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The relevance of inter-personal and inter-organizational ties for interaction quality and outcomes of research collaborations in South Korea

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MARTIN HEMMERT

The Relevance of Inter-personal and Inter-organizational Ties for Interaction Quality and Outcomes of Research Collaborations in South Korea
Dear Reader,

The IN-EAST School of Advanced Studies constitutes a joint enterprise of researchers at the IN-EAST and colleagues in various faculties and research networks at the University of Duisburg-Essen. It has been founded in order to explore the issue of innovation in East Asia from a multidisciplinary perspective that allows for the generation of new knowledge and the advancement of new methodological approaches.

The IN-EAST School of Advanced Studies’ research agenda takes the embeddedness of processes of innovation in society as a whole as its general interest. In this context the focus lies on the interdependent topics of electro-mobility and urban systems. All research activities take East Asia (China, Japan, Korea) as subject of their analysis, but provide interfaces for international comparisons and comparative research agendas.

Innovation is understood as a social phenomenon that does not only cover the act of technological innovation but must be embedded in specific ‘social technologies’ that create innovation-inducing environments and promote the diffusion of new technological solutions in the socio-economic system in order to succeed. The starting point of the research effort may therefore be seen in the trans-disciplinary innovation literature highlighting the institutional foundations of national, regional, sectoral as well as technological innovation regimes. These specific institutions can be interpreted as ‘capital goods’ determining the productivity of individual and social innovation efforts. But as these embedding institutions are existing in specific national cultures and follow different cultural, political and technological path dependencies, innovation in general must be understood as a process that is very much determined by ideosyncratic national and cultural characteristics.

Based on this understanding we believe that a systematic collaboration between different systemic disciplines and area studies can generate significant advances in our knowledge of innovation in general and the parameters of national, regional, sectoral as well as technological competitiveness.

The organization of research is based on the research group concept already well established in the natural sciences but still new to social sciences. The IN-EAST School of Advanced Studies has at its core feature six research groups, which are constituted by one Junior Professor / Postdoc and two PhD students each. Each of these research groups works on one specific aspect of the overall research agenda. Communication and exchange of ideas, results and insights between the groups are facilitated by a series of workshops and joint events as well as a team of mentors coming from the University of Duisburg-Essen as well as leading international institutions. These mentors do not only become the formal PhD supervisors in the respective faculties and provide advice and support for specific research activities but also provide intellectual bridges between the research groups and work on meta-topics devised to establish a coherent picture of the joint research effort.

In the Working Papers on East Asian Studies we are presenting some results of the work of the IN-EAST School of Advanced Studies to the scientific community for discussion. All feedback is highly welcomed.

Markus Taube
Director, IN-EAST School of Advanced Studies
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Abstract
Informal social ties have long been recognized as relevant not only for interaction between individuals, but also for knowledge transfer and other important outcomes of business activities. This applies in particular to East Asian countries such as South Korea where informal networks are widely believed to be prevalent in economy and society. However, less is known about their role in inter-organizational collaboration efforts, such as research collaborations. This research examines the relevance of inter-personal and inter-organizational ties for interaction quality and outcomes of research collaborations in South Korea. Two types of research collaborations are studied: new product development (NPD) collaborations between companies and university-industry research collaborations (UICs). Inter-personal ties are found in a majority of both types of collaborations being studied. However, whereas inter-organizational tie strength is strongly related to interaction quality and outcomes of research partnerships, inter-personal ties are not. Implications for research and for the management of inter-organizational research collaborations are shown.

Keywords
Social ties, research collaborations, interaction quality, knowledge acquisition, Korea
Informal social ties have long been recognized as relevant for interaction between individuals, as well as for other important outcomes of business activities. Social ties among managers and employees facilitate communication, trust and effective teamwork both within and between companies (Marsden / Campbell 1984; Krackhardt 1992; Dhanaraj et al. 2004) and are therefore widely regarded as beneficial from a managerial perspective. At the same time, certain potential drawbacks of strong social ties, such as over-embeddedness and cut-off from important external information, have been identified (Uzzi 1997; Duysters / Lemmens 2003).

In business research, the concept of tie strength, defined as the degree of closeness between collaboration partners through past interactions (Granovetter 1973; Marsden / Campbell 1984), has been frequently applied to the inter-organizational level, suggesting that as a result of past interactions, representatives of collaborating firms feel collectively close to each other (Ring / Van de Ven 1994). In other words, the concept of social ties between individuals (inter-personal ties) has been transposed to the level of ties between whole organizations (inter-organizational ties). Such inter-organizational ties have been found not only as relevant for business transactions in general (Stanko et al. 2007), but also as beneficial for outcomes of knowledge-intensive exchanges such as strategic alliances (Tiwana 2008) and research collaborations (Rindfleisch / Moorman 2001).

A different stream of business research has focused on inter-personal ties and given particular attention to ties between individuals in East Asian countries. In particular, a large amount of studies has been published on the role of guanxi relationships in business and management in China (e.g., Gold et al. 2002; Gu et al. 2008; Luo et al. 2012). While it has been suggested that the relevance of guanxi may diminish over time as a result of China’s ongoing institutional transition (Peng 2003), various recent studies indicate that these inter-personal ties remain very important for doing business in China (Chen et al. 2011; Luo et al. 2012).

Inter-personal ties have also been identified as important for personal and professional life in South Korea (subsequently, Korea) (Yee 2000). Whereas they have been studied much less than guanxi relationships in China, inter-personal ties are widely believed to influence business decisions in Korea (Horak 2014). However, little is known regarding their relevance for specific business processes of Korean companies and their outcomes. In particular, their role in knowledge-intensive inter-organizational exchanges such as research collaborations remains unexplored. This is surprising, as many Korean companies have become major global players in knowledge-intensive industries (Hemmert 2012), resulting in a stronger need to maintain and strengthen their global technological competitiveness through inter-organizational research collaborations. It remains unclear how often inter-personal ties can be found in research collaborations in Korea, and to what extent they enhance the interaction quality between collaborating organizations and collaboration outcomes.

This research aims to advance our understanding of inter-personal ties in Korea by examining their role in inter-organizational research collaborations. Specifically, it addresses the following two research questions: (1) How frequently can inter-personal ties been found in inter-organizational research collaborations in Korea? (2) Do inter-personal ties enhance the interaction quality and outcomes of research collaborations in Korea, in particular when compared with the role of inter-organizational ties? Survey data on two types of inter-organizational research collaborations are studied: new product development (NPD) collaborations between
companies and university-industry research collaborations (UICs).

Subsequently, the background of inter-personal ties and research collaborations in Korea is introduced in Section 2. Thereafter, Section 3 explains the method of the two empirical studies, and their results are reported in Section 4. The findings are discussed in Section 5, followed by concluding remarks on limitations, further research directions and managerial implications in Section 6.

2 BACKGROUND: INTER-PERSONAL TIES AND RESEARCH COLLABORATIONS IN KOREA

In Korea, informal social ties and networks are regarded as strongly prevalent in the society and economy at large. For example, both the size and the density of personal networks of Koreans have been found to be larger than those of US-Americans, indicating that Koreans devote relatively more efforts to their networks (Yee 2000).

The high relevance of inter-personal networks in Korea can also be seen from the variety and richness of related concepts. The Korean term inmaek denotes inter-personal networks in general, whereas the words yongo and yonjul indicate particular types of inter-personal ties. Specifically, hyulyon (family ties), hakyon (school and university ties), and jiyon (ties based on a common region of origin) are identified as highly relevant categories of such specific ties (Horak 2014). Whereas there is agreement that these and other inter-personal ties play an important role in the personal and professional lives of Koreans (Yee 2000; Horak 2014), little is known regarding their relevance for specific business activities of Korean companies and their outcomes.

In the context of Korean business, inter-organizational research collaborations between independent partner organizations are a particularly interesting field to study the role of inter-personal ties. In the past, Korean companies entered relatively few such inter-organizational collaborations, for various reasons. From a cultural perspective, it has been challenging to pursue inter-organizational collaboration due to the strong distinction between in-groups and out-groups in a collectivistic society, and the resulting lack of trust into external organizations and their representatives who have been regarded as outsiders (Huff / Kelley 2003). Furthermore, the Korean business landscape has been dominated by large, diversified business groups (chaebols) which rely on hierarchical control within their boundaries, thereby diminishing the need for companies to collaborate with outsiders (Chang 2003). Finally, when Korea was catching up with developed countries, the import of equipment and technology from abroad was widely regarded as more effective for technological upgrading and knowledge acquisition than research collaboration with domestic partners (Lee / Lim 2001).

In the meantime, however, Korea has become a technologically advanced country with a strong national innovation system (Hemmert 2007) and one of the highest research and development (R&D) intensities in the world (OECD 2013). As a result, the attractiveness of domestic partner organizations as potential knowledge sources for innovation has increased for Korean firms (Doh / Kim 2014). Furthermore, a stronger need for domestic research collaborations can be expected, as there is now relatively less potential for technology transfer from abroad. Taken together, Korean companies have much stronger incentives than in the past to pursue domestic research collaborations, and inter-personal ties of managers with rep-
resentatives of partner organizations may be regarded as one potential means to overcome the strong inter-organizational barriers in Korea, and achieve a high interaction quality and positive outcomes in inter-organizational research collaborations.

3 Method

3.1 Data Collection and Sample

The relevance of inter-personal ties and inter-organizational tie strength for interaction quality and outcomes has been studied for two different types of inter-organizational research collaborations in Korea: (1) NPD collaborations, defined as project-based inter-organizational exchange relations between two independent firms involved in the conception, testing, production, or marketing of a new product, and (2) UICs, defined as project-based collaborative research relationships between universities and companies aiming at the generation or transfer of new products, technologies, or processes. In both studies, questionnaire data have been collected from Korean companies involved in inter-organizational research collaborations. Survey instruments were first translated into Korean and then back translated into English by separate native language speakers of the target languages to secure semantic identity of the survey contents.

For the study of NPD collaborations, data have been collected from firms with 50 or more employees in the Korean machinery and electronics industries. From the Korean Machinery Directory and the Electronics Industry Directory, initial lists of 541 machinery companies and 835 electronics firms were extracted. All these firms were contacted by phone, and those firms that were not manufacturing firms, did not exist anymore, could not be reached, did not develop any new products, or did not have any recent NPD collaborations were removed from the lists. As a result of this screening process, 165 machinery firms and 147 electronics firms with NPD collaborations remained.

A key informant who had to be intimately involved in the collaboration effort and typically was a NPD project manager was identified for each firm. Key informants were carefully instructed over the phone about the survey content and requested to respond on the most recent NPD collaboration within the last three years with an external, independent partner firm. Questionnaires were sent out and responses were collected via E-mail attachment. In total, 126 responses were received, yielding a response rate of 40.3% of the firm population with NPD collaborations. 24 responses were discarded because of missing data on key variables, resulting in a final sample of 102 collaborations, among which 49 were conducted by machinery firms and 53 by electronics firms.

The NPD collaboration sample includes a wide range of sub-classifications within the machinery and electronics industries. Most of the participating firms are small to medium-sized with a median of 125 employees and annual sales of 22 billion Korean Won (roughly equivalent to US$ 20m). The majority of the collaborations were conducted with customer firms (54%), followed by supplier firms (22%), and other partners, mostly venture firms (24%).

In the UIC survey, data were collected from Korean firms active in UICs in the microelectronics, software, and biotechnology industries. Initially, a list of 5,536 firms with 10 or more employees was extracted from the Directory of Microelectronic and Information Companies, the Directory of Bioventure Companies, and a list of companies participating in UICs obtained from the Korea Association of Industry, Academy and Research Institute. For all these firms, a prelim-
inary informant – usually the director of R&D, marketing, new product development, or new business development – was identified and contacted by phone to inquire about whether a UIC has been completed within the last three years. Through this process, 1,784 firms with recent UICs were identified. Next, key informants were identified with the assistance of the preliminary informant. These key informants were contacted by phone and surveys were sent out and collected by E-mail, following the same procedure as in the NPD study. 315 responses were received in total, producing a response rate of 17.7%. Since 28 of these responses were incomplete, they were removed from the subsequent analysis, resulting in a final sample of 287 complete responses (57 from the biotechnology industry, 116 from the microelectronics industry, and 114 from the software industry).

The UIC sample consists to a great extent of relatively young and research active small to medium-sized companies. More than 90 percent of the firms have less than 100 employees. The average firm size is 43.6 employees; the average R&D workforce is 11.1 employees; and the average firm age 9.8 years.

3.2 MEASURES

Most variables are measured through multiple item constructs which are based on previous studies with questions given on 11-point Likert scales in the NPD collaboration survey and on 7-point Likert scales in the UIC survey. The measures reflect the focal company’s perception of the inter-organizational research collaboration (see Appendix for a full list of survey items and reliability measures).

Inter-personal ties

Social relationships were measured using five categorical variables partially adapted from Yee (2000) and measuring the existence of the following inter-personal ties between representatives of the focal firms and representatives of partner organizations prior to the formation of the collaboration: (1) family ties, (2) school/university network ties, (3) regional network ties, (4) industry network ties, and (5) other inter-personal ties. To reduce social desirability, these questions were presented using very neutral wording, avoiding terms such as *inmaek* or *yongo*. The total number of types of inter-personal ties was approximated by adding up the number of prior relationships identified in each research collaboration.

Inter-organizational tie strength

The strength of inter-organizational ties was gauged through a three-item construct inspired by Granovetter (1973) on the closeness and stability of the relationship and the number of collaborations conducted with the partner prior to the focal collaboration. The scale has a Cronbach’s alpha of 0.68 for NPD collaborations and of 0.73 for UICs.

Interaction quality

The quality of interaction between collaboration partners is assessed through two constructs: communication quality and trust. *Communication quality*, defined as the quality of formal as well as informal sharing of meaningful and timely information between collaboration partners (Anderson / Narus 1990), was measured using four items on the timeliness, reliability, adequacy and completeness of the communication between collaboration partners. The items were adapted from Mohr / Spekman (1994); the Cronbach’s alpha of this composite measure is 0.92 for NPD collaborations and 0.95 for UICs. *Trust*, defined as a psychological state to accept vulnerability based upon positive expectations of the partner’s intentions in situations that are interdependent or risky (Morgan / Hunt 1994; Rousseau et al. 1998), was measured using four items based on a scale adapted from Ganesan (1994). The items measured perceived honesty, caring, and reliability of promises made. The scale has a Cronbach’s alpha of 0.88 for NPD collaborations and of 0.93 for UICs.
Collaboration outcomes

Two dimensions of collaboration outcomes are considered: knowledge acquisition and project performance. **Knowledge acquisition**, defined as the degree of information acquired via the collaboration that extends a firm’s knowledge base about new product development, and production and manufacturing processes, is a major objective in NPD collaborations (Rindfleisch / Moorman 2001). It was measured by three items adapted from Lynn et al. (1999) on the acquisition of information about new products, new manufacturing processes and personal practices. The scale has a Cronbach’s alpha of 0.73 for NPD collaborations and of 0.89 for UICs. **Project performance** is defined as the extent to which collaboration goals are met and was measured through a scale adapted from Saxton (1997) which covered five items on the fulfillment of expectations and objectives of the UIC, the extent to which the collaboration was perceived as beneficial and productive, and the motivation to do more projects with the same partner. The scale’s Cronbach’s alpha is 0.89 for NPD collaborations and 0.94 for UICs.

To control for common method variance and social desirability effects, various methodological remedies were employed, as suggested by Podsakoff et al. (2003). First, the survey was split into two parts, which were sent out separately to prevent the application of implicit theories by respondents. In the first part, information on inter-personal ties and inter-organizational tie strength and on interaction quality was collected, whereas the second part contained information on collaboration outcomes. Second, the data were collected as a part of a larger survey on success factors in inter-organizational research collaborations, meaning that both parts of the survey also contained other items unrelated to this paper, resulting in a psychological separation between the variables. Third, as mentioned earlier, words or phrases that could trigger a socially desired response were avoided in the questionnaire.

4 RESULTS

4.1 FREQUENCY OF INTER-PERSONAL TIES AND STRENGTH OF INTER-ORGANIZATIONAL TIES

The frequency of inter-personal ties in the two types of research collaborations being studied is reported in Table 1, whereas Table 2 shows the means and standard deviations for all multiple item variables.

In the study of NPD collaborations, pre-existing inter-personal ties between representatives of the partner organizations are reported for 66% of all projects. Most of these ties are based on industry networks, whereas other types of relationships such as school/university ties or regional network ties are found only in a small minority of cases, and no family ties are found for any collaboration. The average number of pre-existing inter-personal ties in the NPD collaborations is 0.73.

Among UICs, inter-personal ties between company and university representatives have been found for 71% of all projects. Moreover, the density of inter-personal ties is higher than in NPD collaborations, with school/university ties being found existing in 38%, industry network ties in 32% and regional network ties in 20% of all UICs. The average number of inter-personal ties in each UIC is 0.99.

The average strength of inter-organizational ties is 6.36 on a Likert scale ranging from 1 to 11 for NPD collaborations and 4.22 on a Likert scale ranging from 1 to 7 for UICs. Thus, the perceived inter-organizational tie strength is on average slightly above the scale center for both types of research collaborations.
The Relevance of Inter-personal and Inter-organizational Ties

4.2 Association with Interaction Quality and Collaboration Outcomes

The two-tailed correlation of inter-personal ties and inter-organizational tie strength with interaction quality and collaboration outcomes indicators is reported in Table 3 for NPD collaborations and in Table 4 for UICs.

As regards NPD collaborations, neither any specific type of inter-personal tie nor the cumulative count variable for all types of inter-personal ties is positively correlated with interaction quality aspects such as communication quality and trust, or with collaboration outcomes such as knowledge acquisition or project performance. To the contrary, negative correlations (p < 0.05) are found for two pairs of variables (between regional network ties and communication quality, and between other inter-personal ties and knowledge acquisition).

Inter-organizational tie strength between NPD collaboration partners is positively related to communication quality (p < 0.05), trust (p < 0.01) and project performance (p < 0.001). However, there is no significant correlation between inter-organizational tie strength and knowledge acquisition.

For UICs, the total number of inter-personal ties is unrelated to all aspects of interaction quality and collaboration outcomes which are considered. Furthermore, the interaction quality and outcome variables are also mostly unrelated to specific types of inter-personal ties, with a few exceptions: there is a positive correlation between other inter-personal ties and knowledge acquisition (p < 0.05), and there are negative correlations between industry network ties and communication quality and between family ties and knowledge acquisition (p < 0.05 in both cases).

Inter-organizational tie strength exhibits a strong positive correlation with all dimensions of interaction quality (communication quality and trust) and collaboration outcomes (knowledge acquisition and project performance) (p < 0.001 in all cases).

Finally, the data in Table 3 and 4 also show that both for NPD collaborations and UICs there is no association between the total number or specific types of inter-personal ties and the strength of inter-organizational ties, with only one exception: school/university network ties are positively correlated to inter-organizational tie strength in the case of UICs (p < 0.01).

### Table 1: Frequencies of inter-personal ties in research collaborations

<table>
<thead>
<tr>
<th></th>
<th>NPD collaborations (n = 102)</th>
<th>UICs (n = 287)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family ties</td>
<td>0 (0.0 %)</td>
<td>7 (2.4 %)</td>
</tr>
<tr>
<td>School/university network ties</td>
<td>4 (3.9 %)</td>
<td>110 (38.3 %)</td>
</tr>
<tr>
<td>Regional network ties</td>
<td>5 (4.9 %)</td>
<td>58 (20.2 %)</td>
</tr>
<tr>
<td>Industry network ties</td>
<td>54 (52.9 %)</td>
<td>92 (32.1 %)</td>
</tr>
<tr>
<td>Other inter-personal ties</td>
<td>11 (10.8 %)</td>
<td>17 (5.9 %)</td>
</tr>
<tr>
<td>Collaborations with at least one inter-personal tie</td>
<td>67 (65.7 %)</td>
<td>205 (71.4 %)</td>
</tr>
</tbody>
</table>

### Table 2: Means and standard deviations of variables

<table>
<thead>
<tr>
<th></th>
<th>NPD collaborations (n = 102)</th>
<th>UICs (n = 287)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of inter-personal ties</td>
<td>0.73 (0.58)</td>
<td>0.99 (0.80)</td>
</tr>
<tr>
<td>Inter-organizational ties</td>
<td>6.36 (2.15)</td>
<td>4.22 (1.35)</td>
</tr>
<tr>
<td>Communication quality</td>
<td>7.11 (1.93)</td>
<td>4.95 (1.30)</td>
</tr>
<tr>
<td>Trust</td>
<td>6.97 (1.85)</td>
<td>5.18 (1.28)</td>
</tr>
<tr>
<td>Knowledge acquisition</td>
<td>6.59 (1.65)</td>
<td>3.86 (1.49)</td>
</tr>
<tr>
<td>Project performance</td>
<td>6.79 (1.61)</td>
<td>4.67 (1.40)</td>
</tr>
</tbody>
</table>
Discussion

The two studies on different types of inter-organizational research collaborations in Korea (NPD collaborations and UICs) reveal overall similar and partially unexpected findings. First, inter-personal ties between representatives of organizations engaged in research collaborations are widely prevalent in Korea. Inter-personal ties have been found in a majority of NPD collaborations and UIPs. These findings are in line with the results of earlier studies on the high density of personal networks among Koreans (Yee 2000) and the frequency of inter-personal ties in Korean business (Horak 2014) and indicate that inter-personal ties often exist between representatives of organizations engaging in research collaborations.

At the same time, some differences in the overall density of inter-personal ties as well as the frequency of specific types of inter-personal ties can be found between NPD collaborations and UICs. Overall, the density of inter-personal ties is higher in UICs than in NPD collaborations. Moreover, whereas industry network ties are by far the most frequent type of tie in inter-personal in NPD collaborations, school and university ties are most frequent in UICs.

One possible reason for the higher density of inter-personal ties in UICs is the relatively short history of UICs in Korea. Until quite recently, few UICs were conducted in Korea, as many companies were not interested in basic research,

Table 3 Correlations between inter-personal and inter-organizational ties, interaction quality and collaboration outcomes (NPD collaborations)

<table>
<thead>
<tr>
<th></th>
<th>Strength of inter-organizational ties</th>
<th>Interaction quality</th>
<th>Collaboration outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Communication quality</td>
<td>Trust</td>
<td>Knowledge acquisition</td>
</tr>
<tr>
<td>School/university network ties</td>
<td>-0.11</td>
<td>-0.05</td>
<td>-0.18</td>
</tr>
<tr>
<td>Regional network ties</td>
<td>0.13</td>
<td>-0.21*</td>
<td>-0.03</td>
</tr>
<tr>
<td>Industry network ties</td>
<td>0.01</td>
<td>-0.11</td>
<td>-0.11</td>
</tr>
<tr>
<td>Other inter-personal ties</td>
<td>0.00</td>
<td>0.04</td>
<td>-0.03</td>
</tr>
<tr>
<td>Total number of inter-personal ties</td>
<td>0.02</td>
<td>-0.17</td>
<td>-0.18</td>
</tr>
<tr>
<td>Strength of inter-organizational ties</td>
<td>0.24*</td>
<td>0.29**</td>
<td>0.11</td>
</tr>
</tbody>
</table>

* p < 0.05, ** p < 0.01, *** p < 0.001 (two-tailed); n = 102

Table 4 Correlations between inter-personal and inter-organizational ties, interaction quality and collaboration outcomes (UICs)

<table>
<thead>
<tr>
<th></th>
<th>Strength of inter-organizational ties</th>
<th>Interaction quality</th>
<th>Collaboration outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Communication quality</td>
<td>Trust</td>
<td>Knowledge acquisition</td>
</tr>
<tr>
<td>Family ties</td>
<td>-0.10</td>
<td>-0.08</td>
<td>-0.08</td>
</tr>
<tr>
<td>School/university network ties</td>
<td>0.17**</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>Regional network ties</td>
<td>0.00</td>
<td>-0.07</td>
<td>-0.09</td>
</tr>
<tr>
<td>Industry network ties</td>
<td>0.00</td>
<td>-0.12*</td>
<td>-0.10</td>
</tr>
<tr>
<td>Other inter-personal ties</td>
<td>0.03</td>
<td>0.12</td>
<td>0.06</td>
</tr>
<tr>
<td>Total number of inter-personal ties</td>
<td>0.10</td>
<td>-0.04</td>
<td>-0.04</td>
</tr>
<tr>
<td>Strength of inter-organizational ties</td>
<td>0.54***</td>
<td>0.43***</td>
<td>0.36***</td>
</tr>
</tbody>
</table>

* p < 0.05, ** p < 0.01, *** p < 0.001 (two-tailed); n = 287

5 DISCUSSION
universities had limited resources for research activities, and the institutional infrastructure for UICs was underdeveloped (Hemmert et al. 2008). Since the turn of the millennium, as a result of a stronger need to engage in basic research by Korean companies that have reached the technological forefront, stronger research capabilities of universities, and the rapid build-up of university technology transfer centers, UICs have become more popular. However, many companies and universities in Korea are still inexperienced with conducting UICs and struggling to manage them professionally (Hemmert et al. 2014). Therefore, many academicians and corporate managers may leverage inter-personal ties to engage with previously unknown UIC partners. In contrast, Korean companies may be relatively more experienced with NPD collaborations and therefore rely less on inter-personal ties for initiating and implementing them.

The high frequency of industry network ties in NPD collaborations and of school or university network ties in UICs may be related to the networking needs for these two specific types of research collaborations. As NPD collaborations are created between company partners, industry network ties appear to be particularly instrumental for initiating and supporting them. In a similar vein, as academicians constitute one partner in UICs, school and university networks ties, including inter-personal ties between former students who have become industrial managers and their former professors, may often play a role in creating such research collaborations.

A second main finding of this study is that both in NPD collaborations and in UICs, inter-personal ties are generally unrelated to features of interaction quality (communication quality and trust) or collaboration outcomes (knowledge acquisition and project performance). In contrast, the strength of inter-organizational ties between collaborating organizations is positively related to all interaction quality features and outcomes in both types of research collaborations, with only one exception: there is no association between inter-organizational tie strength and knowledge acquisition in NPD collaborations. Thus, the results strongly indicate that whereas inter-organizational tie strength appears to be instrumental for enhancing interaction quality and outcomes of inter-organizational research collaborations in Korea, there is no such positive link between inter-personal ties and interaction quality and outcome dimensions.

Given the perceived high relevance of inter-personal ties in Korean society and business (Yee 2000; Horak 2014), these findings warrant further explanation. Follow-up hearings were conducted with representatives of selected companies and universities engaged in NPD collaborations and UICs to gain further insights on the role of inter-personal ties in these research collaborations. Company and university representatives commented that inter-personal ties between key representatives of collaborating organizations tend to nurture high initial expectations of the partner’s competency and commitment which are not always met in the subsequent everyday working-level interaction. As a result, inter-personal ties do not necessarily enhance the interaction quality or outcomes of inter-organizational research collaborations, as they are often general in nature and thus do not reflect professional competencies which are needed to make such collaborations a success. For example, whereas a personal friendship with a former high school or university classmate or a person originating from the same city or village who is now working for a different company may facilitate the initiation of a NPD collaboration, such a personal friendship may not always be related to the technical or professional competency of the partner organization or the organizational fit of the collaborating companies.

Furthermore, there are also other aspects of inter-personal ties in Korea which may sometimes inhibit their effectiveness in enhancing the interaction quality and outcomes of research collaborations (Bstieler / Hemmert 2010). So-
cial relationships in Korea are often hierarchical, and the relative position of individuals is strongly determined by their relative age and status when compared with others. For example, a different time of graduation from school or university results in hierarchical relationships between individuals in alumni networks. When junior partners may find it difficult to speak up towards their senior counterparts during the working-level interaction in a research collaboration, such unequal power status may negatively affect the interaction quality between collaboration partners (Lawler et al. 2000) and eventually, collaboration outcomes.

Taken together, the results of the two studies suggest that in contrast to widespread perceptions in the business community in Korea regarding the importance of inter-personal ties (Horak 2014), these ties may often not be instrumental for achieving a high interaction quality and positive outcomes in research collaborations, as such ties are mostly unrelated to professional competencies and the specific needs of organizations engaging in research collaborations. In this sense, Korean yongo relationships which are often based on fixed personal attributes such as kinship, educational institution or geographical origin appear to be quite different from guanxi ties in China which are mostly unrelated to such personal attributes and are built in a targeted manner when relationships with specific individuals appear to be helpful for achieving specific goals (Gu et al. 2008).

This interpretation of the findings is supported by the strong association of inter-organizational tie strength with the interaction quality and outcomes of NPD collaborations and UICs. In contrast to inter-personal ties, inter-organizational ties reflect the track record of partners in previous interaction and are therefore not only helpful for assessing the partner’s technical and managerial competencies in research collaborations, but also for predicting its future behavior (Krackhardt 1992). As a result, a higher interaction quality and better outcomes may be achieved when collaborating with partners with strong inter-organizational ties.

Inter-organizational tie strength is positively related to all aspects of interaction quality and collaboration outcomes both for NPD collaborations and UICs, with only one exception: there is no association between inter-organizational tie strength and knowledge acquisition in NPD collaborations. This result could be related to the potential knowledge redundancy between NPD collaboration partners which are not only focusing on similar technical challenges, but may also have absorbed much of the partner’s knowledge throughout previous interaction. This suggests that Granovetter’s (1973) emphasis on weak ties for the acquisition of new knowledge may be relevant in the context of NPD collaborations in Korea. In contrast, there may be less knowledge overlap between companies and universities with strong inter-organizational ties due to the different goals and organizational cultures of companies and universities (Bruneel et al. 2010). As a result, strong inter-organizational ties appear to be more instrumental for knowledge acquisition in UICs than in NPD collaborations.

Finally, the results of the two studies also indicate that inter-personal ties and inter-organizational tie strength are mostly unrelated in inter-organizational research collaborations in Korea. This finding further supports the argument presented above on the ineffectiveness of inter-personal ties for achieving a high interaction quality and positive outcomes due to the lack of relatedness of these inter-personal ties to the highly specific technical and managerial needs of research collaborations. As an inter-personal tie with an individual in a partner organization which is based on a common educational background or geographic origin does not necessarily mean that positive outcomes can be achieved in a research collaboration with this partner organization, inter-personal ties may often not result in strong inter-organizational ties.
6 CONCLUSION

The studies of NPD collaborations and UICs in Korea have two main findings: (1) Inter-personal ties between representatives of partner organizations can be frequently found in both types of inter-organizational research collaborations. (2) In contrast to inter-organizational tie strength, inter-personal ties are not related to interaction quality and outcomes of inter-organizational research collaborations. The two studies thus contribute to our knowledge on the relevance of inter-personal ties in the context of research collaborations, which play an important role in the innovation systems of technologically advanced countries as Korea.

This research has some limitations. It relies on information provided by a single key informant for each research collaboration, as it turned out to be difficult to obtain multiple responses from the mostly small R&D teams of the surveyed firms. Instead, the quality of responses was maximized through the careful selection of key informants and the careful instruction of these key informants about the survey.

A number of remedies have been employed to minimize the potential for common method variance, as suggested by Podsakoff et al. (2003). However, its existence cannot be strictly ruled out.

Furthermore, the potential of these two cross-sectional studies to capture the dynamic interaction between partner organizations in inter-organizational research collaborations is limited.

Finally, the findings of this research partially rely on correlation analysis. As statistical correlation is not equivalent to causality, some caution is needed regarding the interpretation of results.

Given the contributions and limitations, there are several promising research avenues for further studies on the relevance of inter-personal ties for research collaborations and other innovation-related business activities. Case study and longitudinal study designs may be employed to verify the results of this research and further advance our understanding of the role of inter-personal ties in research collaborations. Furthermore, studies on the largely unexplored relevance of inter-personal ties for business and research collaborations in other East Asian studies also appear to be highly promising.

From the perspective of representatives of Korean firms engaged in research collaborations, the findings suggest that managers should not excessively rely on inter-personal ties for partner selection and the management of research collaborations. Whereas inter-personal ties may be instrumental for identifying potential collaboration partners, these partners may not always necessarily be the best ones for achieving a high interaction quality and positive outcomes such as knowledge acquisition. It therefore appears important to evaluate all potential partners objectively in terms of technical and managerial competence and fit with the focal firm’s needs, and proceed with inter-organizational research collaborations only when the results of this evaluation process are positive.

REFERENCES


References


# Appendix. Measures of Variables

**Inter-personal ties**

Prior to this collaboration, the following relationships between representatives of our firm and the partner existed:

- (a) family relationships
- (b) school/university network relationships
- (c) regionally based relationships
- (d) industry network-based relationships
- (e) other personal relationships

<table>
<thead>
<tr>
<th></th>
<th>Loadings (NPD collaborations)</th>
<th>Loadings (UICs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inter-organizational tie strength</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(NPD collaborations: ( \alpha = 0.68 ); UICs: ( \alpha = 0.73 ))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior to this collaboration,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>... our business relationship with this partner was close</td>
<td>0.78</td>
<td>0.86</td>
</tr>
<tr>
<td>... we did a lot of collaborations with this partner</td>
<td>0.83</td>
<td>0.65</td>
</tr>
<tr>
<td>... the history of our relationship with this partner was stable</td>
<td>0.75</td>
<td>0.90</td>
</tr>
</tbody>
</table>

**Communication quality**

(NPD collaborations: \( \alpha = 0.92 \); UICs: \( \alpha = 0.95 \))

In this collaboration, the communication between us and the partner representatives was

<table>
<thead>
<tr>
<th></th>
<th>Loadings (NPD collaborations)</th>
<th>Loadings (UICs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>... untimely/timely</td>
<td>0.87</td>
<td>0.92</td>
</tr>
<tr>
<td>... inaccurate/accurate [you can rely on it]</td>
<td>0.90</td>
<td>0.95</td>
</tr>
<tr>
<td>... inadequate/adequate</td>
<td>0.91</td>
<td>0.93</td>
</tr>
<tr>
<td>... incomplete/complete</td>
<td>0.90</td>
<td>0.95</td>
</tr>
</tbody>
</table>

**Trust**

(NPD collaborations: \( \alpha = 0.88 \); UICs: \( \alpha = 0.93 \))

In this collaboration,

<table>
<thead>
<tr>
<th></th>
<th>Loadings (NPD collaborations)</th>
<th>Loadings (UICs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>... the partner’s representatives were frank in dealing with us</td>
<td>0.85</td>
<td>0.90</td>
</tr>
<tr>
<td>... promises made by the partner’s representatives were reliable</td>
<td>0.93</td>
<td>0.93</td>
</tr>
<tr>
<td>... if problems (such as delays) arose, the partner’s representatives were honest about the problems</td>
<td>0.90</td>
<td>0.89</td>
</tr>
<tr>
<td>... we felt the partner’s representatives were on our side</td>
<td>0.78</td>
<td>0.91</td>
</tr>
</tbody>
</table>

**Knowledge acquisition**

(NPD collaborations: \( \alpha = 0.73 \); UICs: \( \alpha = 0.89 \))

Through this collaboration,

<table>
<thead>
<tr>
<th></th>
<th>Loadings (NPD collaborations)</th>
<th>Loadings (UICs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>... we learned a lot about how to develop new products</td>
<td>0.84</td>
<td>0.91</td>
</tr>
<tr>
<td>... we received a lot of insights about new manufacturing processes</td>
<td>0.78</td>
<td>0.92</td>
</tr>
<tr>
<td>... we gained a lot of personal practice, know-how and tricks from our partner</td>
<td>0.79</td>
<td>0.90</td>
</tr>
</tbody>
</table>

**Project performance**

(NPD collaborations: \( \alpha = 0.89 \); UICs: \( \alpha = 0.94 \))

In this collaboration,

<table>
<thead>
<tr>
<th></th>
<th>Loadings (NPD collaborations)</th>
<th>Loadings (UICs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>... our expectations have been met</td>
<td>0.77</td>
<td>0.85</td>
</tr>
<tr>
<td>... we achieved our objectives</td>
<td>0.89</td>
<td>0.90</td>
</tr>
<tr>
<td>... it was beneficial to invest the time and efforts</td>
<td>0.91</td>
<td>0.92</td>
</tr>
<tr>
<td>... the relationship with the partner was productive</td>
<td>0.84</td>
<td>0.94</td>
</tr>
<tr>
<td>... we became motivated to do more new projects with this partner</td>
<td>0.75</td>
<td>0.89</td>
</tr>
</tbody>
</table>
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