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Chapter 5

MANAGERIAL NETWORK COGNITION IN THE CONTEXT OF 2014 WINTER OLYMPIC GAMES TENDER COMPETITIONS

ABSTRACT

Perception of inter-organizational networks has been found to influence firm's performance outcomes (Henneberg, et al., 2010; Sutcliffe, 1994). However, there is little knowledge on how different factors affect managerial perception (Sutcliffe, 1994; Sutcliffe et al., 2005; Henneberg, et al., 2010). Thus, despite knowing that accurate network perception is beneficial for firm performance, it is unclear how the perception accuracy can be improved. My study examines how event participation and network centrality influence managers' cognitive network maps. I analyzed 78 firms that were participating in 5 different tenders, which were held by 4 separate organizations. The analysis revealed that participation in tender related events and having a central network position improve perception accuracy. Positive changes in perception accuracy over time are observed among managers that participate in tender related events and have central network position. Positive changes in perception accuracy over time are greater among managers that have prior experience in tender competitions.

Keywords: Managerial cognition, networks, social capital, project based organizations, tender competitions

5.1. Introduction

Existing research on network development can be subdivided in three different research streams: 1) focuses on the relation between individual characteristics and network development, 2) on the relation between existing network and network development, and 3) agency perspective, focuses on the relation between behavior of the actor and network development (Vissa & Bhagavatula, 2012). Most of the existing studies on social network development focus on the individual characteristics and existing networks. In contrast, an emerging stream of research takes a strategic view of tie formation (Santos & Eisenhardt, 2009; Vissa, 2010). This research stream emphasizes how firms and individuals actively shape their approach to tie formation through thoughtful agency (Emirbayer & Goodwin, 1994; Vissa & Bhagavatula, 2012). Overall, previous research on social networks 1) show that firms gain performance benefits from large number of ties with key actors, 2) indicate which ties are likely to form, and 3) suggest a role of agency in network development. However, the literature has yet to address *how* exactly firms efficiently form ties (Hallen & Eisenhardt, 2012).

The general belief of conceptual and empirical work in organizational adaptation research is that successful organizations adjust their strategies and structures to fit environmental conditions (e.g., Lawrence & Lorsch, 1967; Miles, Snow, Meyer & Coleman, 1978). The underlying assumption is that decision makers have an accurate perception of environment, and as such they can develop strategies in accordance with their accurate perception. However, empirical studies have revealed that

organizational performance is strongly dependent on accuracy of managerial perception of environmental characteristics, yet this perception is seldom accurate (e.g. Burt, 1992; Cho and Hambrick, 2006; Krackhardt and Hanson, 1993; Porac, Thomas, and Baden-Fuller, 1989; Sutcliffe, 1994; Sutcliffe et al., 2005). According to theories in managerial and organizational cognition the realities are socially constructed. The process of social construction occurs among decision makers within a firm (Weick, 1995). The results of such social constructions may vary depending on the accuracy of perceived organizational and environmental factors (Fiol & O'Connor, 2003). Thus, the perceptual accuracy of managers' improves the effectiveness of their behaviors (Tenbrunsel et al., 1996; Thomas et al., 1993; Fiol & O'Connor, 2003). However, most research on managerial perception has tended to treat information processing mechanisms as separate from decision makers who use it (Fiol & O'Connor, 2003). Such approach ignores the fact that decisions are often influenced by the mentally and socially constructed realities of the decision makers (Weick, 1995).

Existing studies on managerial cognition have examined managerial perception on different environmental factors, such as perceived environmental instability, munificence, complexity and hostility (Sutcliffe, 1994; Sutcliffe and Huber, 1998), complexity of strategic schemas, and cognitive strategic groups (Porac et al., 1989; McNamara et al., 2002). Studies on inter-organizational network perception have found that accurate perception is significantly related to various outcome variables (e.g., Porac, Thomas, & Baden-Fuller, 1989). These inter-organizational networks have found to enable the access of tacit knowledge (Coleman,

1990), improve sales growth (Lechner, Dowling, Welppe, 2005), financial performance (Hansen, 1995), new venture survival (Raz & Gloor, 2007), access to new information and identifying new opportunities (Adler and Kwon, 2002; Burt, 1992; and Granovetter, 1973), and access to sensitive and valuable knowledge (Witt, 2004). Inter-organizational networks are thus increasingly perceived as the channels that provide firms access to external knowledge resources that facilitate organizational performance (Inkpen & Tsang, 2005). This raises a complementary question regarding the factors that influence managerial perception of inter-organizational networks (Henneberg, et al., 2010; Sutcliffe, 1994). This is important because, these biases can limit managers from fully mobilizing the resources that are available through their network ties. Consequently, I examined how characteristics of management team, environmental scanning, and network position influence the accuracy of managers' inter-organizational network perception.

This study builds on recent observations that there are a number of conceptual studies that have been conducted on this issue (e.g., Aldrich & Kim, 2007; Bondonio, 1998; Casciaro, 1998; Daft, Sormunen, & Parks, 1988; Hambrick, 1982; Singh, Hansen, & Podolny, 2010; Stuart & Sorenson, 2001): however, there is limited empirical research systematically examining influences on environmental perceptions (Sutcliffe, 1994; Sutcliffe et al., 2005; Henneberg, et al., 2010), by assessing how different factors affect managerial perception. Accordingly, this study systematically examines the influence of different factors on inter-organizational network perception accuracy.

The contributions of my study are threefold. First, this study will contribute to recent research on the role of agency on network development (e.g., Baker & Nelson, 2005; Lounsbury & Glynn, 2001; Vissa & Bhagavatula; 2012) by looking at how managers actions influence inter-organizational network perception. Second, by linking network theory to managerial cognition literature I will examine the effects of network centrality as an antecedent of managerial network perception. Finally, the unique context and longitudinal nature of my study will enable us to examine the relation between antecedents of network perception and network perception accuracy over time. The setting of my study are the 2014 Winter Olympic tender competitions. Tender competitions are temporary projects with no prior history, fluid relationships, and short time span.

5.2. Literature review

5.2.1. *Managerial cognition*

Social cognition studies how people make sense of themselves and others, and how their cognition influences their action (Fiske & Taylor, 1991). Studies on managerial cognition are related to social cognition studies and are mainly focused on the relation between managerial cognition and performance. Existing studies on managerial cognition have examined the relation between perception of various aspects and outcome variables such as: perception of social networks and performance of work teams (Ancona, 1990; Ancona & Caldwell, 1992); perception of social paths and boundary-spanning activities (Burt, 1992); focus of attention and

strategic action (Cho and Hambrick, 2006); knowledge structures and organizational strategy (Day and Lord, 1992); interdivisional boundaries and joint venture formation (Fiol, 1989); sense-making/sense-giving and change efforts in universities (Gioia and Chittipeddi, 1991); informal networks and managing of organization (Krackhardt and Hanson, 1993); cognitive structures and new design technology implementation (L wstedt, 1993); and, competitors and rivalry (Porac, Thomas, and Baden-Fuller, 1989). These studies essentially indicate a significant positive relation between accurate perception of the environmental factors and outcome variables.

5.2.1.1. Predictors of managerial cognition

Prior research has identified a variety of factors that influence managerial cognition. These factors are related to a wide range of aspects including network position/network centrality (Aldrich & Kim, 2007; Bondonio, 1998; Casciaro, 1998; Singh, Hansen, and Podolny, 2010; Stuart & Sorenson, 2001), prior experience and expertise (Burt, 2005:22-23; McNamara, Luce, Tompson, 2002), prior affiliation (Sutcliffe & Huber, 1998), functional diversity (March & Simon, 1958), team tenure (O'Reilly, Caldwell, & Barnett, 1989; Hambrick and D'Aveni, 1992:1447), characteristics of the manager and management team (Hambrick & Mason, 1984), environmental scanning (Daft, Sormunen, & Parks, 1988; Hambrick, 1982; Sutcliffe, 1994), organizational characteristics (Huber, O'Connell, & Cummings, 1975), intensity and frequency of organizational scanning (Fahey and King, 1977), and performance monitoring (Eisenhardt, 1989).

These factors relate to two basic cognitive processes: scanning and interpretation (Thomas et al., 1993).

Scanning has been seen as an antecedent to interpretation and provides external information that decision makers use (Daft & Weick, 1984). The frequency of scanning is viewed as an indicator of amount of information that is obtained on the environment (Hambrick, 1982). Scanning frequency of executives has been shown to be related to firm performance (Daft, Sormunen, & Parks, 1988). The relation between scanning and performance is assumed to be related to the existence of objective facts that managers can perceive more accurately if they obtain sufficient and qualitative information (Stubbart, 1989).

Interpretation has to do with understanding and processing of the available information (Fiol & O'Connor, 2003). Heuristics and cognitive shortcuts are often used to interpret the available information, which can often lead to inaccuracies (Calori, Johnson, & Sarnin, 1992). Accuracy of decision making can be improved by providing the decision makers with more and better information (Stubbart, 1989) and by making use of better decision mechanisms to sort through and interpret the available information (Sutcliffe, 1994).

The outcomes of scanning and interpretation are the managerial decisions and actions (Fiol & O'Connor, 2003). Successful organizations tailor their decisions and actions to environmental conditions (Lawrence & Lorsch, 1967). This requires prior accurate perceptions of the environment that is based on scanning and interpretation actions (Fiol & O'Connor, 2003). To avoid poor decision making that has little or no value for firm

performance, it is important to improve the accuracy of managers' perceptions on environmental conditions.

5.2.2. Social networks

Network theory proposes that resources key to business performance that otherwise would be difficult or impossible to obtain, could be accessed in a cost effective way through networking (Zhao and Aram, 1995). Networking can thus provide value to members of the network by gaining them access to the resources that are embedded within the network (Florin et al., 2003). As such, networking can enable TMTs to access resources that are external to the firm (Jarillo, 1989). Use of networks can, therefore increase firm's chances of success.

Coleman (1988) noted the importance of information for decision making, however it is often costly to obtain. As such, networks provide a means by which important information can potentially be acquired in a cost effective manner. Similarly, firms whose owners are heavily involved in networking should outperform firms whose owners make limited use of networking (Havnes and Senneseth, 2001). There have been a number of studies that have documented a positive association between networking and various aspects of firm performance (e.g. Donckels and Lambrecht, 1995; Duchesneau and Gartner, 1990; Lerner, Brush and Hisrich, 1997; Hemert, Nijkamp and Masurel, 2013). In sum, networking can be viewed as a form of environmental scanning that can provide access to information and resources.

However, organizational networks, even very small ones require the monitoring of hundreds of possible relationship pairs, posing a serious cognitive challenge (Kilduff & Krackhardt, 1994). Most managerial work involves interacting with key people in social networks (e.g., Mintzberg, 1973), an accurate understanding of such networks would be of great value for the managers (Krackhardt & Hanson, 1993). Study of Kilduff et.al. (2008) examined 116 perceived friendship networks from four organizations. The result indicated that people had biased perceptions, they attributed more small world properties, perceived more friendship clustering, and attributed more popularity and brokerage than it was actually the case. Tendency to misperceive clustering in networks and attribute more importance to perceived popular people might mislead managers in thinking that they are in touch with key clusters and people, without realizing that their perception does not accurately mirror the reality (Kilduff et. Al., 2008). Thus, the possible benefits that can be derived from social networks are significantly influence by how accurate is the perception of these networks. To improve network perception accuracy it is necessary to acquire relevant information.

5.2.3. Event participation

As already noted, one of the key dimensions of information acquisition on the environment is the level of environmental scanning by executives (Sutcliffe & Weber, 2005). Scanning intensity is related to the amount of acquired information (Hambrick, 1982), and more information enables better and more accurate appraisal of the environment (Sutcliffe &

Weber, 2005). Environmental scanning emphasizes comprehensive information acquisition by TMT from multiple sources in order to create accurate knowledge on contextual factors (Sutcliffe & Weber, 2005). Organizational scanning perspective has grown out of classical strategic management (e.g., Hofer & Schendel, 1978) and organizational theory (e.g., Duncan, 1972; Pfeffer & Salancik, 1978) and suggests that managers use information on environment to accordingly adjust organizational strategy and action (Bourgeois, 1985). The accuracy of executives' perception on their environment can therefore influence the effectiveness of the decision making process (Sutcliffe & Weber, 2005).

Firms can implement formal units that are dedicated to collect strategic level environmental information; however, most firms lack such formal units (Boyd & Fulk, 1996), instead information acquisition is conducted by the scanning efforts of individual members of the TMT (Aguilar, 1967; Ritvo, Salipante, and Notz, 1979). Given the frequent information and knowledge sharing between the members of TMT I will focus on the collective knowledge of TMT (Wilcox King & Zeithaml, 2003: 764). One of the possible ways that managers can scan their environment is by attending conferences, business meetings and other related industry events. Such events provide a unique temporary occasions for managers to share knowledge and interact with different significant actors (Garud, 2008), and engage in brokerage activities (Stam, 2010). Events related to 2014 Winter Olympic games were mostly attended by organizational leaders that were in charge of the tender competitions, and by managers and executives of tendering firms. In such locally clustered events ties

among participating actors tend to be created (Breiger, 1974). Frequent interaction between participating actors can result in embedded ties. The actors in embedded ties tend to show more reciprocal type of behavior that is based on mutual trust and long-term view of the relationship (Witt, 2004). Such ties tend to better and more often facilitate transfer of sensitive knowledge and valuable resources. These embedded ties have been found to be important in transferring of tacit and sensitive information (Hansen, 1995; Uzzi, 1997). Given the context of tender competitions, I expect that information on organizational leaders' network will be shared among actors that share close relation with one another. As such, Managers and executives who frequently visit events related to 2014 Winter Olympic tender competitions will establish close relations with organizational leaders and managers of other tendering companies that in turn will enable them to access information on organizational leaders' network structure and content, and over time improve their network perception. Perceptual accuracy refers to the tender participating managers' perception accuracy of tender officials' network structure and network content. Network structure refers to presence or absence of ties between each pair of tender officials. Network content refers to the resources (official decision making authority, special expert knowledge of construction industry, good connections with influential persons, general respect as someone who can mobilize people behind certain proposals, and unique access to key information or resources concerning the tenders) possessed by each of the tender officials.

Given the arguments in favor of scanning, and the supporting empirical evidence, it would be reasonable to expect that firms where TMTs' are frequently participating in tender related events will have a more accurate perception of organizational leaders network structure and content.

H1: The frequency of event participation by TMT is positively related to accuracy of managers' cognitive network maps.

5.2.4. Network position

Prior research has found significant relation between network structure and firm performance (McEvily and Zaheer, 1999; Nohria and Garcia-Pont, 1991). According to the strategic network perspective, the embeddedness of firms in networks with other organizations can have significant implications for firm performance (Gulati, Nohria, and Zaheer, 2000). The study of Burt (1992, 2000) showed that firms occupying the favored network position of bridging structural holes between firms otherwise disconnected in the network are likely to perform better because they enjoy a better access to information. Given that resources such as access to knowledge (Burt, 1992), are often acquired through networks of inter-organizational ties, and since access to such resources and capabilities influences firm performance (Mowery, Oxley, and Silverman, 1996), it can be argued that firms with superior network position may be better able to exploit the available resources within their network (Zaheer, & Bell, 2005).

A central position within the network has been shown to be positively related with fast and accurate identification of key network actors, having an accurate perception of the network in general, and improved ability to identify available opportunities (Singh, Hansen, and Podolny, 2010; Stuart, & Sorenson, 2001). Degree centrality and demographic and social distances between network actors have been identified as strong predictors of cognitive accuracy (Bondonio, 1998).

Degree centrality, closeness, and betweenness are the most common measures of network centrality (Freeman, 1979). Degree centrality refers to number of links connected to an actor. Closeness centrality focuses on the path distance between the actor and the rest of the network. Betweenness emphasizes the brokerage position that an actor has between two other actors or groups within the network.

Building on these empirical findings on network position, I propose that TMT's that have most ties with tender officials are likely to have a more accurate perception of organizational leaders' network structure and content. Thus, TMT's with highest degree centrality will have the most accurate perception.

H2: TMT network centrality is positively related to accuracy of managers' cognitive network maps.

5.2.5. Prior tender experience

So far the assumption has been that active participation by managers and executives in environmental scanning and events related to

Olympic tenders affords them opportunities to access additional information on organizational leaders' network structure and content. Consequently, they will access and process the additional information to improve their perception accuracy on organizational leaders' network composition.

However, previous research suggests that opportunities alone do not automatically lead towards forming of relation and accessing information (Ahuja, 2000). Some entrepreneurs seem to be more successful in exploiting opportunities than others (Baron and Markman, 2003; Shane and Venkataraman, 2000). The received information needs to be processed in order to understand the underlying meaning (Fiol & O'Connor, 2003).

Extant literature presents empirical evidence for the link between prior career experience and outcome variables. Past experience has been shown to strongly affect the strategies, structures, and performance of their ventures (Burton, Sørensen & Beckman, 2002). Relevant past experience can increase the ability of individuals to effectively exploit available opportunities and access relevant information (Stam, 2010). Furthermore, previous research suggests that past experience enables individuals to more accurately perceive network structures (Janicik and Larrick, 2005).

I build on these ideas by proposing that the extent of managers past experience with tender competitions will enable him to correctly interpret the available information. Prior experience is generally defined as the range of past experience across different industries, organizations, and functions (Stam, 2010). However, given the unique nature of Olympic tenders I have focused solely on prior tender experience. Given that prior experience

enables individuals to more accurately perceive network structures (Janicik and Larrick, 2005), I argue that managers' with high prior tender experience will develop a more accurate perception and in shorter time, than managers' with low prior experience. Moreover, since prior experience can increase the ability of individuals to effectively exploit available opportunities and access relevant information (Stam, 2010), I also expect that managers' with extensive prior experience will better exploit their central network position to improve their perception accuracy than managers' with low prior tender experience.

H3a: The relationship between event participation and perception accuracy will be stronger for TMTs' with extensive prior tender experience than for TMTs' with limited prior tender experience.

Social skills

H3b: The relationship between network centrality and perception accuracy will be stronger for TMTs' with extensive prior tender experience than for TMTs' with limited prior tender experience.

5.2.6. Longitudinal effects

Given the longitudinal data on the tender competitions, it is interesting to study the change in network perception. As such, I examine how the variables in my model influence perceptual accuracy over time. I expect that event participation, network centrality, and prior tender experience will positively influence the changes in perception accuracy.

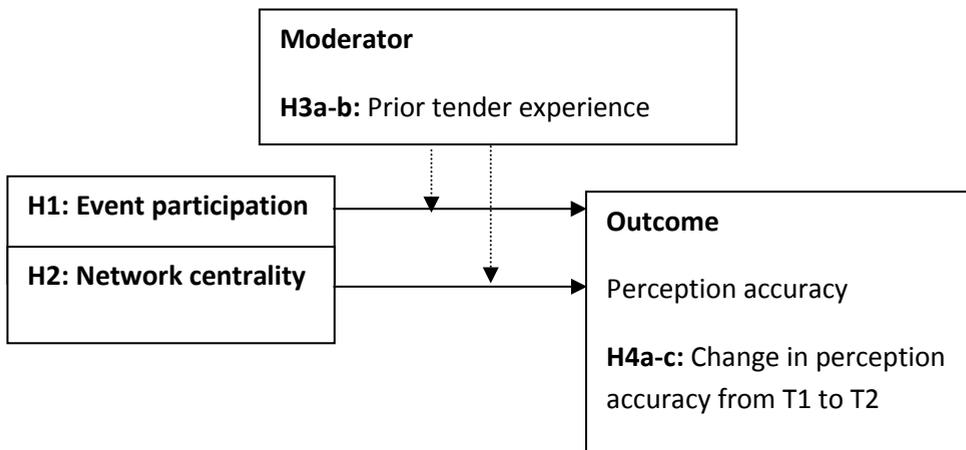
H4a: Event participation will significantly and positively influences the changes in network perception accuracy from T1 to T2.

H4b: Network centrality will significantly and positively influences the changes in network perception accuracy from T1 to T2.

H4c: Prior tender experience will significantly and positively influences the changes in network perception accuracy from T1 to T2.

As a summary, Figure 3 presents the conceptual models underlying the predicted static and longitudinal relationships between event participation, network centrality, and perception accuracy.

Figure 3:
Conceptual models



5.3. Methods

5.3.1. Research setting

The setting of the present research is the 2014 Winter Olympic Games in the city of Sochi, which is located in the Krasnodar region of Russia. Holding of such event requires the organizer to prepare a wide variety of modern facilities for sport players, delegates and tourists from different countries. Concurrent with preparation of the Games the government of the Russian Federation has planned to transform the region into the world-class popular resort for sport, business and leisure tourism that will attract visitors all year long. The infrastructure, which has been developed in the preparation for the Olympic Games will become a significant legacy for the city of Sochi and the whole region and will essentially improve the quality of life of the local residents. The preparation for the Games includes construction of the modern roads, railways, hotels and new transport hubs, modernization of engineering infrastructure and a sufficient increase in power capacity.

According to the Federal Target Program, in 2007 the Federal budget of Russian Federation has allocated 327 billion rubles (approximately US\$9 billion according to the exchange rate of 2007) for the hosting of 2014 Winter Olympic Games and for the general development of the area in and around the city of Sochi. Additionally, there is also financing from non-budget sources (including private investor funds), which will be distributed in the following way: US \$2, 6 billion will be spent on the development of the tourist infrastructure, US \$270 million - for

the transport infrastructure, US \$100 million - for power supply facilities, and US \$500 million - for the construction of the Olympic venues.

5.3.2. *Tenders*

Tender competitions are being held by several organizations in order to select companies that will be contracted to execute 2014 Winter Olympic Games related projects. Competitive tenders for the construction of the Olympic venues and development of the Krasnodar region are being held among both National and International companies. The companies can participate in tenders in different sectors, such as: construction and assembly works, design and survey works, procurement, real estate valuation and development, accounting, transportation and other areas. The duration of tender competition and consequent selection procedure is limited in time and varies between several weeks to several months. The selection procedure is conducted by officials of organizations that are in charge of the tenders.

5.4. Data

The setting of my study is the 2014 Winter Olympic Games tender competitions in Krasnodar region of Russian Federation. My study focuses on tenders that are being held by various public and private organizations such as local and federal municipalities and private subcontractors.

Data on network perception accuracy, environmental scanning, event participation and prior tender experience were collected in a two-way survey that was administrated with the members of TMT of each

tendering firm, and tender officials in charge of the tenders. I conducted the survey in June 2010, and again after tender winning companies were announced (four to five months later) to obtain data on changes of network perception.

I used information from various sources, such as: Krasnodar region municipalities, internet, and high ranking officials in Krasnodar and Sochi in order to construct an initial list of 2014 Winter Olympic Games related tender competitions. This resulted in 31 Olympic tenders, from which I randomly selected eight tender projects. These tenders were being organized by six different public and private organizations. A total of 65 officials were in charge of the tender proceedings, and 122 firms were participating in these eight tenders. To maximize my response rate I requested my high level contacts at Krasnodar Krai municipality to contact the organizations that were in charge of the tenders, and explain to them the purpose and importance of the research project. Next I made appointments during which questionnaires were personally administered on-site. Officials in one of the six tender organizers declined full cooperation, yielding a sample of five tender organizers and 86 tendering firms. Since 15 of the 24 members of one of the five tender organizers declined to cooperate with the second survey, the final study population amounted to four tender organizers and 78 tendering firms. Overall participation rate for tender organizers was 66.6% (i.e. 4/6) and the internal response rate was 63% (i.e. 41/65). The overall participation rate for tendering firms was 63.9% (i.e. 78/122) and the internal response rate was 77.5% (i.e. 196/253). Analyses of non-response in both survey rounds

indicated no significance differences between respondents and non-respondents in terms of firm age, firm size, tender size, and tender organizer size.

My final sample consisted of 78 tendering companies that were participating in five different tenders. The tenders were of different size and in different industry sectors (1) renovation of an existing research and education institution on environmental issues, 2) improving sections of roads around the city of Sochi, 3) conducting the yearly audit of one of the main organizations that is supervising the development of the Olympic venues, 4) real-estate valuation, and 5) transportation of construction materials), which enabled us to control for industry sector and tender size. Companies that expressed interest to participate in the tenders could apply within the given time period, which could range from several weeks to months.

I studied the cognitions of the key executive and his or her team of top managers on network structure and content of officials in charge of the tender proceedings. The top executive level is the point, at which strategic information converges, is interpreted, and acted upon (Sutcliffe and Weber, 2005). A total of 196 respondents from the participating companies were personally contacted. I conducted a similar survey among the organizations that were in charge of the tender proceedings in order to reveal the “objective” information on network structure and content of these officials. A total of 41 tender officials in charge of the managing the tenders from the four temporary project groups were contacted. The participating firms ranged in size from 4 to 76320 employees, and averaged 7041 employees.

The age of the firms ranged from 1 to 43 years, with an average age of 14 years.

5.5. Measures

5.5.1. Network perception

I assessed network perception variables with questionnaire items adapted from previous studies (e.g. Laumann, 1976). The questionnaire was translated from English to Russian by two independent native speakers who were also fluent in English. The questionnaire was translated back from Russian to English to control for any possible errors that might have arisen during the translation process. The questionnaire was pilot tested among Russian entrepreneurs and executives residing in The Netherlands. I refined the questionnaire on the basis of the pilot test results. I averaged individual level scores of the respondents to create measures on executive team level. I assessed the intra-class correlation of the perceptual measures, to examine the extent to which responses of the individual respondents within a firm are similar to one another (Shrout and Fleiss, 1979; Kenny and LaVoie, 1985). The average intra-class correlation across the constructs was .86 indicating sizeable agreement among top executive group members in their responses.

I used the roster method to measure the perception accuracy of tender competing firms on tender officials' networks. Network perception accuracy consists of both perceived network structure, and network content. I assessed perceived network structure by presenting to managers the complete roster of officials and asking them to assess presence or

absence of ties between each pair of tender officials. Perceived network content was assessed by asking the managers to indicate the resources (official decision making authority, special expert knowledge of construction industry, good connections with influential persons, general respect as someone who can mobilize people behind certain proposals, and unique access to key information or resources concerning the tenders) possessed by each of the tender officials.

Actual network data was gathered among tender officials. Using the roster method I asked the tender officials to indicate their mutual social ties and nominate themselves and other officials according to influence and resources that they possess. The actual network will be identified by an asterisk: $R^*_{i,j}$ (See Krackhardt, 1990 for more details). The network is defined as follows: $R^*_{i,j}=1$ if $R_{i,j,i}=1$ and $R_{i,j,j}=1$ 0 otherwise. Thus, both i and j must agree on the existing relation between them before the relation between i and j is recognized. Similarly, both have to agree on the resources that they possess. The average interclass correlation of officials' responses on network structure was .93 and network content .89, indicating strong agreement among responses of officials.

Similarly to the studies of Gower and Legendre, (1986); Krackhardt (1990); and Casciaro (1998) I used the Pearson correlation coefficient between perceived and actual network information in order to calculate perception accuracy. The scores ranged from 0 (indicating no correlation between perceived and actual network information) and 1 (showing a complete agreement between perceived and actual network information). Same approach was conducted after the second survey and the scores were

compared to the scores of the first survey to reveal changes in perception accuracy. This approach provides an accurate and objective measure of perception accuracy (Casciaro, 1998; Gower and Legendre, 1986; and Krackhardt, 1990).

5.5.2. Network centrality

Degree centrality, closeness, and betweenness are the most common measures of network centrality (Freeman, 1979). Degree centrality refers to number of links connected to an actor. Closeness centrality focuses on the path distance between the actor and the rest of the network. Betweenness emphasizes the brokerage position that an actor has between two other actors or groups within the network.

I assessed network degree centrality by asking the members of tender participating firms' TMTs' to select from the list of organizational leaders the persons that they would contact if they were looking to acquire information on tender related issues (thus, virtual ties and not necessarily prior existing ties). I used roster method with the complete list of all of the tender officials and tender participating firms. In order to verify the existence of ties I used locally aggregated structure or LAS (Krackhardt, 1987). LAS implies that actor A and actor B both have to agree that a relation between them exists in order for this relation to be accepted as existing. This measure of relation is therefore direct and has obvious face validity (Krackhardt, 1990).

5.5.3. Event participation

Respondents were asked to indicate on a 7 point scale the extent that they had participated in events that were related to the development of 2014 Winter Olympic Games in the past twelve months (from 1 very little to 7 very often).

5.5.4. Moderator

My moderator is previous tender experience. I controlled for previous tender experience, by asking the members of TMT to indicate the number of tender competitions that they and/or their firm had participated prior to entering this tender competition.

5.5.5. Control variable

My control variables are firm age and firm size. The control variable is firm size. Larger firms are more likely to enjoy higher negotiation power over their clients and suppliers (Serrasqueiro and Macas Nunes, 2008; Mansfield, 1962; Singh and Whittington, 1975). Additionally, larger firms face less difficulty in accessing investments, and have a larger pool of human capital (Yang and Chen, 2009). Firm size was calculated as the logarithm of total number of employees.

Smaller firms tend to lack legitimacy and are less likely to receive resources from potential resource providers (Stinchcombe, 1965). Whereas larger firms enjoy greater trust and legitimacy that enables them to procure resources from weak ties (Hite and Hesterly, 2001). Firm age was measured as the logarithm of the number of years since the firm was founded.

5.6. Analyses and Results

Table 14 presents means, standard deviations and zero-order correlations among the variables used in the analysis. As shown, most of the managers had participated in about ten tender competitions, with a maximum of twenty-one tender competitions. They had attended an average of around 5 events with a maximum of nine. As expected event participation and network centrality were significantly and positively related to perception accuracy. Surprisingly, negative insignificant relation existed between prior tender experience and perception accuracy.

Table 14:
Means, standard deviations and correlations

<u>Variable</u>	<u>Mean</u>	<u>s.d.</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
1 Age	13.51	11.48					
2 Firm size	7041.32	20082.88	-0.15				
3 Prior tender experience	11.71	9.48	-0.16	0.01			
4 Network centrality	5.57	4.34	0.01	0.02	0.09 [†]		
5 Event participation	3.20	1.71	-0.00	0.03	0.08 [†]	0.05 [†]	
6 Perception accuracy	0.34	0.25	-0.08	0.01	-0.04	0.08*	0.14*

N=78

*p<.05, **p<.01

5.6.1. Hypothesis tests

Table 15 presents the results of hierarchical regression analyses used to predict perception accuracy. First I included only the control variables. As shown in Model 1 of Table 15, control variables explained a significant share of the variance in perception accuracy ($R^2=.24$, $p<.001$). However, neither of the control variables was significantly related to perception accuracy.

Next, I introduced the main effects of event participation and network centrality to test Hypotheses 1-2. Addition of these variables significantly increased the variance explained in perception accuracy relative to the baseline model ($\Delta R^2=.07$, $p<.05$; and $\Delta R^2=.05$, $p<.05$). The result model 4 of Table 14 ($b=.116$, $p<.05$) shows a significant positive relation between event participation and perception accuracy, supporting hypothesis 1. Next, I tested hypothesis 2 whereby a positive significant relation between network centrality and perception accuracy was expected. The results in Model 4 of Table 15 ($b=.072$, $p<.05$) support hypothesis 2.

Next, I tested hypotheses 3. The results did not support the prediction of hypothesis 3a on positive moderating effect of tender experience on the relation between event participation and accurate perception, and 3b network centrality and accurate perception. As shown in model 5 and model 6 of Table 15, hypothesis 3a and b received no support ($b=.031$, N.S.; $b=.035$, N.S.).

Table 15:
Hierarchical regression results predicting perception accuracy

	model 1	model 2	model 3	model 4	model 5	model 6
Firm size	.033	.037	.046	.041	.045	.040
Firm age	-.023	-.022	-.019	-.023	-.021	-.019
Prior tender experience		-.018	-.024	-.019	-.021	-.029
H1: Event participation			.116*	.115*	.111*	.113*
H2: Network centrality				.072*	.069*	.075*
H3a: Event X Experience					.031	.035
H3b: Net.cent. X Experience						.011
Model F	3.78***	3.82***	4.01***	3.83***	3.93***	4.06***
Adjusted R ²	0.24	0.26	0.29	0.31	0.32	0.35
Δ R ²		0.02	0.07*	0.05*	0.02 [†]	0.01

N=78. [†] p<.10, * p<.05, ** p<.01 *** p<0.00

Finally, I tested the longitudinal effects proposed in hypotheses 4a, 4b, and 4c. Results in models 2, 3 and 4 in Table 16 support the expected positive effects between independent variables and improvement in perception accuracy over time ($b=.098^*$; $b=.117^*$; $b=.077^*$). Addition of these variables significantly increased the variance explained in perception accuracy relative to the baseline model ($\Delta R^2=.06$, $p<.05$; $\Delta R^2=.08$, $p<.05$; and $\Delta R^2=.06$, $p<.05$). The results support the positive effects of prior tender experience, event participation, and network centrality on perception accuracy. Thus, confirming hypotheses 4a, 4b, and 4c.

Table 16:

Hierarchical regression results predicting changes in perception accuracy

	model 1	model 2	model 3	model 4
Firm size	.033	.037	.046	.026
Firm age	-.03	-.022	-.019	-.01
H4a: Prior tender experience		.098*	.024	.031
H4b: Event participation			.117*	.107*
H4c: Network centrality				.077*
Model F	3.97***	4.09***	4.11***	4.13***
Adjusted R ²	0.21	0.22	0.25	0.27
ΔR^2		0.06*	0.08*	0.06*

N=78. [†] $p<.10$, * $p<.05$, ** $p<.01$ *** $p<0.001$

5.7. Discussion

This study examined how participating in industry events and having a central network position impact inter-organizational network perception accuracy in the context of 2014 Winter Olympic Games tender competitions. Although previous studies established the value of inter-organizational network perception (e.g., Porac, Thomas, and Baden-Fuller, 1989), it is yet unclear what factors influence managerial perception of inter-organizational networks (Henneberg, et al., 2010; Sutcliffe, 1994). The empirical results of this study reveal that: 1) participation in tender related events and having a central network position improve perception accuracy; 2) positive changes in perception accuracy are observed over time among managers that participate in tender related events and have central network position; 3) positive changes in perception accuracy over time are greater among managers that have prior experience in tender competitions.

The positive relation between event participation and perception accuracy, and between network centrality and perception accuracy show that different forms of environmental scanning are improving perception accuracy. As such these findings contribute to the small, but growing literature on the role of industry events by empirically demonstrating the link between event participation and network perception accuracy. These findings also provide empirical support for the important role of environmental scanning in improvement of perception accuracy (Daft, Sormunen, & Parks, 1988; Hambrick, 1982; Sutcliffe, 1994). The current study extends this line of work, by highlighting that environmental scanning not only improves intra-organizational network perception, but also inter-organizational network perception. This distinction is important given that intra-organizational networks are generally more stable, whereas inter-organizational networks tend to be more dynamic.

This study also contributes to the agency literature by indicating a significant and positive relation between event participation and perception accuracy. It extends studies on thoughtful agency (e.g. Emirbayer & Goodwin, 1994; Santos & Eisenhardt, 2009; Vissa, 2010) by showing how managers improve their network perception through event participation that in turn actively shapes their approach to tie formation.

The positive relation between network centrality and perception accuracy contributes to network theory by empirically supporting the importance of network centrality in identification of key network actors (Singh, Hansen, and Podolny, 2010; Stuart, & Sorenson, 2001). It extends the network theory literature on network centrality, by highlighting that network centrality is not only positively linked to various firm level performance outcomes, but that it also positively influences the managerial perception of inter-organizational networks.

The longitudinal findings supported the positive effects of network centrality, event participation and prior tender experience. Interestingly, the role of past tender experience was not positively related to perception accuracy in the static model. This finding suggests the notion that cognitive shortcuts are often used to interpret the available information, which can often lead to inaccuracies (Calori, Johnson, & Sarnin, 1992). Managers with prior tender experience might already have predetermined cognitive pictures that are not necessarily accurate. However, past tender experience was positively and significantly related to improvement of perception accuracy over time. Suggesting that prior experience combined with environmental scanning enables managers to quickly interpret the available information and adjust their cognitive maps. It also shows that only studying the static effects may paint an incomplete picture. To more fully understand the relation between different variables and perception accuracy, it is necessary to conduct a longitudinal study.

These findings are important for three reasons. First, the findings extended my understanding of managerial inter-organizational perception by extending work in managerial and organizational cognition literature. Second, the findings contribute to social network literature by providing more insight in antecedents of social capital. Finally, the unique setting and longitudinal character of the research enabled us to study the changes in inter-organizational network perception.

5.8. Limitations

This study has several limitations that can be interesting for future research. First, the data employed in this research may suffer from sample selection. Although I randomly selected tenders, I did not include companies that were not participating in tender competitions.

However, given the diversity of the tenders the results can be generalized to other companies in different settings. Second, there is the problem of reverse causality. Thus, it is necessary to investigate whether managers' perception influences their networking activities. Finally, a more extensive and longitudinal study on the relation between different personal and organizational characteristics and network perception can provide more comprehensive understanding of how different variables influence perception accuracy over time.

5.9. Practical implications

The results indicate that event participation, and central network position facilitates the inter-organizational network perception accuracy. The results support the important roles of environmental scanning and interpretation for perception accuracy. The benefits of environmental scanning can especially be important to firms that operate in uncertain and/or new settings. Thus, it is beneficial for firms to allocate time and resources to actively scan the environment and frequently interact with key players and competitors.