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RESEARCH PAPER

Exploring market orientation through social network analysis: an exploration of three cross-functional, cross-geographic teams

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Prior research has shown a correlation between market orientation and business performance as measured through new product success. Market orientation has traditionally been measured through the MKTOR and MARKOR scales developed by Narver and Slater and Kohli et al., respectively. We examine whether there might be a different, complementary way to study market orientation. Kohli and Jaworski discuss the role of networks in achieving higher levels of market orientation, but network analysis has not previously been used to study market orientation. Following Kohli and Jaworski we find that network analysis can show how information is gathered and disseminated within a group; and following Narver and Slater we find that network analysis can be used to examine customer orientation and coordination. We discover a possible association between the organization's structure and its level of coordination, and that certain roles within the group facilitate increased customer orientation within the team. Our research suggests that network analysis, particularly when managers participate in the interpretation of results, can be an effective means of identifying and correcting obstacles to a team's market orientation. We believe our research contributes to theory by showing an alternative, complementary way to study market orientation and suggests factors that contribute to a group's level of market orientation. We believe that this research contributes to practice by providing managers with a practical measure to improve their organization's market orientation, thus increasing the likelihood of new product success.

Introduction

While evolving over the years, definitions of the marketing concept since the 1950s have generally included the idea that the purpose of marketing is to help an organization meet its objectives (Felton, 1959; Keith, 1960; Darroch *et al.,* 2004). As market orientation is intended as a means to implement the marketing concept (Kohli and Jaworski, 1990), it can be seen by extension as a means for an organization to reach its objectives. Narver *et al.* (2004) suggest that market orientation leads to the development of core capabilities, which in turn lead to competitive advantage, and ultimately to business performance. Jaworski and Kohli (1993, p.56) state that because 'a market orientation essentially involves doing something new or different in response to market conditions, it may be viewed as a form of innovative behaviour'. Atuahene-Gima (1996) notes that a firm can directly influence innovation by adopting a market orientation. Low *et al.* (2007), in a study of 73 Australian companies, find a positive correlation between market orientation and innovation and

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between both of these constructs and firm performance. A highly customer-oriented organization understands not only its direct customers, but also the entire value chain of customers and customers' customers. Furthermore, the highly customer-oriented organization seeks to understand this value chain not only as it exists today, but also as it might look in the future (Narver *et al.*, 2004).

Prior research shows a correlation between market orientation and success in the marketplace (Narver and Slater, 1990; Jaworski and Kohli, 1993; Langerak *et al.*, 2004; Baker and Sinkula, 2005; Kirca *et al.*, 2005). Ellis (2006, p.1101) concludes his meta-analysis of market orientation-performance studies by noting that:

> This study presents quantitative evidence verifying the universal nature of the link between market orientation and performance. The idea that firms can boost their performance by fostering a culture that responds to changing customer needs with solutions that are superior to rivals, is demonstrably generic. In any given setting, rewards will accrue to those companies that are more market oriented than their rivals.

In addition to conducting their own primary research, which supports a positive relationship between market orientation and new product performance, Baker and Sinkula (2005) examine 18 studies that use new product performance as the measure of business success, and in all but one case a positive correlation between market orientation and new product performance is found. Baker and Sinkula (2005, p.496) note that 'a strong market orientation can directly influence NPD by creating a better fit between the benefits consumers seek and the benefits a firm provides its customers'.

Market orientation is defined in seminal works by Kohli and Jaworski (1990) and Narver and Slater (1990) and suggests how organizations implement the marketing concept through a combination of behaviors and attitudes. Since these original articles, our understanding of market orientation has evolved through the work of other researchers (Jaworski and Kohli, 1993; Slater and Narver, 1994, 1995, 1998, 1999; Narver *et al.*, 2004; Atuahene-Gima *et al.*, 2005). Kohli and Jaworski (1990, p.6) define market orientation as 'organization-wide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organization-wide responsiveness to it'. Narver and Slater (1990, p.21) define the concept as 'organizational culture that most effectively and efficiently creates the behaviors for the creation of superior value for buyers and thus, continues superior performance for the business'. They propose that market orientation includes three components: understanding the customer (customer orientation), understanding competitors (competitor orientation), and inter-functional coordination. Narver and Slater's definition of market orientation seems to be a natural evolution from the customer orientation seen since the 1950s as the cornerstone of the marketing concept (Cooke *et al.*, 1992). In other words, Narver and Slater argue for the importance of a comprehensive market orientation rather than a solely customer orientation.

Both Kohli and Jaworski (1990) and Narver and Slater (1990) make clear that their definitions of market orientation are complementary rather than competing. The complementary nature of the approaches can be seen, for example, when Kohli *et al.* (1993) write that intelligence gathering is carried out to gain greater understanding of the customer and the marketplace, which is quite similar to Narver and Slater's customer and competitor orientations. In a similar vein, Slater and Narver (1998, p.1003) state:

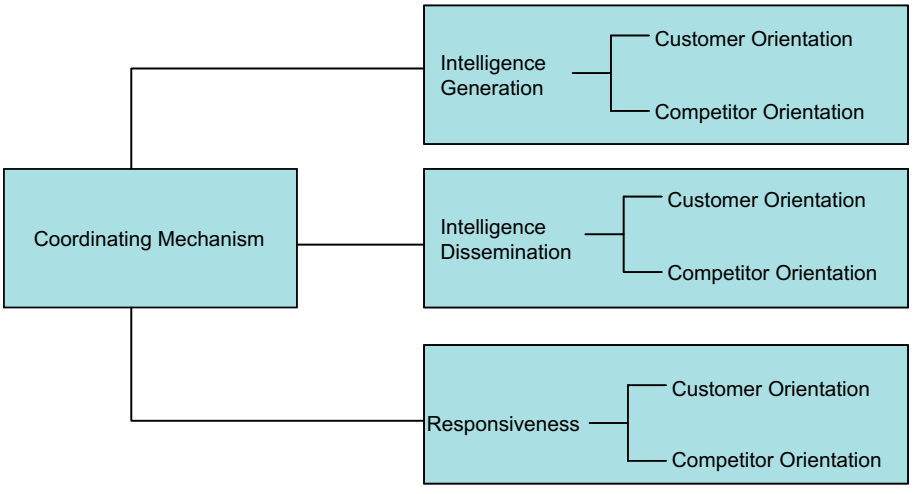

Figure 1. The Cadogan and Diamantopoulos integration of market orientation definitions

> Market-oriented businesses are committed to understanding both the expressed and latent needs of their customers, and the capabilities and plans of their competitors through the processes of acquiring and evaluating market information in a systematic and anticipatory manner. They continuously create superior value by sharing knowledge throughout the organization and by acting in a coordinated and focused manner.

Cadogan and Diamantopoulos (1995) show in Figure 1 how the two definitions can be synthesized into a single conceptual model.

Measuring market orientation

Regardless of definition, an organization's market orientation has traditionally been measured through variations of the MARKOR and MKTOR scales developed, respectively, by Kohli and Jaworski (1990) and Narver and Slater (1990). Darroch *et al.* (2004) point out that as the definition of the marketing concept evolves, the measurement of market orientation, which implements the marketing concept, should likewise evolve. This has not, however, happened; the MARKOR and MKTOR scales have not been significantly modified since their creation, although they have been adapted to meet the needs of particular organizations. Kohli and Jaworski (1993, p.56), however, discuss the role of networks in achieving higher levels of market orientation: 'The greater the extent to which individuals across departments are directly connected (or networked), the more they are likely to exchange market intelligence and respond to it in a concerted fashion'. Despite the explicit reference to networks in Kohli and Jaworski's paper, no research to date has used network analysis to examine market orientation. Exploring market orientation through network analysis suggests an alternative to the MKTOR and MARKOR scales and follows up on Kohli and Jaworksi's speculation on the importance of networks in achieving market orientation.

Using network analysis to explore market orientation

We suggest that network analysis provides unique and valuable insights into a team's level of market orientation, complementing what can be learned through the MKTOR and MARKOR scales. Network analysis enables one to view a community of people. This is quite different from scale data, which provide information, sometimes valuable, on abstract concepts. If you will, scale data provide insight as to *what* is happening in a group. Network analysis not only provides different insights as to what is happening, but also provides insights regarding *where* it is happening and, if you will, *who* is making it happen. We can use network analysis to view how coordination manifests itself in an organization through the flow of information to and from members. We can use network analysis to see specifically from whom intelligence is gathered, and to whom intelligence is disseminated. Our research can be seen as an extension of the work of Cross *et al.* (2008), which uses network analysis to measure team effectiveness and coordination, a dimension of market orientation. Cross *et al.* (2008, p.84) state that network analysis can be used to 'assess leverage points for performance improvement', examining the quality of relationships among team members, between the team and the customer, and between the team and the overall organization.

Our research is concerned with understanding how product development and customer teams can increase the probability of achieving high levels of market orientation and new product success. It seeks to understand factors that facilitate or hinder the transfer of information from the individual to the team. We suggest that network theory and network analysis contribute to this understanding in a number of ways. The notion of network provides a theoretical framework for understanding how and why information of various types is likely to move among members of a given community. Therefore, it provides an interesting perspective on the gathering and dissemination of information within the team, two dimensions of Kohli and Jaworski's (1990) market orientation. Similarly, the notion of network can help develop theory regarding possible antecedents and consequences of two dimensions of Narver and Slater's (1990) market orientation: coordination and customer orientation. It helps visualize coordination in a given team, shedding light on where coordination is manifested through the sharing of information. Similarly, network theory provides an interesting means of studying customer orientation, showing to and from whom among customer contacts information flows. More importantly, network theory provides a possible explanation as to why information is or is not moving between and among team members, and between team members and customer contacts.

Network theory supposes that structural relations are more influential determinants of an individual's behavior than demographic characteristics (Knoke and Yang, 2008). Network theory seeks to uncover patterns in social ties, the conditions under which these patterns emerge, and the consequences of these relationships on the individual actors and community as a whole (Freeman, 2004). The teams studied in this research are composed of multiple sub-networks within an overall network. For example, there is the sub-network containing the ties that team members have with one another, and there are the sub-networks that each member has with those outside the team, whether they be within or outside the company. Examining the sub-network composed solely of team members provides insights into the team's

level of coordination, and the gathering and dissemination of information within the team. Examining the sub-network that includes customer contacts provides insights into the team's customer orientation.

Cross and Prusak (2002) define roles within a network, and the execution of these roles might influence the team's market orientation. This includes boundary spanners, defined by Cross and Prusak (2002, p.109) as

> roving ambassadors, people who serve as the group's eyes and ears in the wider world. These boundary spanners nurture connections mainly with people outside the informal network – for instance, they communicate with people in other departments within a company, at different satellite offices, and even in other organizations.

They might also be seen as ambassadors and scouts, representing the group to others and bringing back information on customer activities (Ancona and Caldwell, 1992a, 1992b). We anticipate that teams with boundary spanners connecting the team to key external groups, most importantly within the customer's organization, will outperform teams without such connections as they are more likely to receive the information needed to be customer oriented.

Information brokers relay information between various subgroups within the network: 'Without these information brokers, the networks as a whole wouldn't exist' (Cross and Prusak, 2002, p.110). They bridge gaps within the teams, connecting functional groups and geographies. We anticipate that information brokers will connect sub-networks within the team, bridging the fault lines caused by functional and geographic diversity within the team. Thus, they facilitate the transfer of information within the team, reducing the likelihood of conflict, and increasing coordination (Jehn, 1997; Jehn *et al.*, 1999).

Burt (2004) explains why boundary spanners and information brokers have such potential to benefit their teams: 'people who stand near the holes in a social structure are at higher risk of having good ideas' (Burt, 2004, p.349). While ideas developed within a group tend to be homogenous, ideas between different groups tend to be heterogeneous. Therefore, a person connecting two groups is likely to be exposed to more new ideas than a person connected only within one group. The best of these new ideas can be synthesized into the person's overall perspective. By extension, one can argue that the team as a whole has potential to benefit from having among its members those who stand near these holes. Conceivable, teams with more hole-bridging members will outperform teams that do not have members bridging structural holes. Boundary spanners, bridging the hole between the team and its customer, will bring into the team the customer's perspective, enhancing the team's overall customer orientation. Similarly, we anticipate that information brokers, those connecting sub-networks within the team, will play an important role in coordination, bridging holes between functional and/or geographic groups and balancing the potentially disparate perspectives of different subgroups.

Tortoriello and Krackhardt (2010) argue that not all ties are equally effective in transferring knowledge. Their research examines how third-party bridging ties increase the likelihood that information will successfully span the boundary between two groups. A bridging tie is one that connects two otherwise separate groups. A third-party bridging tie connects two otherwise separate groups through a triad, rather than a dyad. Third-party bridging ties increase the likelihood that interested parties will be willing to invest time in transferring knowledge and that the

knowledge will be comprehendible. If the team members' ties to their respective network connections are weak, third-party ties will increase the likelihood that network connections respond to team member requests for information, thereby increasing the pool of information that the team can use. We anticipate that third-party bridging ties, whether connecting the team to the customer through boundary spanners, or connecting subgroups within the team through information brokers, will increase the likelihood of information transfer, strengthening customer orientation when connecting the team to the customer and enhancing coordination when connecting subgroups within the team.

Cross and Prusak (2002, p.111) also define what they call 'peripheral specialists':

> Large or small, every informal network has its outsiders. Although they operate on the periphery, these people play a vital role in the network by serving as experts. They possess specific kinds of information or technical knowledge – for instance, research data, or software skills, or customer preferences – that they pass on to the other members of the group whenever it is needed.

We anticipate that teams that identify and connect with potential peripheral specialists, tapping into their expertise, have the potential for greater market orientation as they will access information that might benefit their customers.

Network analysis and theory can also be used to identify specific breakdowns in coordination and information transfer, and the possible causes for these breakdowns. This can be used to suggest how changes in team dynamics and/or structure can improve organizational performance (Cross *et al.*, 2002, 2008, 2009). Managers can modify team structure and process in order to improve market orientation. For example, the team leader might serve as the coordinator for team communications and might be the team's representative with management. If the team leader is not well connected to management, the team might suffer from management's poor understanding of the project's needs and progress. Network analysis can identify this weakness, which can then be addressed. Following Gould and Fernandez (1989), we might expect team members to serve as representatives for their respective functions. If the team's marketing representative is not well connected to the team, for example, the marketing perspective might not be considered by the team as a whole and consequently the team might have a low customer orientation. Network analysis can lead to recommendations on how changes in team dynamics can improve market orientation and product success.

There are parallels between specific items in the MKTOR and MARKOR scales and what can be seen through network analysis. The MKTOR scale, for example, includes within coordination information shared among functions and inter-functional customer calls. Customer orientation includes understanding customer needs (Narver and Slater, 1990, p.4). The MARKOR scale (Kohli *et al.*, 1993, p.476) includes:

- In this business unit, we meet with customers at least once a year to find out what products or services they will need in the future.
- Individuals from our manufacturing department interact directly with customers to learn how to serve them better.
- We poll end users at least once a year to assess the quality of our products and services.

- We often talk with or survey those who can influence our end users' purchases (e.g. retailers, distributors).
- There is minimal communication between marketing and manufacturing departments concerning market developments. (A reverse coded item)

While network analysis does not necessarily show the nature of the communication (for example, whether the customer communication was about future products or services), it does provide the distinct benefit of showing precisely who in the organization communicated with whom in the customer's organization. Much like Cadogan and Diamantopoulos (1995), network analysis brings together the Narver and Salter (1990) and Kohli and Jaworski (1990) definitions of market orientation, emphasizing that they are complementary lenses for viewing the same phenomenon. For example, we see coordination through the gathering and dissemination of information among people in the community. We see customer orientation through the gathering of information from and dissemination to customer contacts.

We believe that the most effective use of network data in understanding a group's market orientation will come from specific conversations about the group's individual results. Network data can show a person's position in the community, but only through a community-specific conversation can we determine if that position is optimal. In some cases, for example, a specific person on the network's periphery might be a cause for concern. In other cases, however, this position might be appropriate. Similarly, network data can show from which external sources information is being brought into the community, but through discussion we see if the information is coming from the right, or enough, external sources. Network analysis, for example, can identify information coming from a specific customer contact, but cannot place a value on the likely importance of the information. This is even truer with regard to competitive information. Only through dialogue with group members can we determine which people, if any, in the network are supplying and receiving competitive information. Neither does network analysis shed light on a group's responsiveness to the information that is being gathered and disseminated among its members. This, however, can be addressed through specific conversations and/or through use of the MARKOR scale in conjunction with the network analysis.

We believe that network analysis of market orientation can be particularly valuable for action research. Managers can, for example, see whether intelligence is being gathered from specific, desired areas within their own organization or from specific points along the customer value chain. Managers can also see if information is being disseminated effectively to all members of the team. We believe that many managers can use network data to target specific areas for improvement, conducting the study again at a later date to see if desired changes have been made.

Methods

The research includes data from three teams, which are in the same division of the same company, known here as Parthenon. The teams studied for this research have the following characteristics. They are:

- cross-functional
- cross-geographic
- have full and part-time members

- are ongoing
- are collectively responsible for producing an output for a target audience outside the organization.

As seen in Table 1, the teams are comparable in terms of geographic and functional diversity. All three teams studied in this research come from the same firm, which has its global headquarters in the US. The teams examined in this research come from the same division of this firm, a business-to-business operation. The division's products are incorporated into the customers' products, which are then sold to end users around the world. The division's products include both hardware and software components. The division works in a highly competitive industry and believes that continued innovation is key to continued success. Like the company as a whole, the division maintains global headquarters in the US with additional offices around the world. The Beta team was one of five product development groups responsible for developing core components. The Alpha and Gamma teams, each responsible for a specific customer, combine core components developed by the core product development teams into subsystems that meet their customer's particular needs. These teams are directly responsible for new product success within their division. The division disbanded the Beta team after one year, citing the team's failure to develop successful new products. The Alpha and Gamma teams consistently meet their sales targets.

Data were gathered through an online survey. Network data for the Alpha team were gathered over the course of two years, making it possible to make year-to-year comparisons. Each member of all three teams identified her/himself as both a member of a cross-geographic functional team and a member of a cross-functional geographic team. Network questions included:

- To whom have you provided work-related information in the last three months? (Respondents were provided with a drop-down menu with all team members.)
- Please enter the name(s) and organization(s) of anyone else to whom you have provided information related to your work on the (Alpha, Beta, and Gamma) team in the last three months. These people can be employees of Parthenon, the customer, and/or a supplier. Information can be provided during meetings, informal conversations, by telephone, and/or by e-mail. You may list as many individuals as you want. (Respondents were provided with a text box and could write in as many names as they wanted.)
- From whom have you received work-related information in the last three months? (Respondents were provided with a drop-down menu with all team members.)

Table 1. Comparing geographic and functional diversity in the teams

Team	Year for network analysis	Number of offices	Number of functions
Alpha	One	6	7
Alpha	Two	7	8
Beta	One	4	6
Gamma	One	8	6
Gamma	Two	8	6

- Please enter the name(s) and organization(s) of anyone else from whom you have received information related to your work on the (Alpha, Beta, and Gamma) team in the last three months. These people can be employees of Parthenon, the customer, and/or a supplier. Information can be received during meetings, informal conversations, by telephone, and/or by e-mail. You may list as many individuals as you want. (Respondents were provided with a text box and could write in as many names as they wanted.)

It was our expectation that there would be a difference between the provided to and received from views. All three teams studied were cross-geographic and therefore had many characteristics of virtual teams, relying frequently on electronic forms of communication, which can be less effective than face-to-face communication (DeSanctis and Monge, 1999; Hoegl *et al.*, 2007; Siebdrat *et al.*, 2008). We expected that respondents would provide information through electronic communication tools, such as email, but that the communication would not necessarily be received by the intended recipient because s/he had not opened it or had given it only a cursory read. Follow-up interviews were conducted with a number of team members from each team. It is, however, beyond the scope of this paper to present detailed findings from these data, which still need to be fully analyzed. We do, however, refer in this paper to specific conversations with the Alpha team leader about the network analysis data.

This research focuses on the Alpha team as the leader of this team was very interested in using the data from this study to make improvements to his group. He used the data to target a specific area for improvement, and then developed an action plan to make improvements in this area and examined data collected one year later to see if the desired change had been made. Data from the other two teams are provided as support.

While average distance, density, and centrality were calculated using analysis tools in UCINET, roles among team members (e.g. boundary spanner, information broker, and peripheral specialist) were identified through discussions with team members while reviewing network data and diagrams. The importance of the boundary spanner role was well understood in the teams prior to the research and was in fact assigned to specific people on the Alpha and Gamma teams. KNJU, for example, was charged with gathering and disseminating information from the customer's European subsidiary. While the network data showed who on a team was communicating with customer contacts, through discussions respondents were able to provide more detail on the customer contact (e.g. geography, functional group, and level of influence in the customer's organization). Additionally, respondents were able to detail the nature and purpose of the information shared. While teams did not assign specific people as information brokers *per se*, team members noted that the organization's matrix structure was designed, in part, to facilitate information transfer. It was through discussion that we identified those on the network's edge as either peripheral specialists – appropriately on the network's edge – or as team members insufficiently integrated into the team.

Results

We begin by exploring coordination within the team, studying information provided and received among team members. First, we present results that we saw independently in the data. This is followed by a presentation of how, working collaboratively

with the Alpha team leader, the data were interpreted. Similarly, we then present what we saw in the data showing the flow of information to and from people external to the team. Again, this is followed by an examination with the Alpha team leader of how the data were interpreted. The response rates from the network analysis data collection are presented in Table 2.

Team membership on the Alpha team remained very consistent from one year to the next. There were only four changes in its membership. Two of the additions (AIKA and KIRY) were people who performed precisely the same role in both years. The Alpha team leader, however, wanted to include them in the later data collection. CYRE was replaced on the team by GIAN, who had already been working in the division for a number of years, and so had working relationships with many of Alpha team members prior to his assignment on the team. SHCH left the organization and had not been replaced at the time of the next year's data collection.

Coordination

As shown in Table 3, in each of the three teams there are relatively dense networks and short average distances between team members.

In each team the network for information received is denser than the network for information provided, and the average distance between nodes for information received is shorter than the average distance between nodes for information provided. As discussed above, we had expected that the information provided to would have been denser than the information received from network, supposing that people were not necessarily absorbing all of the information sent to them. What might account for this unanticipated result? In follow-up interviews, team members blamed the nature of team communications. Information was generally shared in a group meeting, most typically in a weekly teleconference. While member A provided member B with information during a meeting, all the other members on the call also received the information. Position in the network is comparable when looking at

Table 2. Response rates for network analysis

Team	Year	Number of team members	Number of respondents	Response rate
Alpha	One	29	29	100%
Alpha	Two	30	26	87%
Beta	One	12	11	92%
Gamma	One	60	51	85%
Gamma	Two	62	33	53%

Table 3. Comparison of network density and average distance

Team	Network analysis year	Information type	Density	Average distance
Alpha	One	Received from	0.60	1.40
Alpha	One	Provided to	0.49	1.50
Alpha	Two	Received from	0.49	1.40
Beta	One	Received from	0.66	1.30
Beta	One	Provided to	0.54	1.40
Gamma	One	Received from	0.32	1.50
Gamma	One	Provided to	0.28	1.60

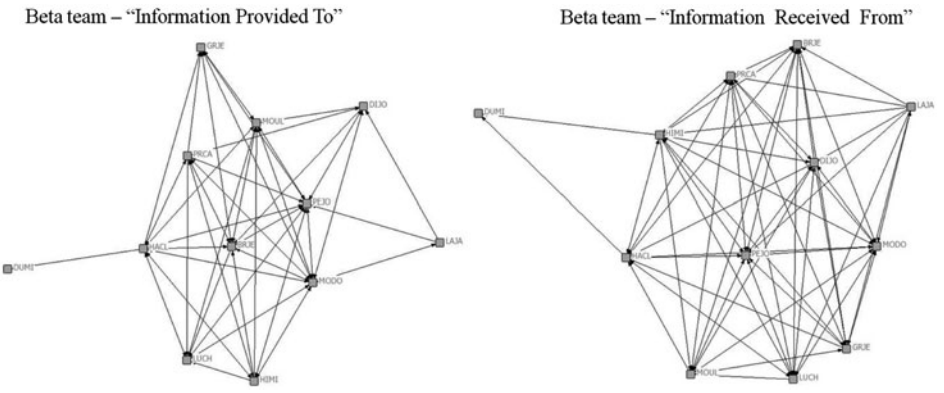

Figure 2. Comparison between provided to and received from

provided to and received from data. Additionally, the name generators generated comparable results as members stated that there was typically an exchange of information provided and received in communications with contacts outside the team. Therefore, we will focus on the received from data so as not to be redundant. We provide a comparison of information received and information provided in Figure 2 in order to illustrate the similarities.

Information brokers The data suggest that the coordination of information within the teams might be influenced by the teams' matrix structure. Using the Cross and Prusak (2002) terminology, information brokers connect their functional and geographic groups, bridging the hole between the two groups and thus enabling information to flow between them. Most team members belong to both a cross-functional, geography-based sub-team and a cross-geographic, function-based sub-team. These sub-teams in all but one case have a greater density than the team as a whole. This is presented in Table 4.

It is not remarkable that groups composed of people from a single geography or functional group have a higher density than groups that are both cross-geographic and cross-functional. What we find interesting is that certain team members link the geographic sub-team to the functional sub-team. As shown in Figure 3, for example, CYRE and DIJO, encircled, are in both the geographic group USA 1 and the functional group marketing. They bring these groups together, providing pathways for information between USA 1 and other geographies through the marketing functional group. Following Gould and Fernandez (1989), they represent their functional group in geography-based interactions, and they represent their geography in functional group interactions. Through their position in these two different subgroups, they help move information from one group to the other.

In addition to connecting the USA 1 office to the global marketing functional group, CYRE and DIJO, encircled, also connect the USA 1 office through MAHI, enclosed in the square, to the Japan 1 office, which is shown in Figure 4. It is noteworthy that there is redundancy in the boundary spanning role presented in Figure 4. In this case, redundancy is not likely to be a disadvantage. Redundancy increases the likelihood that information moves from one group to another and that the information is internalized by the recipient. Also, the redundancy in the boundary spanning role provides the team with a safeguard if one of the two boundary

Table 4. Density and average distance within sub-groups

Team	Information type	Group	Density	Average distance
Alpha	**Received**	**Whole**	**0.60**	**1.40**
Alpha	Received	Engineering	0.81	1.19
Alpha	Received	Marketing	0.87	1.13
Alpha	Received	Sales	1.00	1.00
Alpha	Received	USA 1	0.77	1.23
Alpha	Received	Japan 1	0.92	1.08
Alpha	Received	Japan 2	0.94	1.06
Alpha	**Provided**	**Whole**	**0.49**	**1.53**
Alpha	Provided	Engineering	0.81	1.33
Alpha	Provided	Marketing	0.97	1.03
Alpha	Provided	Sales	0.92	1.08
Alpha	Provided	Japan 1	0.92	1.08
Alpha	Provided	Japan 2	0.89	1.11
Alpha	Provided	USA 1	0.63	1.38
Beta	**Received**	**Whole**	**0.66**	**1.28**
Beta	Received	Engineering	1.00	1.00
Beta	Received	R&D	0.50	1.25
Beta	Received	Germany	1.00	1.17
Beta	Received	USA 1	0.87	1.13
Beta	**Provided**	**Whole**	**0.54**	**1.44**
Beta	Provided	Engineering	0.83	1.17
Beta	Provided	R&D	0.50	1.25
Beta	Provided	Germany	1.00	1.00
Beta	Provided	USA 1	0.73	1.27
Gamma	**Received**	**Whole**	**0.32**	**1.53**
Gamma	Received	Engineering	0.43	1.34
Gamma	Received	Logistics	0.33	1.00
Gamma	Received	Marketing	0.84	1.16
Gamma	Received	Quality	0.36	1.17
Gamma	Received	Sales	0.83	1.03
Gamma	Received	USA 1	0.66	1.28
Gamma	Received	Japan 1	0.35	1.41
Gamma	**Provided**	**Whole**	**0.28**	**1.64**
Gamma	Provided	Engineering	0.41	1.40
Gamma	Provided	Logistics	0.33	1.00
Gamma	Provided	Marketing	0.79	1.21
Gamma	Provided	Quality	0.21	1.18
Gamma	Provided	Sales	0.81	1.06
Gamma	Provided	USA 1	0.55	1.41
Gamma	Provided	Japan 1	0.32	1.44

spanners leaves the group, which is what happened in this team. Shortly after the data were collected, CYRE left the Alpha team for a position in another division within the company. Information flow between the USA 1 geography and global marketing group was not hindered, however, as DIJO maintained the same boundary spanning position within the Alpha team network. The preceding example shows how the geographic locations are connected through the marketing functional group. Other functional groups, such as engineering and sales, connect the team's different offices in a similar way. Because of these cross-functional, cross-geographic interconnections, there are no dominant central connectors on the team; the majority of team members move information to and from their geographic and functional subgroups.

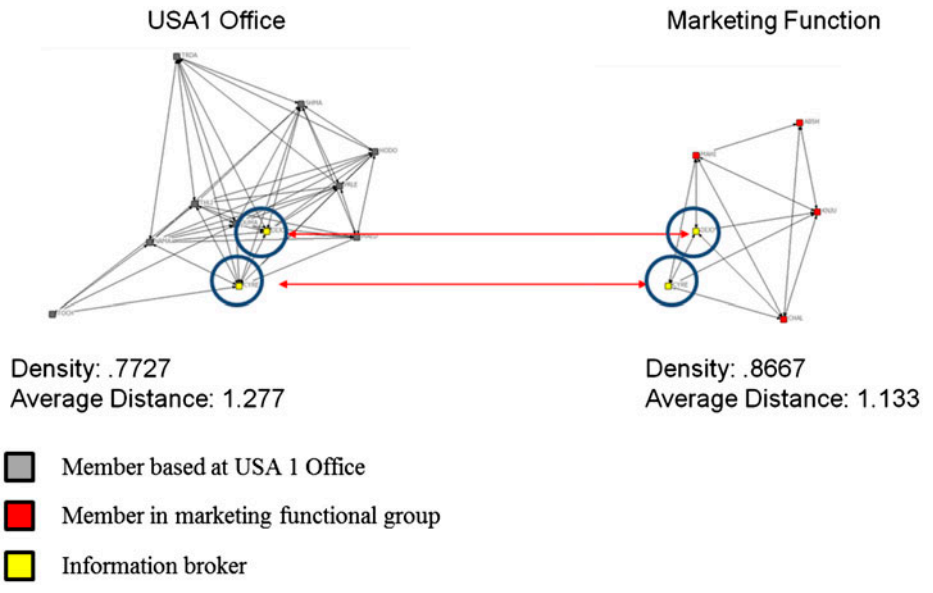

Figure 3. Information brokers join two sub-groups

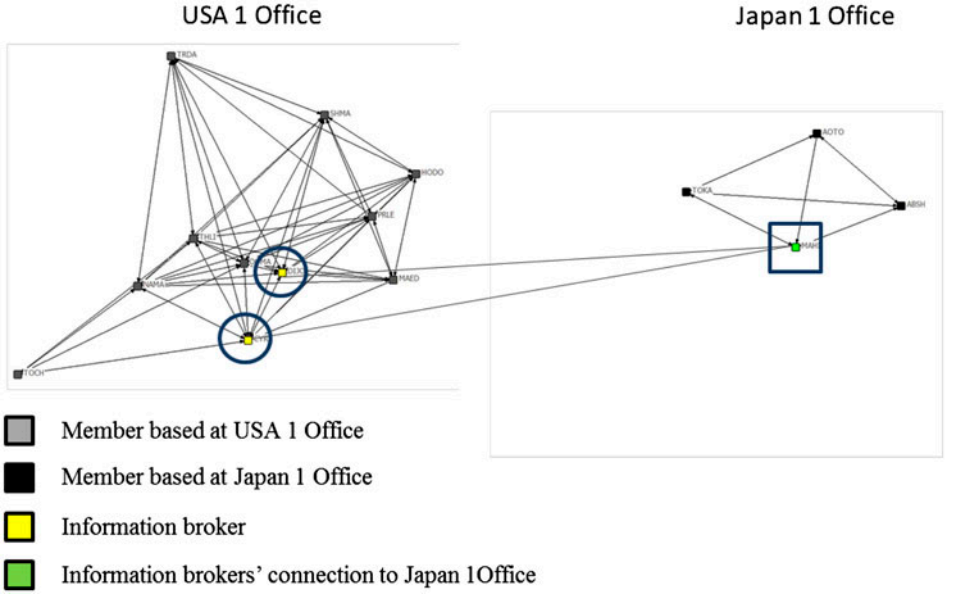

Figure 4. Marketing team members connect USA 1 and Japan 1 offices

We see a comparable phenomenon when looking at the Gamma team, which has the same matrix structure. Once again, DIJO, encircled, a member of both the Alpha and Gamma teams, bridges the cross-functional USA 1 location and the

cross-geographic marketing functional group, which, in turn, through DIJO's connection to NAYU, connects the USA 1 and Japan 1 offices. These connections are seen in Figure 5.

Peripheral specialists As seen in Figure 6, CHALI (encircled), TOCH (enclosed in the square), and CHAL (enclosed in the triangle) are on the periphery of the Alpha team's network in the first year we conducted the network analysis. Perhaps not surprisingly, two of these three are either functional and/or geographic isolates. CHAL is the sole team member based in China. CHALI is the sole member to work in the USA 2 office and is the sole team member to work in manufacturing. Network analysis in itself, however, does not show whether the position of these three individuals is good or not. The visualization, however, provoked a very interesting conversation with the Alpha team leader. According to the team leader, CHALI and TOCH are peripheral specialists. CHALI serves as the liaison between the team and the company's manufacturing division. TOCH processes customer orders and processes invoices to the customer. They are also what Ancona and Caldwell (1992b) call a 'task-coordinating function', coordinating activities between the team and other groups within Parthenon. Based on their function within the team, the leader stated that it was not necessary for CHALI and TOCH to have a deep understanding of the team's objectives, strategies, customers, and competitors. In other words, the team leader believed that their position in the network was appropriate. This was not the case for CHAL. The team leader expressed a level of concern that this person was on the network's periphery as CHAL was the team's sole representative in China, a fast-growing and strategically important market.

Note that CHAL and CHALI were geographic isolates within the team. CHAL was the only member in China, and CHALI was the only member based in USA 2. CHALI, the only team member in the manufacturing department, was also a

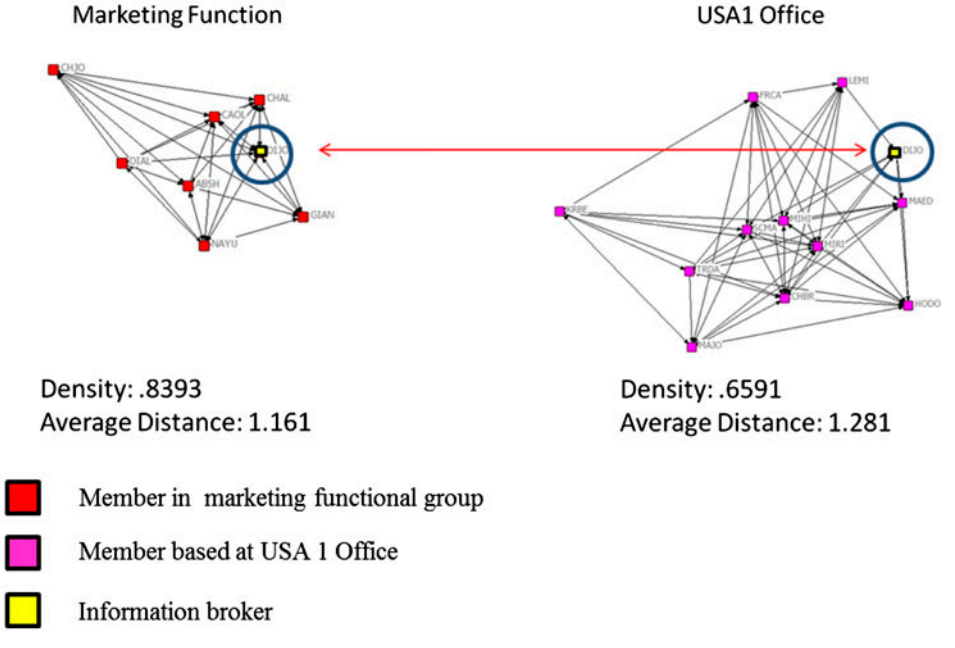

Figure 5. Information brokers in the Gamma team

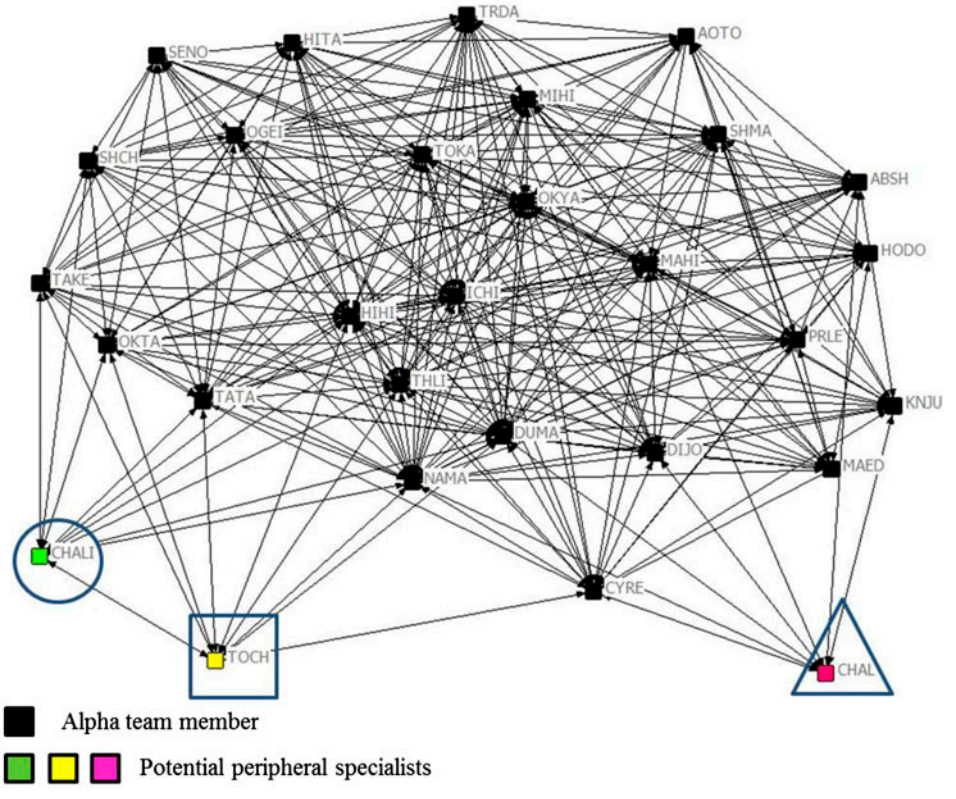

Figure 6. Peripheral players in the Alpha team

functional isolate, the only member of the team in manufacturing. While integrating CHAL was not made an explicit team objective following the network analysis, CHAL's connections to other team members increased from seven to 10 in the second year of the study. New connections for CHAL included the team leader and the head of the Japan 2 office, which is located in the same city as the customer's global headquarters (i.e. CHAL became connected to the team's leaders). CHALI and TOCH did not experience a similar increase in their number of connections within the team. In fact, CHALI's number of connections to the team decreased from 10 to six, and TOCH's number of connections decreased from nine to seven.

We find a comparable example of peripheral specialist on the Beta team. As seen in Figure 7, DUMI, encircled, is on the Beta team periphery with only one connection to the team when looking at information provided to, and with two connections to the team when looking at information received from. In discussing roles within the team, however, a number of members pointed out that DUMI was involved in very advanced R&D work and it would be a poor use of his time to attend general informational meetings. Members felt it was more efficient to channel targeted communication to this person through a single point of contact, CLHA.

Centrality

We used degree centrality to see how information flows within the teams and to gain insights into the relative influence of the geographic and functional subgroups within

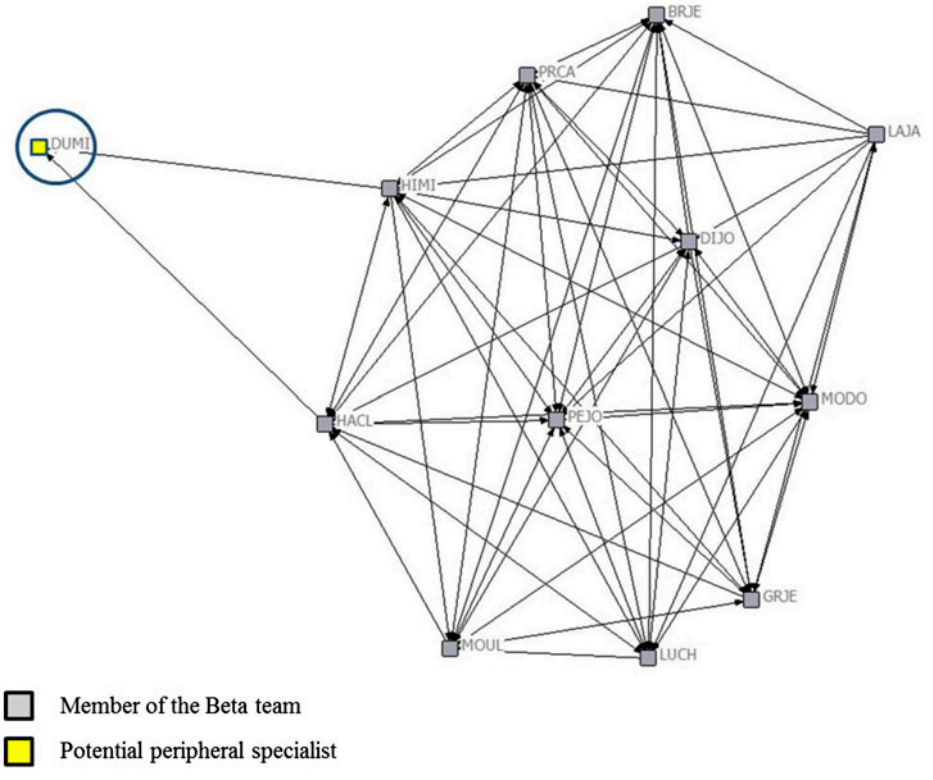

Figure 7. Beta team: highlight of peripheral player

the teams. Looking at information received from data from the first year of the network analysis for the Alpha team, the five team members with the highest degree centrality were HIHI, NAMA, DUMA, THLI, and ICHI. The first four members are each connected to 27 other members, and the fifth, ICHI, is connected to 26. Perhaps not surprisingly, the network for these five people has a density of 1; each is connected to the other four. As a group, these highly connected people create redundant paths for information flow to nearly all other team members. Redundancy in this context is an advantage as it increases the likelihood that information will be internalized by recipients. All five team members work full-time and include the customer team leader, the head of the satellite office in the same city as the customer's headquarters, the sales lead, and the engineers responsible for commercializing product concepts.

It is interesting to note that the marketing member with the highest degree of centrality is DIJO with 20 connections, making him the eleventh most connected team member out of 29 total members. The team (and the division as a whole) has a philosophy that engineering, sales, and marketing should work together as equally important components in customer engagement. Degree centrality suggests that the marketing group as a whole is less influential than the better connected engineering and sales groups in the customer engagement triumvirate as the individuals in marketing are not as well connected as their engineering and sales counterparts. In

other words, coordination among the three functional groups is not as balanced as the division's philosophy espouses.

Degree centrality for the Alpha team the following year is similar. ICHI is no longer in the top five, having been replaced by another engineer from the office, OKYA. DIJO remains the marketing member with the highest degree centrality, being eleventh out of 30 in degree centrality for the team overall. The results for the Gamma team are quite similar. The most connected team members are in the engineering and sales groups, while the most connected marketing member is twenty-second out of 60 members. In individual interviews, team members from the Alpha and Gamma teams stated that marketing as a functional group was not as well-integrated as their stated philosophy suggested. It is more peripheral in the product development process, spending much time working on product launches. While coordination for the team overall appears to be quite high, marketing has perhaps a less influential voice in the coordination. In contrast, the balance of influence among geographies suggested by degree centrality is more in line with expectations and team goals. The most influential members of both the Alpha and Gamma teams are spread relatively evenly between Parthenon's global headquarters and the satellite office closest to the customer. The Alpha team leader believed that this creates a balance between seeing issues from the company's perspective and seeing issues from the customer's perspective.

Customer orientation

We next turn our attention to information flowing into the team from the outside. Using a name generator, team members identified the following sources of external information: other company employees, customer contacts, company vendor contacts, and contacts at the customer's vendor. For the Alpha and Gamma teams, the majority of information flowing into the team, approximately 60%, comes from Parthenon employees outside the team. A significantly lower percentage, approximately 35%, of information comes into the team from customer contacts. The percentages for the Beta team were 75% and 25%, respectively. This is summarized in Table 5.

Boundary spanners The company maintains a satellite office in the same city as the customer's global headquarters. In Figure 8, Alpha team members HITA, MIHI, OGEI, OHYA, TAKE, encircled, interface directly with their functional counterparts in engineering, logistics, quality, and sales on the customer side. In other words, there are multiple points of contact between the team and the customer. From

Table 5. Year one: sources of information flowing into the team

Source of received information	Alpha team Year one network analysis Percentage of information received	Beta team Year one network analysis Percentage of information received	Gamma team Year one network analysis Percentage of information received
Parthenon	62%	75%	60%
Customer	34%	25%	35%
Parthenon's vendor	2%	0%	5%
Customer's vendor	2%	0%	0%

follow-up interviews, we learned that they are scouting for information from the customer (Ancona and Caldwell, 1992b) and transferring information from the team to key customer contacts. They are boundary spanners, connecting the team to its customers (Cross and Prusak, 2002). Also shown in Figure 8, team members CHAL, DIJO, and KNJU, enclosed in the squares, are the primary, in some cases only, conduit of information between the team and the customer's subsidiary offices in China, the US, and Europe. They serve as boundary spanners between Parthenon and its customer's subsidiaries. These people are in a unique position, creating a bridge over the structural hole between the team and a particular subgroup within the customer's organization. They bring together the knowledge and perspective from the customer and the team. This network position gives them the potential to develop innovative solutions that meet the needs of both groups.

According to the team leader, a reasonable amount of information was coming into the team from the customer's global headquarters. In other words, he believed that the connectivity with the customer, as seen in the network analysis, was sufficient. The team, however, was receiving information from only two contacts from the customer's largest subsidiary. DIJO was the sole point of contact between this subsidiary and the team. These contacts were valuable, but could provide information on only a limited number of key programs. KNJU served an important role on the team as the information broker between the team and the customer's second larg-

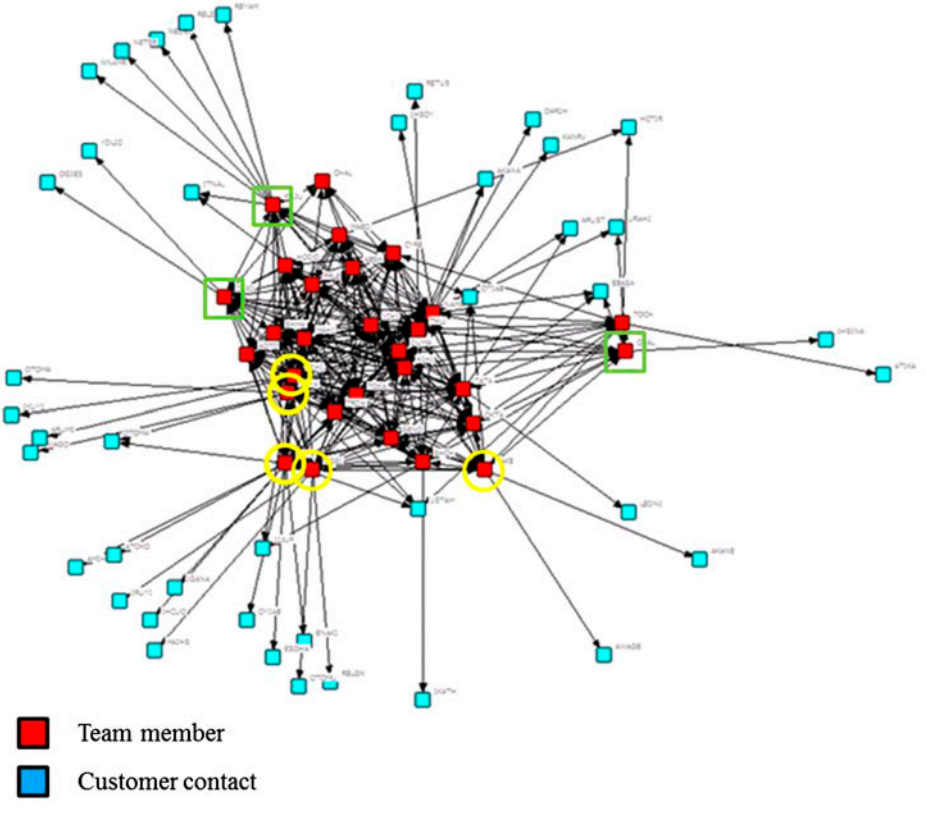

Figure 8. Alpha team, year one: information received from the customer

est subsidiary. The team leader noted, however, that prior to the arrival of KNJU, all information from this subsidiary came through a single team member. When this member left the organization, the team had to establish new relationships. Therefore, the team leader saw it as a risk that KNJU was the sole point of contact between the team and the customer subsidiary. Similarly, there was only a single source of information coming into the team through CHAL from the customer's fastest growing market.

Based on the network analysis, the team leader established increasing the information coming into the team from the customer, particularly from the customer's largest subsidiary, as one of the team's yearly objectives. One activity planned to help the team meet this objective was developing a series of technology fairs at which 10 team members would present technology concepts to 25–40 customer contacts. These fairs were held at the global headquarters and at first and second largest subsidiaries. Follow-up meetings were held with subsets of customer attendees and team members in each of these markets.

In the follow-up study, we see that the percentage of information coming into the team from customer contacts increased from 34% to 57% (Table 6). Additionally, we see in Figure 9 that information coming into the team from the customer's largest subsidiary through DIJO, again enclosed in a square, increased from two to 20 sources. The number of sources coming from customer headquarters and other subsidiaries remained relatively constant – still relatively strong for information coming from the customer's headquarters and the second largest subsidiary, and still relatively weak for the fastest growing subsidiary. Information from the customer's largest and second largest subsidiaries appears in Figure 9 to come solely through DIJO and KNJU, encircled, respectively. This had been identified as a problem in the previous year. The team leader, however, stated that multiple team members participated in the technology fairs in each of these markets. These interactions, however, occurred outside the three-month time horizon specified in the research question.

When presented with Figure 10, which shows information flowing into the team from customer contacts, members of the Beta team were not surprised by the results. Team members are represented by squares. Each of the other shapes represents a different customer. Team members also felt that the low level of direct customer contact hindered them from developing products that met customer need. They did not believe it was sufficient to receive the majority of customer information indirectly through other Parthenon employees, as was currently happening. They believed that they faced an additional challenge in that they were responsible for developing concepts to meet the need of multiple customers whereas the Alpha and Gamma teams were focused solely on a single customer. The Beta team was disbanded before any plan to address this issue could be implemented.

Table 6. Alpha team year-to-year comparison: information flowing into the team

Alpha team Source of received information	Year one network analysis Percentage of information received	Year two network analysis Percentage of information received
Parthenon	62%	41%
Alpha	34%	57%
Parthenon's vendor	2%	2%
Alpha's vendor	2%	0%

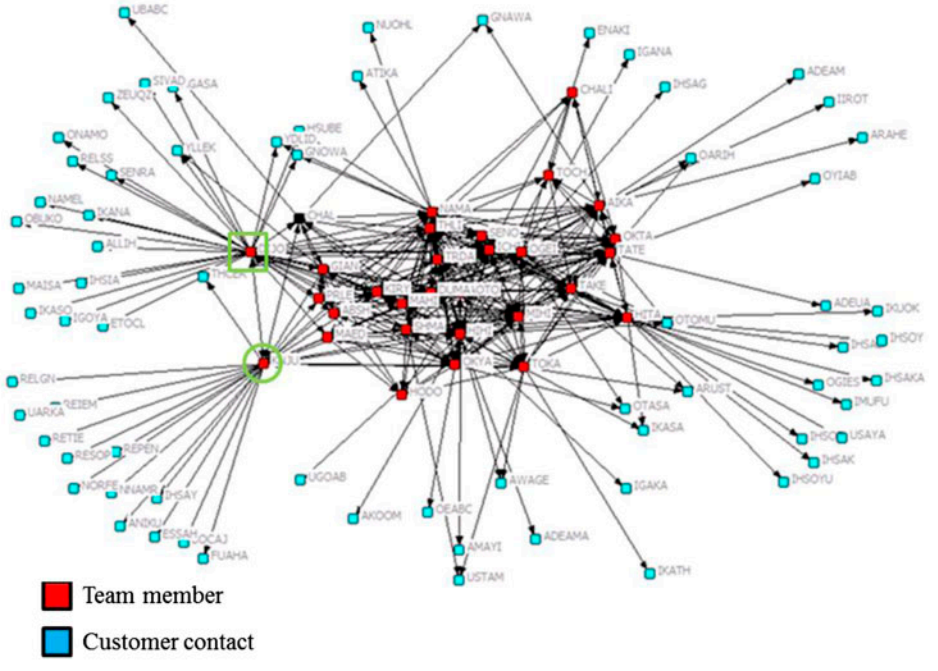

Figure 9. Alpha team, year two: information received from the customer

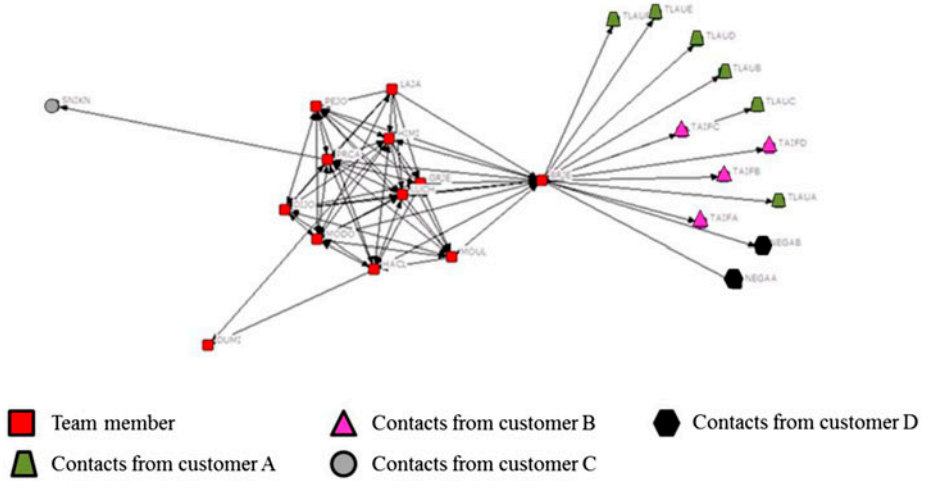

Figure 10. Beta team: information received from customer

As with the Alpha team, the Gamma team was not satisfied with the information being received directly from customer contacts at the subsidiary. This is presented in Table 7. In their opinion, too little information was being received from the rapidly

Table 7. Gamma team year-to-year comparison: information flowing into the team

Gamma team Source of received information	Year one network analysis Percentage of information received	Year two network analysis Percentage of information received
Parthenon	60%	53%
Gamma	35%	46%
Parthenon's vendor	5%	1%
Gamma's vendor	0%	0%

growing European market. To address the issue, the division reorganized the teams. CAOL, originally responsible for communication with the customer's European subsidiary, was removed from the Gamma team to focus on other growing responsibilities. MAAN assumed CAOL's responsibilities on the Gamma team. This team, like the Alpha team, saw a shift in percentages between information received from the customer and information received from internal sources (Table 7). As MAAN did not respond to the survey conducted to gather data for this research, we do not know the impact of his work on gathering information from, and disseminating information to, the customer's European subsidiary.

Discussion and study limitations

We began this study with two objectives – exploring a complementary means of assessing market orientation, and providing managers with a tool for measuring their own organization's market orientation. Our research has reinforced our belief that the Narver and Slater (1990) and Kohli and Jaworski (1990) models are complementary means of explaining the same overall phenomenon. We believe that our work has shown that network analysis can be used to complement the traditional market orientation scales. Our work, however, suggests that it cannot replace these scales. The network analysis in our study provides a lens for exploring some, but not all, dimensions of both models. In our study, network analysis also shed light on novel aspects of coordination and customer orientation, but not competitor orientation. Similarly, network analysis provided insights into how information was generated and disseminated in the teams, but did not show how the teams responded to it.

Our findings suggest that the teams' matrix organizational structure contributes to the teams' coordination. Team members belong to both cross-functional, geographic teams and cross-geographic functional teams. Team members are encouraged to serve as information brokers, sharing information gathered from one group with another, thus facilitating information transfer. Additionally, we find data to support our contention that the teams understand the importance of boundary spanners in achieving higher levels of customer orientation. The Alpha and Gamma teams assigned specific people to serve as boundary spanners and charged them with gathering and disseminating information to specific functional and geographic groups within the customer organization. These teams, in fact, attributed their business success in large part to their effectiveness in developing relationships with contacts in key functional and geographic groups. Each of these teams noted that their customer orientation suffered when the boundary spanner assigned to a particular customer subsidiary left the organization, suggesting the importance of having multiple boundary spanners to reinforce relationships. The third team cited its lack of boundary

spanners as a key reason for its failure. The lack of direct information transfer with customer contacts hindered its ability to develop a strong customer orientation.

We believe that the most meaningful insights from our network analysis came through discussion with team members. This can perhaps be seen as a limitation in that the network analysis in our study depended on another data source – interviews – for more meaningful interpretation. Discussion around the network results, however, provided the team with meaningful insights. Therefore, as a method for action research, it proved successful for the Alpha team. The Alpha team leader looked to our study to provide two benefits. First, the research suggests areas that the team should target for improvement. Second, the research should confirm whether annual improvements have been realized. The network analysis and MKTOR scale results each provided the team with distinct, but equally valuable, areas for improvement. The network analysis of the team's customer orientation, for example, suggested the team was not receiving information from key customer subsidiaries. The MKTOR analysis pointed to relative weaknesses in the team's practice of measuring customer satisfaction, an item within MKTOR's customer orientation construct. Network analysis offered a benefit not afforded by use of the statistics to analyze the MKTOR data. It was not possible to see many year-to-year improvements in the statistical analysis because of the small sample size. Annual differences, however, were clear in the network results. Members could easily compare to whom each member was connected from one year to the next. Our study therefore suggests a network approach to improving a team's market orientation might be particularly useful for smaller groups looking to benchmark performance. It is unfortunate that data from the Beta and Gamma teams were not as rich as for the Alpha team as this would have permitted additional comparisons. We did gather data in the first year of the study that measured the strength of ties. This was discontinued in the second year of gathering network data at the request of the Alpha team leader. These data have not yet been analyzed, but the data promise to generate additional insights when we see where strong and weak ties are used in the networks.

In continuing this research, it would be beneficial to work with larger teams so that it is possible to make more comparisons between the network and statistical data to see if changes in coordination and customer orientation seen in the network data are also seen in the statistical data. While we were not able in this study to use network analysis to understand competitor orientation, we believe that this might be possible in the future. In our study, we simply asked respondents to provide us with their connections within the network. We did not probe the nature of the relationship. In future research, we or other researchers might consider offering discrete choices to categorize the nature of the information provided and received. The above acknowledged, we believe that this study has met its original objectives in suggesting an alternative means of viewing market orientation that practitioners can use to assess strengths and weakness, and as a benchmark for improvement.

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