the knowledge combination capability items (eigenvalue = 2.86), had factor loadings ranging from 0.61 to 0.87. The Cronbach’s alphas for these measures were 0.93, 0.90, and 0.85 respectively.

Control variables. We controlled for unit size and perceived environmental uncertainty. Size was controlled for because it may account for variation in unit performance and was measured by number of employees. Because perceptions of the environment influence the way units behave, we assessed perceived environmental uncertainty by adapting three items on the scale developed and used by Miller and Droge (1986). The items were: (1) ‘Actions of other units are quite easy to predict;’ (2) ‘Our unit rarely has to change its technology and operational practices to keep up with the market;’ and (3) ‘Demand and customer preferences are quite easy to forecast.’ They were assessed on a five-point scale ranging from 1 = ‘strongly disagree’ to 5 = ‘strongly agree.’ The Cronbach alpha for this scale was 0.65, similar to the reliability reported in other studies (Carmeli and Tishler, 2004a).

Level of analysis

Relying on multiple informants has been shown to be more reliable and less subject to superficiality than a single respondent in strategy research (Bowman and Ambrosini, 1997). Having multiple informants requires an assessment of the consistency of responses within a unit. We performed three tests to determine whether the data should be aggregated to the unit level (see Table 1). First, a one-way analysis of variance was carried out. Results showed that there was greater variability in the ratings between units than within units (p < 0.01). Second, we calculated intraclass correlations (ICCs) to assess unit member agreement. ICC(1) indicates the extent of agreement among ratings from members of the same unit. ICC(2) indicates whether units can be differentiated based on the variables of interest. Except for perceived environmental uncertainty (for ICC(2)), the ICC(1) and ICC(2) values for all variables were between 0.30 and 0.70. Finally, we also used an inter-rater reliability coefficient developed by James, Demaree, and Wolf (1993) to examine the intragroup reliability (rwg) of responses. The average intraunit reliabilities of the research measures were
RESULTS

Table 2 presents the means, standard deviations, and Pearson’s correlations between research variables.

Table 1. Results of ANOVA, R_{wgj}, and ICC of the research variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>ICC(1)</th>
<th>ICC(2)</th>
<th>95% confidence interval</th>
<th>F-test with true value 0</th>
<th>R_{wgj}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower bound</td>
<td>Upper bound</td>
<td>Value</td>
<td>df1</td>
<td>df2</td>
</tr>
<tr>
<td>Environmental uncertainty</td>
<td>0.38</td>
<td>0.64</td>
<td>0.52</td>
<td>0.74</td>
<td>2.89</td>
</tr>
<tr>
<td>Intraunit relational capital</td>
<td>0.62</td>
<td>0.94</td>
<td>0.92</td>
<td>0.96</td>
<td>17.84</td>
</tr>
<tr>
<td>Interunit relational capital</td>
<td>0.44</td>
<td>0.85</td>
<td>0.78</td>
<td>0.90</td>
<td>8.46</td>
</tr>
<tr>
<td>Knowledge combination capability</td>
<td>0.41</td>
<td>0.89</td>
<td>0.86</td>
<td>0.92</td>
<td>10.94</td>
</tr>
<tr>
<td>Unit performance</td>
<td>0.32</td>
<td>0.79</td>
<td>0.70</td>
<td>0.85</td>
<td>5.68</td>
</tr>
</tbody>
</table>

N = 122, Two-tailed test.
*p < 0.05, **p < 0.01, ***p < 0.001.

Table 2. Means, standard deviations, and Pearson’s correlations between research variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unit size</td>
<td>19.43</td>
<td>25.84</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Environmental uncertainty</td>
<td>3.31</td>
<td>0.56</td>
<td>0.06</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Intraunit relational capital</td>
<td>3.43</td>
<td>0.53</td>
<td>−0.06</td>
<td>−0.01</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Interunit relational capital</td>
<td>3.13</td>
<td>0.56</td>
<td>−0.09</td>
<td>−0.02</td>
<td>0.47***</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Knowledge combination capability</td>
<td>3.30</td>
<td>0.45</td>
<td>−0.03</td>
<td>−0.08</td>
<td>0.49***</td>
<td>0.36***</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>6. Unit performance</td>
<td>3.73</td>
<td>0.40</td>
<td>−0.04</td>
<td>0.00</td>
<td>0.46***</td>
<td>0.32***</td>
<td>0.46***</td>
<td>—</td>
</tr>
</tbody>
</table>

all above 0.80. These values exceed conventional standards for aggregating individual questionnaire responses about team-level analysis in field research (see Bliese, 2000).

To test the hypotheses, we followed the guidelines for testing mediation as outlined by Baron and Kenny (1986) and more recently modified and stipulated in Kenny, Kashy, and Bolger (1998). To establish a mediation model, three basic conditions should be met: (1) establishing a statistically significant relationship between the dependent variables and the independent variables; (2) establishing a statistically significant relationship between the mediator and independent variables; and (3) showing that the statistically significant relationship between the dependent variables and the independent variables becomes nonsignificant when the mediator is specified in the model. According to Kenny et al. (1998), a variable (M) mediates the relationship between an antecedent variable (X) and an outcome variable (Y) if: (1) X is significantly related to Y; (2) X is significantly related to M; (3) after X is controlled for, M remains significantly related to Y; and (4) after M is controlled for, the X-Y relationship is zero. Kenny et al. (1998: 260) described these criteria as ‘the essential steps in establishing mediation.’ The first step ‘is not required, but a path from the initial variable to the outcome is implied if [the two middle steps] are met’ (Kenny et al., 1998: 260). Furthermore, the last step is necessary only to show a complete mediation effect. Accordingly, we tested our model by evaluating whether these steps had been met.

To test full mediation, we performed various regression equation analyses which are shown in Table 3 and illustrated in Figure 1. Although only...
Hypotheses 3a and 3b concerned mediation, each of the hypotheses was evaluated using the procedures for testing mediation outlined by Baron and Kenny (1986) and Kenny et al. (1998). Model 1 in Table 3 presents the results of the first regression, in which unit performance was regressed on both intraunit relational capital and interunit relational capital and the control variables. The results of Model 1 showed a statistically significant relationship between intraunit relational capital and unit performance ($\beta = 0.40$, $p < 0.001$), and a statistically nonsignificant relationship between interunit relational capital and unit performance ($\beta = 0.13$, $p =$ n.s.). Model 2 in Table 3 presents the results of the second regression, in which knowledge combination was regressed on both intraunit relational capital and interunit relational capital and the control variables. The results of Model 2 showed that both intraunit relational capital and interunit relational capital were significantly related to knowledge combination capability ($\beta = 0.42$, $p < 0.001$; $\beta = 0.16$, $p < 0.05$, respectively), in support of Hypothesis 1.
Model 3 in Table 3 tests Hypothesis 2, which posited a positive relationship between knowledge combination capability and unit performance. The results of the third regression, in which unit performance was regressed on knowledge combination capability and the control variables, supports the hypothesis and indicates that the relationship between knowledge combination capability and unit performance is statistically significant ($\beta = 0.46$, $p < 0.001$).

Model 4, which regressed unit performance on the independent variables (intraunit relational capital and interunit relational capital) and the mediator knowledge combination as well as the control variables, partially supports Hypothesis 3. The effect of the mediator, knowledge combination capability on unit performance remained significant, ($\beta = 0.46$, $p < 0.001$ versus $\beta = 0.29$, $p < 0.01$), but: (1) the effect of interunit relational capital on unit performance remained nonsignificant ($\beta = 0.09$, $p = n.s.$ supporting full mediation of interunit relational capital $\rightarrow$ knowledge combination capability $\rightarrow$ unit performance); and (2) the effect of intraunit relational capital on unit performance remained significant ($\beta = 0.40$, $p < 0.001$ versus $\beta = 0.28$, $p < 0.01$), indicating partial mediation, namely a direct and indirect link (through knowledge combination capability) between intraunit relational capital and unit performance. Figure 1 presents the results of the mediation model.

**Case study assessment**

We conducted an in-depth qualitative analysis in order to determine whether there were alternative means of interpreting the findings above and further validating them. Eighteen months after we collected the survey data, we contacted the plants’ managers and asked for permission to conduct open interviews with unit members to further study how relational ties among members enable knowledge combination and enhance innovation and work outcomes. One plant’s CEO generously authorized us to freely interview members working on the production floor. Employees on the production floor of this plant were not engaged in such projects as computer missile intercept programs, where cutting-edge technologies are developed. However, even in a setting such as the production floor, there are extensive interactions among employees to address production issues in an innovative way through the integration of knowledge. As will be seen later, this setting provided ample examples of the way relationships formed by members enable knowledge combination and innovative outcomes.

We first located (with the help of a senior manager) cases where it was clear that an individual, talented as he/she may be, was not capable of solving an issue by herself/himself, but needed to interact with others. Next, we approached the individuals who had addressed the identified issue. Table 4 presents...
<table>
<thead>
<tr>
<th>Case</th>
<th>Number of members involved</th>
<th>Form of relational capital and knowledge combination</th>
<th>Issue</th>
<th>Identified options</th>
<th>Implications for knowledge combination and innovation</th>
</tr>
</thead>
</table>
| AA   | 3                          | Intraunit relational capital and knowledge combination | Defective components for a production machine were received from a supplier (abroad) | 1) return the component to the supplier  
2) manually identify the non-defective components  
3) use a *mechanical sensor* to locate the defective part while incorporating it into the machine and fixing it | Unit members cultivated their work relationships to integrate knowledge and come up with an innovative solution that had not previously been used in the unit |
| BB   | 4                          | Intraunit relational capital and knowledge combination | Failure of a machine to perform measurement tests during the assembly process | 1) purchase or build a new machine that will perform pretests  
2) design and incorporate a conveyor belt with two embedded test devices | Unit members worked together to generate a novel solution which was based on all the members’ knowledge of assembling, testing, and measurement |
| CC   | 5                          | Intraunit relational capital and knowledge combination | Five production activities carried out by five employees (requiring each employee to do a single activity 12 times) until the arrival of a critical piece of machinery | 1) reduce each employee’s work shift until the component arrives  
2) add a circuit part with a serial device | The innovative idea emerged through consultation between the project leader and four members. It required the design, production, and implementation of this device |
| CD   | 5                          | Intraunit and interunit relational capital and knowledge combination | Filling system of oil rollers. Replacing oil requires a four-hour halt in production in addition to five workers needed to carry out the procedure | Designing and setting up a pipeline enabling permanent lubrication of the bottom of the rollers | This solution was proposed by the operators who saved hundreds of hours on these types of rollers. The solution was implemented by a designer from another unit, a project leader and an operator |
four illustrative cases out of the six we located and investigated. We discuss these four cases below.

**Case A.** The issue the unit faced was as follows: defective technological components for a piece of the plant’s production equipment were received from a foreign supplier. An operator observed a problem with a supplier’s products. He notified his project leader and they both invited an electrical engineer to help them decide how to solve this issue. They came up with three options: (1) to return the component to the supplier—the implication was a huge delay in production and product delivery; (2) to manually identify the nondefective components—this solution was costly and time consuming; or (3) use a mechanical sensor to locate the defective part while incorporating the piece of equipment into the machine and fixing it—this solution was economical and required a relatively short time frame. This case illustrates how unit members have cultivated their work relationships to integrate knowledge and come up with an innovative solution that had not previously been used in the unit.

**Case B.** The issue the unit faced was the failure of a machine to perform measurement tests during the assembly process. The mechanical operator who identified the problem called on three members—the project leader, a member who was an expert in testing and measurement, and a member who was a mechanical engineer with special expertise in the plant machines—to assist him. After a lengthy discussion, they narrowed the options down to two viable solutions: (1) purchase or build a new machine that would conduct pretests; or (2) incorporate a conveyor belt with two embedded test devices. The problem with the first option was that all the machines were designed and built over a long period of time with unique technological specifications corresponding to the plant. Purchasing a new machine that would run pretest measurements would be highly costly because of the time needed for the design and building of such a machine and also because costly working hours would be spent in manual pretest measurements in the meantime. The second option was chosen because it assured a full measurement test at any point in time, no additional working hours were required, and it was very economical compared to purchasing a new machine. Interestingly, the general idea emerged through a discussion between the machine operator and his project leader. Assessments were provided by the other two members. The solution was implemented using a work team of the project leader and two of the unit members.

**Case C.** The issue the unit faced was: carrying out five production activities by five employees (forcing each employee to perform a single activity 12 times) until a critical piece of machinery arrived. The plant employees were dissatisfied and complained that there must be a better way. The unit leader invited five individuals—the project leader, the electrical engineer, the designer, a mechanical operator, and a mechanical engineer—to address this issue. Two options were discussed: (1) reduce each employee’s work shift until the equipment was delivered; or (2) design and install a circuit part with a serial device that circumvented the problem. The latter innovative idea emerged through consultation, but it was primarily put forward by the project leader and the mechanical operator. However, feasibility was evaluated by the designer, electrical engineer, and mechanical engineer. Implementation was carried out by the designer, project leader, mechanical operator, mechanical engineer, and electrical engineer. By implementing this solution, the unit economized on the work hours of five employees and reduced production time and costs.

**Case D.** The unit had problems with its rollers. The filling system for the oil rollers was inefficient because replacing oil required a four-hour halt in production. During this time frame, five employees were needed to replace the oil. This not only reduced productivity, but caused the unit to lose valuable working hours, resulting in critical product delivery problems. The operators, who had extensive experience, discussed this issue and came up with a solution that would eliminate the problem. They suggested installing a new device that would continually lubricate the bottom of the rollers. The benefits were clear: only one person would be needed to carry out this procedure and the production line no longer needed to stop, leading to optimal use of work time. The implications were fewer defective products and on-time product delivery. This solution was proposed by the operators who approached a designer to assess the feasibility of the plan and ways it could be implemented. Following evaluation and approval, the solution was installed by the designer, project leader, and operator.

These cases further validate our model in which innovative solutions are generated through positive relational ties among members and knowledge integration. As we have noted, members used their relationships with each other to seek out, tap, and
combine knowledge to produce innovative solutions and enhance the performance of the unit as a whole. Interestingly, it was found that: (1) solutions arose from extensive interactions between members and an understanding of others’ expertise and skills; and (2) innovations were implemented in an integrated way, where several members worked together to turn the new ideas into functioning solutions.

DISCUSSION

In this study, we examined two research questions: (1) how intraunit relational capital and interunit relational capital facilitate the development of knowledge combination capability; and (2) how knowledge combination capability affects the performance of units that engage in the development of innovative and advanced technological solutions and products in the defense industry in Israel. Our findings suggest that relational capital is an important mechanism by which knowledge combination capability is developed and built, and that knowledge combination capability has a positive impact on unit performance in organizations that engage in the development and introduction of innovative products to the marketplace. In so doing, we make several potential contributions to research on innovation and knowledge management, relational capital, and work units in high technology settings.

Specifically, innovation occurs when a firm is ‘carrying out new combinations’ of knowledge (Schumpeter, 1934: 65). Our study further highlights the critical role of knowledge combination for work units in organizations that are engaged in the development of cutting-edge technological products where innovation is imperative. This is consistent with knowledge and innovation theories that suggest firms seeking to innovate must develop capabilities of combining knowledge (Henderson and Clark, 1990) because knowledge combination capabilities often reside in individuals and are appropriated by them (Grant, 1996a; Leonard-Barton, 1995). The capacity of firms to combine existing knowledge assets is what enables them to maintain continuous innovation (Soete and Weel, 1999; Almeida, Phene, and Grant, 2003).

Our study extends previous research on innovation and knowledge management and sheds light on the relational underpinnings of knowledge combination capabilities. In so doing, we address the call to investigate the intra-organizational mechanisms that firms need to establish to facilitate knowledge combination (Almeida, Grant, and Song, 1998). The findings indicate that both types of relational capital—intraunit (within units) and interunit (between units)—are facilitators of the development of knowledge creation capability. This suggests that when people form high-quality ties or relationships with each other within a unit and with others in other parts of the organization, the unit has greater access to specialized and important information. This, in turn, enables them to: (1) assess current knowledge and identify those specific types of knowledge that are needed to develop; (2) find new and improved ways to combine the exchanged knowledge by learning from the experience of others and becoming more familiar with combination routines in the unit and outside it; and (3) better understand the significance or value emerging from the exchange and combination processes. Relational ties enable people to engage in trial and error (Lee et al., 2003), which helps them acquire new insights into a problem (Clark and Fujimoto, 1989; Lee et al., 2003), thus enhancing the likelihood of addressing deficiencies and strengthening the effectiveness of the unit as a whole. In addition, networks of relationships facilitate help-seeking behaviors. These behaviors enable people to obtain critical information and expertise from others and enhance their understanding of the problem and capacities to solve it. The importance of relational ties was shown to be evident at Siemens. Here, engineers working on optoelectronic components noted that to be able to combine knowledge and innovate, there was a need to go beyond e-mails and file transfers to supplement them with frequent interactions—personal visits, telephone conversations, and videoconferences (Almeida et al., 2003). This new knowledge can be combined into existing routines to improve the overall performance of the system (Lee, 1997; Lee et al., 2003; Leonard-Barton, 1995). As such, relational capital explains why some knowledge units do better than their counterparts—they realize that knowledge resides in multiple parts of the organization.

Interestingly, we found that compared to interunit relational capital, intraunit relational capital had a greater impact on knowledge creation capability. This clearly has implications for understanding how knowledge units work. Our findings indicate that high-quality ties with other members of the unit serve as a facilitating platform for accessing, exchanging, and combining knowledge. This may be explained by social identity processes: members
may prefer to exchange knowledge with others in their own unit to a greater extent than with other parties. Unit members form perceptions that value their own expertise more than the expertise of other parties. In addition, when people form high-quality work relationships, they are more willing to access and share issues with each other when the issues require each party’s knowledge and expertise to come up with an innovative solution. As evident from our qualitative data, the vast majority of problems were solved through well-established work connections that enabled individuals to locate the expert persons on the issue. This is critical because when issues are firm specific, there is a need to base choices on knowledge that resides in individuals who have accumulated highly specific tacit knowledge. When quality relationships are formed between members, they are able to approach one another freely and attempt to integrate each person’s knowledge to achieve innovative outcomes. Teaching members to exchange and combine tacit knowledge is a key challenge for companies. Practices such as creativity/innovation seminars are important in overcoming issues of prestige, status, and even how to extract knowledge from people with different backgrounds. Thus, as evident in our study and for other companies (e.g., Siemens), building relational mechanisms are vital to enhancing members’ ability to combine knowledge and innovate (see also, Almeida et al., 2003). Furthermore, the link between interunit relational capital and knowledge combination may be more difficult to achieve, partly because of differences in the knowledge stocks. Work units often engage in specific and complex projects, which require a high level of specificity. However, when interunit relational capital is achieved, it is likely to lead to more radical innovations because of the diversity in the knowledge stocks that are realized. However, an intranunit knowledge combination is more likely to produce incremental innovations because members draw on and utilize a similar body of knowledge and often use the same language and work patterns to address problems in innovative ways.

We focused on the importance of relational ties manifesting quality relationships between parties, thus addressing research call to devote more effort to the relational dimensions of social capital (Levin and Cross, 2004). Furthermore, whereas studies of social capital have mainly focused on ties between parties within a particular organization (Hansen, 2002) or ties between organizations and businesses (Lane and Lubatkin, 1998; Yli-Renko et al., 2001), we inquired how relational ties within or between work units may facilitate effective knowledge management. Furthermore, our study provides a first examination of the link between relational capital and knowledge combination capability.

Our study extends research on relational capital and knowledge management. We presented a first attempt to reason and document how relational capital builds knowledge combination capability. We expanded research on relational ties and processes and outcomes—such as internationalization (Hitt et al., 2006)—and knowledge exchange and transfer (Collins and Smith, 2006; Levin and Cross, 2004; Uzzi, 1997). Our work sheds light on a burgeoning research issue—why some units are better at combining knowledge that resides both within units and in other parts of the organization (Hansen, 2002)—by showing that quality relationships between members of a particular unit, as well as quality ties people form with people in other units in an organization, play a key role.

Our study also extends research on the role of strategic capabilities in general and combinative capabilities in particular (Kogut and Zander, 1992). Specifically, our study points to the importance of combinative capabilities (Kogut and Zander, 1992) as well as specific capabilities to combine current and new knowledge (Eisenhardt and Martin, 2000; Jansen et al., 2005; Kogut and Zander, 1992; Van Den Bosch et al., 1999) by documenting the relational underpinnings of knowledge combination capability. Our study shows that relational capital is a key building block of idiosyncratic yet common combinative capabilities (Eisenhardt and Martin, 2000).

The findings of this study show that there is a positive link between knowledge combination capability and unit performance. It emphasizes the importance of the capability to integrate current and new knowledge bases in units that engage in the development of cutting-edge technological solutions and products. In so doing, we expand theory and provide empirical support for the role of knowledge combination in improving the performance of work units and, by extension, the organization as a whole.

Finally, our research contributes to a better understanding of small work units in organizations that develop advanced technologies and quality sophisticated products. This is a critical point because organizations have transformed the structure of work
in a way that makes work processes highly interdependent and entails the activity of relatively small units or groups. Understanding why some units work better than others has significant implications for the market position of the organization as a whole.

Limitation and future research directions

Our research is not without limitations. Our research setting is both a strength and a weakness. On the one hand, it provides a compelling context for examining our research questions, as it enables us to study knowledge units in the Israeli defense industry where organizations compete fiercely for technological supremacy. On the other hand, it is a unique setting that limits our ability to generalize our results. Nevertheless, consistent with Beard and Dess’ (1981) observation that even firms within an industry differ, all the sampled organizations are internationally oriented (about 70 percent of the products are sold outside Israel) and engage in knowledge management practices relatively similar to those used by other multinational defense companies. Future studies, however, may benefit from crosscultural samples, though this would entail some extensive research collaboration. Although we provide theoretical reasoning for our research model, given the survey-based nature of the data, the findings need to be interpreted with caution, especially with regard to causality. Although we used multiple respondents, which provides more reliable estimations (Bowman and Ambrosini, 1997), one cannot rule out the fact that the data potentially carry common method bias (CMB). We examined whether there was a difference between respondents in terms of age and tenure and found no significant differences ($p > 0.10$). In addition, following Podsakoff et al. (2003), we performed additional analyses where we used data gathered from the assistant manager of the units on the independent variables (intraunit relational capital and interunit relational capital) and data gathered from the unit managers on knowledge combination capability and unit performance. We followed the above mentioned mediation procedure outlined by Baron and Kenny (1986) and Kenny et al. (1998). The results indicate that the effect of the mediator, knowledge combination capability, on unit performance remained statistically significant, ($\beta = 0.53$, $p < 0.001$ versus $\beta = 0.28$, $p < 0.01$), but: (1) the effect of interunit relational capital on unit performance remained non-significant ($\beta = 0.12$, $p = \text{n.s.}$ supporting full mediation of interunit relational capital $\rightarrow$ knowledge combination capability $\rightarrow$ unit performance); and (2) the effect of intraunit relational capital on unit performance remained significant ($\beta = 0.45$, $p < 0.001$ versus $\beta = 0.30$, $p < 0.01$), indicating partial mediation, namely a direct and indirect link (through knowledge combination capability) between intraunit relational capital and unit performance. Thus, CMB associated with single source data may not be severe in our study.

Although our study contributes to the literature by examining two types of relational capital, future research might benefit from examining external ties with parties outside the organization. This would provide a more complete picture of how different levels or forms of relational capital facilitate the development of knowledge creation capability. Future work could explore the potential moderators between relational capital and knowledge combination capability, as well as between knowledge integration capability and unit performance. Additionally, it is important to note that future research may need to further refine the scale for knowledge combination to specifically assess knowledge integration and distinguish it from related constructs. It is important to note that the literature treats knowledge combination as an organizational construct, whereas our study refers to the construct at the work unit level. Clearly, we need further research to explore how knowledge combination at the unit and organization levels emerges and the way it affects their outcomes. Finally, it is also important to investigate outcomes not only at the unit or group levels, but also at the individual level. For example, we know little about how knowledge combination capability enhances the creative performance of individuals in the workplace.

CONCLUSIONS

This study emphasized the importance of relational capital and the ways networks of quality work relationships facilitate the development of knowledge creation capabilities in knowledge units in the defense industries in Israel. Here, firms engage in the development of cutting-edge and highly sophisticated technological solutions and products. We found that both intraunit relational capital and interunit relational capital facilitate the capability to create new knowledge. In addition, our findings indicate that compared to interunit relational capital, intraunit relational capital had a greater impact on
knowledge combination capability. This may suggest that interunit relational capital entails greater variation in knowledge stocks and, thus, may lead to more radical innovation than intrarelational capital that entails more similar knowledge bases and, thus, produces more incremental innovations. Furthermore, the results show that knowledge combination capability is a key to enhancing the performance of knowledge units. Finally, the findings of this study indicate that knowledge combination fully mediates the relationship between interunit relational capital and unit performance and that intraunit relational capital had both direct and indirect (through knowledge creation capability) effects on unit performance.

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REFERENCES


Relational Capital and Knowledge Combination Capability


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