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AN INQUIRY INTO THE STATUS AND NATURE OF UNIVERSITY-INDUSTRY RESEARCH COLLABORATIONS IN JAPAN AND KOREA*

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Abstract

University-industry collaboration (UIC) has become an increasingly frequent innovation strategy, especially in the Western hemisphere. But we know much less about such research collaborations in East Asia. This study explores and contrasts the current nature and status of UICs in Japan and Korea focusing on factors that facilitate the development and management of such research linkages. The findings indicate that UICs are path dependent, i.e. firms benefit from their experience with previous projects when collaborating with universities. At the same time, cultural factors appear to result in significant differences in the organization of UICs in Japan and Korea.

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I. *Introduction and Literature Review*

In today's global economy firms have become extremely concerned with fierce competition, the fast pace of technological change, the increasing speed with which new technologies must progress from development to commercialization, and the increasing level of technological complexity. These challenges require a multidisciplinary approach, interaction with external entities, and mutual knowledge sharing and development. As a consequence, industry increasingly enters into collaborative arrangements with universities to obtain, combine, and leverage their R&D resources. This development reflects the fact that innovating companies are eager to acquire emerging technologies and scientific knowledge, while universities increasingly open up to industry, seek additional research funding, and become more application-oriented (Etzkowitz and Klofsten, 2005). The prevailing perspective on university-industry collaborations (UICs) for R&D suggests that these can facilitate innovation and commercialization efforts of firms and lead to competitive advantage (Leydesdorff and Meyer, 2006). This changed setting has been addressed as open innovation (Chesbrough, 2006).

However, R&D and product innovation is often complex and difficult and many of these difficulties are likely to be accentuated in collaborative development, particularly when partners from corporate and academic cultures must coordinate and depend on one another for the success of the R&D project. UIC also raises unique challenges, such as how to protect intellectual property when for universities the free and open dissemination of research results is essential to the goal of expanding knowledge, while for industry the protection and exploitation of proprietary information is necessary to the ultimate goal of financial return.

Given the crucial importance of innovation for survival in most industries, this study examines such research collaborations. In spite of numerous obstacles, cooperation between firms and universities is an increasingly frequent innovation strategy. A UIC here is defined as a project-based R&D collaboration between universities and companies aiming at the generation or transfer of new products, technologies, or processes. Such relationships can be instrumental in facilitating the industrial firm's advancement of both knowledge and new technologies and may enhance the firm's technological innovations with reduced in-house R&D expenses. At the same time, universities find themselves under increasing pressure to open themselves up for more collaboration with industrial partners in order to obtain sufficient funds for conducting research activities.

While UICs for the development of new products or technologies are of growing importance, they remain relatively understudied in general (Santoro and Saparito, 2003). Extant research has predominantly investigated the conditions or processes that influence the performance of such collaborations, including geographical proximity between the partnering organizations (Santoro, 2000), companies' innovation strategies (Bercovitz and Feldman, 2007), firm size (Santoro and Chakrabarti, 2002), the amount of university linkages (George et al., 2002), organizational factors, such as firm structures, cultures, or university intellectual property policies (Gopalakrishnan and Santoro, 2004; Hertzfeld et al., 2006), organizational knowledge

interfaces (Sherwood and Covin, 2008), trust in the university partner (Barnes et al., 2002), commitment to the collaboration (Mora-Valentin et al., 2004) or the role of knowledge explicitness in university-industry interaction (Santoro and Bierly, 2006). Empirical analyses on the determinants and effects of UIC found out that large and research-intensive companies particularly tend to collaborate with universities (Fritsch and Lukas, 2001; Mohnen and Hoareau, 2003).

Yet, we still know little about international differences regarding the organization and outcomes of UICs, as most previous studies were conducted in single countries only (Veugelers and Cassiman, 2005; Hanel and St.Pierre, 2006). Though the European Community Innovation Survey (CIS-2) covers various countries, it does not sufficiently address details on collaboration patterns and sector particularities (Tether, 2001) . Few international comparative studies explicitly focus on branch peculiarities. In the case of biotechnology Owen-Smith et al. (2002) compare university-industry relations in Europe and the U.S., while other studies focus on single countries such as Häussler (2004) on UIC in the German biotechnology sector.

Moreover, the extant UIC research has been predominantly focused on Western countries, whereas little is known about the situation in Asian economies. Among the few previous research conducted on UIC in Japan studies focused on firm specific determinants like size (Fukugawa, 2005), research intensity (Motohashi, 2005) or the role of intermediary organisations (Kodama, 2008) and the impacts of recent changes in the Japanese university system (Woolgar, 2007) . Other studies found out that the occurrence of UIC increased Japanese companies' R&D productivity (Zucker and Darby, 2001).

In light of this, the purpose of this study is to explore the current nature and status of such collaborations in Japan and South Korea (subsequently: Korea). More specifically, we explore and contrast factors which can facilitate the development and management of research linkages between industry and universities in these two countries. The particular social and context variables examined in this study include industry's prior experience with UICs, how research partners find each other, the transparency and perceived fairness of university intellectual property policies, the role of technology transfer offices, the importance of clear ground rules for collaboration, trust between the collaboration partners, the role innovation champions play in these arrangements, and the outcomes of these collaborations.

The focus of this research is on the industry partner within the UIC. In the following, we provide a brief summary on the status of UICs in the two countries. We then present the findings of a recent study on over 500 UICs in Japan and Korea and suggest recommendations for the future management of such R&D projects.

II. *A Brief Historical Overview on UIC in Japan and Korea*

1. Japan

Formal and informal UICs have been active for more than 100 years[1], encompassing a large part of the history of Japanese universities. Therefore, it would be too simplistic to assume that UIC is underdeveloped in Japan or lags far behind the United States and Europe.

[1] Baba and Goto (eds.) (2007) provide several examples of UICs in Japan from the 1880s to the 1950s.

However, UICs were institutionally constrained after World War II as a reaction against the wartime experiences and became even more inactive after the 1960s[2].

The crucial moment in science and technology policy came in 1995 with the Science and Technology Basic Law. Two important initiatives aimed at promoting UIC were enacted under the first Science and Technology Basic Plan (1996-2000): "The act to promote technology transfer from universities" in 1998, the so-called "TLO Act", that financially supports the Technology Licensing Organizations (TLOs) at universities, and "The special act to regenerate industrial vitality" in 1999, which enabled national universities to retain intellectual property rights based on government research funds (the Japanese version of the U.S. Bayh-Dole).

Under the second Science and Technology Basic Plan (2001-2005) the university system in Japan experienced further drastic changes. In 2003, MEXT (Ministry of Education, Culture, Sport, Science, and Technology) started to set up the Intellectual Property Centers at universities to manage and make better use of intellectual properties. In 2004, national universities were transformed into more independent university corporations. In 2005, METI (Ministry of Economy, Trade, and Industry) achieved its goal to create 1,000 academic spin-offs within five years. It is also noteworthy that the constraints on the faculty of national universities to work for private firms have been relaxed step by step since 2000. In order to promote UICs at the regional level, METI launched the Industrial Cluster Project in 2001, followed by the Intellectual Cluster Project by MEXT in 2002.

Supported by these policies, the number of R&D collaborations between national universities and private firms etc. increased remarkably from 56 in 1983 to 2,568 in 1998 and to 13,654 in 2007 (NISTEP, 2003; MEXT, 2008)[3]. The number of joint R&D projects involving private and public universities (prefectural and municipal) amounted to 2,557 in 2007, so that national universities account for the large majority of UICs.

It is noteworthy that small firms play an important and increasing role in R&D collaboration with national universities[4]: Their share in the number of joint R&D projects with national universities has consistently increased from 13% in the mid-1980s (1983-1986) to 40% at the beginning of the 21st century (2001-04)[5].

2. Korea

Until the 1990s innovation-related collaboration between industry and universities was very limited and joint research activities were rare. Several reasons can be identified for the previously low level of university-industry interaction in Korea. First, there was a lack of interest by companies to enter technological collaborations with universities. Until the 1990s, most Korean companies were still catching up technologically to competitors from the most

[2] Even during the period where formal UICs were inactive, close informal relationships were in place. These informal relationships were formed and maintained through the placement of students (Branscomb et al., 1999).

[3] These numbers do not include commissioned (contracted) research projects. National universities include national graduate institutes and junior colleges. Public organizations and local authorities count among private firms etc. This statistic counts only the formal projects reported to MEXT from each national university since 1983.

[4] According to the Small and Medium Enterprise Basic Law revised in 1999, small businesses in the manufacturing sector are defined here as those with less than 300 employees or 300 million yen capital.

[5] In calculating the share of small businesses, the number of joint R&D projects with private firms (excluding public organizations and local authorities) is used as the denominator.

advanced countries. The focus was primarily on collaborating with foreign rather than Korean firms, as the former were perceived to be more competent in the technological domain. Korean firms also tended to be primarily interested in applied technologies that could directly enhance business performance instead of seeking scientific knowledge suitable to strengthen research capabilities and long-term technological competitiveness. As a result, companies mostly disregarded universities as potentially attractive collaboration partners.

Second, Korean universities were not known to be strong research institutions. In fact, until quite recently universities were regarded by Koreans as predominantly education institutions and their research activities gained relatively little attention (Kim, 1997). The universities' activities were primarily focused on teaching with modest research budgets.

Third, there was very little infrastructure in place to support research partnerships between universities and companies. Universities did not have clear and explicit IP policies or technology transfer offices that could facilitate the interaction with industry.

However, the situation regarding UICs in Korea has changed very significantly since the turn of the millennium. Many companies have reached the technological forefront and are increasingly interested in strengthening not only their development and engineering competencies, but also their research capabilities (Kim, 1998; Cho et al., 2005). At the same time, government and private funding of university research has steeply expanded, resulting in an almost threefold increase of their R&D expenditures within less than ten years (MoST, 2007). In the most recent 2007 OECD STI Scoreboard Korea ranks fourth among OECD countries with the highest growth in government R&D budgets. Consequently, many universities are able to change priorities and direction and increasingly emphasize and support their faculties' research output and quality. As a result, the capabilities to conduct high-level scientific research at many Korean universities have been rapidly improving in recent years and so has the supporting infrastructure for UICs (OECD, 2005). To illustrate, there were no technology transfer centers in universities until 2002. Since then, 134 of such transfer centers were built, thereby covering the vast majority of full-scale universities in Korea (Korea Research Foundation, 2007).

As a result of the various favorable environmental changes, the number of UICs has been rapidly increasing in Korea throughout the last years.[6] Accordingly, the number of patents which were co-held by members of different organizations or institutions has been increasing steeply since the 1990s (Lim, 2006). Nevertheless, the general perception remains that there is still ample room for expanding and deepening such collaborations in Korea.

As in Japan, small and medium sized enterprises (SMEs) play an important role in the field of UICs in Korea. In a survey among 12 leading universities conducted in 2006, 51.6% of all collaborations by these universities were conducted with SMEs with less than 300 employees (Korea Research Foundation, 2007).

[6] The total number of UICs has been statistically counted in Korea only in recent years. In 2005, there were 4,846 such collaborations (KSTC, 2006). Thereafter, the number of collaboration cases increased to 5,229 in 2006 and 5,660 in 2007 (information obtained by phone from the Korea Institute of Science and Technology Evaluation and Planning).

III. *The Study: University-Industry Collaboration in Japan and Korea*

1. Data and Sample

We collected data on UICs for developing new technologies or products in Japan and Korea. We sampled firms with at least ten (Korea) or twenty (Japan) employees in the biotechnology, microelectronics, and software industries. The industry selection was guided by the observation that there appears to be a high propensity to conduct UICs in these three fields in general (Meyer-Krahmer and Schmoch, 1998).

In Korea, company directories of industry associations were used to identify the sample firms. These lists contained 5,306 firms with more than ten employees: 431 firms in the biotechnology industry, 2,647 firms in the software industry, and 2,228 firms in the microelectronics industry. In these firms we contacted a preliminary informant, usually the director of R&D, marketing, new product development, or new business development to confirm that the firm is indeed active in UIC and help identify the most recently completed UIC project. Then a key informant within each firm—the person considered most qualified to respond to the survey, mostly a project manager—was identified and their cooperation solicited.

In Japan, the sample firms were collected mainly from the Tokyo Shoko Research Company Database based on industry classification at the 3 or 4 digit level for the lack of reliable and comprehensive company directories for the focal industries, especially for microelectronics and software. In this way, we identified 1,761 firms from diverse biotechnology-related industries, 3,520 firms from diverse microelectronics-related industries, and 4,037 firms classified into the software industry. Then we added 564 firms from the member list of the Japanese Bioindustry Association (JBA). Thus, we obtained a sample of 9,882 firms in total for the postal survey.

The data were collected via a structured questionnaire. The initial English language version was translated into Japanese and Korean and then translated back into English by a different person to secure the identity of the contents. We then pre-tested both versions with managers from the sample firms, resulting in slight adaptations. In the questionnaire we tapped into the perceptions of the informants regarding environmental factors, arrangements and processes, and outcomes of the most recent UIC. Most responses were given on 7-point Likert scales.

A total of 1,223 responses were received in Korea and 1,732 responses in Japan (response rates: 23.0% and 17.5%, respectively). 284 firms (23.2% of all responding firms) conducted and finished an UIC in the period 2005-2007 in Korea and 277 firms (16.0% of all responding firms) in Japan. Thus, we obtained samples in comparable size in both countries.

The composition and characteristics of the sample firms are summarized in Table 1. The average firm size is higher in Japan than in Korea because of the difference in sampling, but more than 90% of the total responses were received from small and medium-sized firms with less than 300 employees in both countries. The firms appear to be strongly technology oriented with a high proportion of the workforce dedicated to R&D activities.

TABLE 1. SAMPLE COMPOSITION AND CHARACTERISTICS

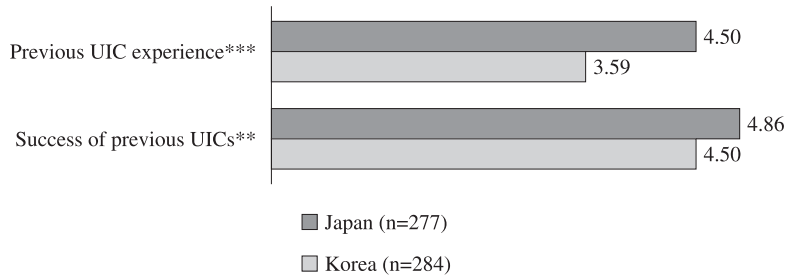
	Japan	Korea
Number of responses by industry		
Biotechnology	107	66
Microelectronics	75	106
Software	80	112
Other industries or not identified	15	–
Total	277	284
Characteristics of sample firms		
Mean number of employees (sd)	100.6 (142.6)	45.2 (137.2)
Mean number of R&D workforce (sd)	52.8 (202.7)	11.2 (50.3)

2. Results

Figure 1 shows the respondents' perceptions regarding the amount of previous UIC experience and the success of previous UICs. The results indicate that Japanese firms have significantly more UIC experience than their Korean counterparts ($p < .01$). Moreover, the Japanese respondents rate the success of previous research collaborations with universities significantly higher than the Korean respondents ($p < .05$).

Next, we examined the information sources the companies used for finding university partners (Figure 2). In both countries, the personal network of the firms' managers is perceived as the most important source of information in this context. However, for Korean UICs the importance of this information source is higher than for Japanese collaborations ($p < .1$). Reversely, the relative importance of all other information sources, with the exception of business partners, is rated higher by the Japanese than by the Korean respondents ($p <. 01$ for all items). These results suggest that Korean firms predominantly rely on their managers' personal networks when searching for university partners, while the Japanese firms more extensively use multiple external information sources. Moreover, the relative importance of

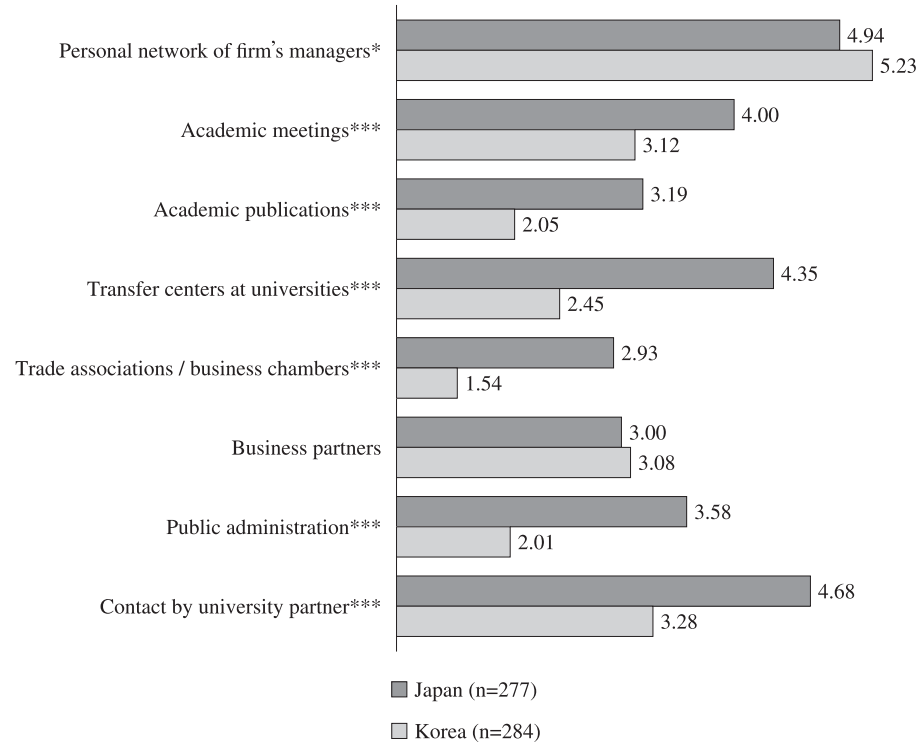
FIG 1. PREVIOUS UIC EXPERIENCE AND SUCCESS OF SAMPLE FIRMS (MEAN VALUES)



Scale: 1 = no projects at all/generally unsuccessful –7 = a lot of projects/generally successful

** significant difference at 0.05-level
*** significant difference at 0.01-level

FIG 2. RELEVANCE OF INFORMATION SOURCES FOR FINDING UNIVERSITY PARTNERS (MEAN VALUES)



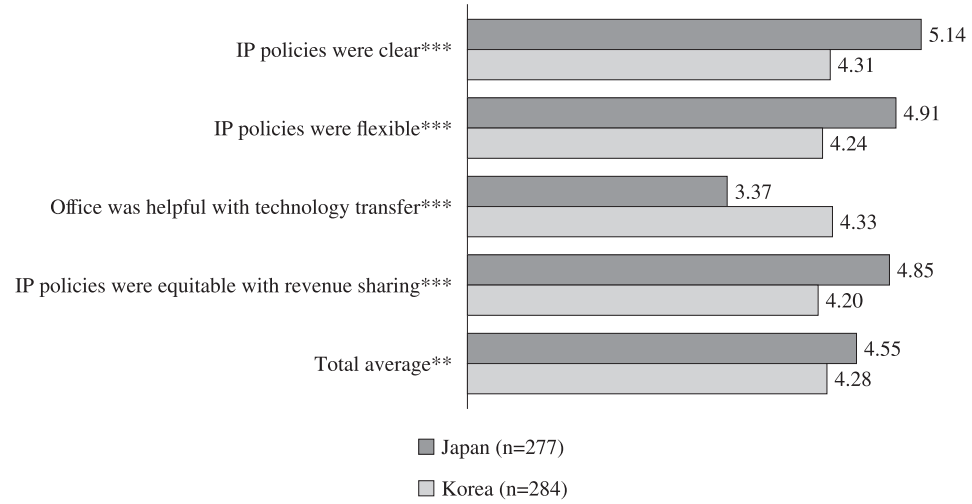
Scale: 1 = not relevant at all – 7 = extremely relevant

* significant difference at 0.1-level
*** significant difference at 0.01-level

'transfer centers at universities' and 'contact by the university partner' as information sources for firms is significantly higher in Japan compared to Korea ($p < .01$). This indicates that Japanese universities and their faculty play a much more active role in contacting firms for research partnerships.

We also asked the managers to evaluate the role of partner universities' IP policies and transfer offices in supporting UICs (Figure 3). The Japanese managers perceive the intellectual property (IP) policies of their partner universities as clearer, more flexible and more equitable than the Korean managers ($p < .01$ for all items). At the same time, the Korean respondents perceive the partner universities' transfer offices as more helpful with technology transfer than their Japanese counterparts ($p < .01$). These results indicate that whereas Japanese universities have established relatively clear and supportive IP policies to help transferring technology to company partners of UICs, universities in Korea rely to a higher extent on the discretionary

FIG 3. EVALUATION OF PARTNER UNIVERSITY'S SUPPORT OF UICS (MEAN VALUES)



Scale: 1 = strongly disagree – 7 = strongly agree

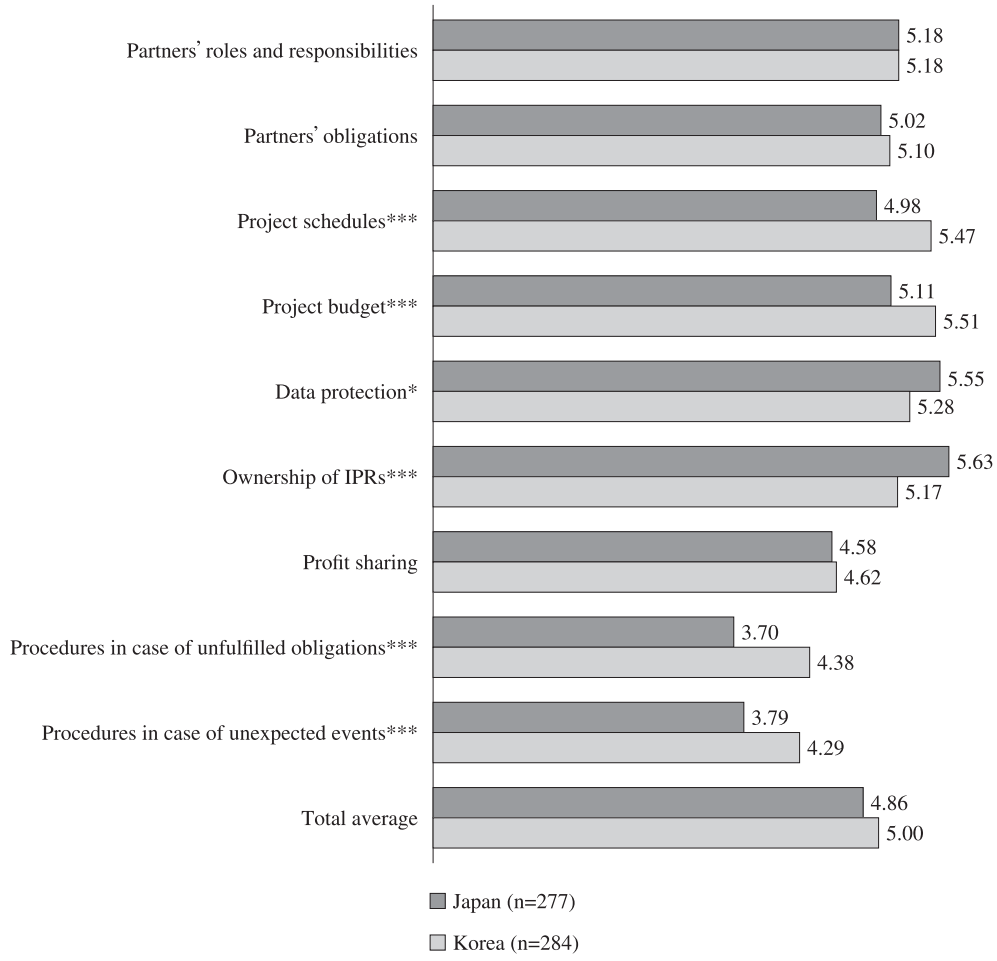
** significant difference at 0.05-level
*** significant difference at 0.01-level

management of their transfer offices' staff regarding this matter. On average, the Japanese respondents evaluate their partner universities' support of UICs higher than their Korean counterparts ($p < .05$).

Furthermore, our survey tapped into the managers' perceptions regarding the role of various relational mechanisms in research collaborations with universities. The strength of contractual safeguards in UICs varies between the two countries (Figure 4). In particular, contractual safeguards are more strongly pronounced in Korea than in Japan regarding project schedules, project budgets, procedures in case of unfulfilled obligations and procedures in case of unexpected events ($p < .01$ for all items). At the same time, contractual provisions regarding ownership of intellectual property rights ($p < .01$) and data protection ($p < .1$) are more explicit in Japan than in Korea. These findings suggest that Korean firms perceive a stronger need for contractual safeguards to deal with relational uncertainties on issues such as schedules, budgets or partners' obligations in UIC projects, while Japanese firms perceive a stronger safety need for appropriation issues related to the knowledge jointly generated with universities. In total, Korean firms appear to put more emphasis on contractual safeguards than Japanese firms. However, the accumulated difference between the two countries is not significant.

The trust developed between the partners in UICs is perceived as clearly higher by the Japanese than by the Korean respondents (Figure 5). For seven out of nine survey questions as well as for the total average, the assessments of respondents on how much they trust their university partners are higher in Japan than in Korea ($p < .01$). This indicates that a higher amount of trust is developed in Japanese than in Korean UICs.

FIG 4. STRENGTH OF CONTRACTUAL SAFEGUARDS IN UICS (MEAN VALUES)

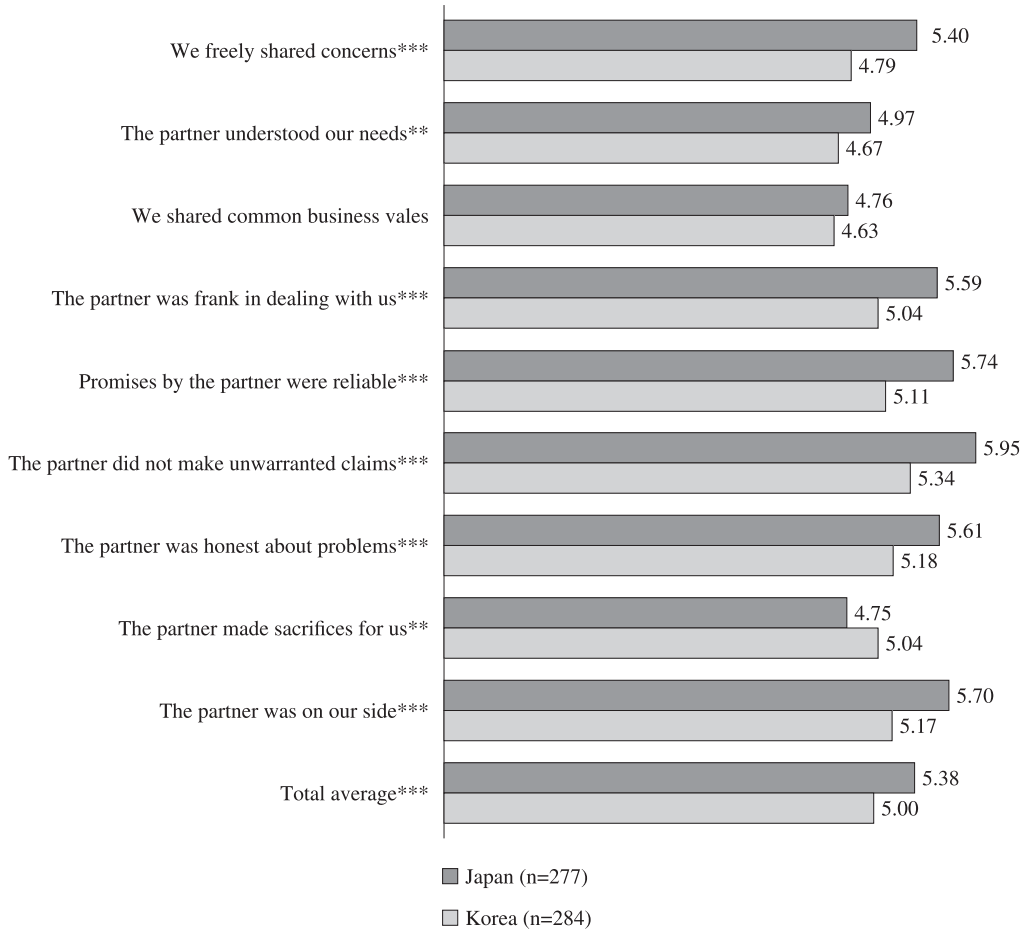


Scale: At the beginning of the research collaboration, there was 1 = no mutual understanding – 4 = an oral mutual understanding – 7 = a mutual understanding exactly defined in written document regarding these issues

* significant difference at 0.1-level
*** significant difference at 0.01-level

Moreover, the Korean respondents evaluate the role of innovation champions in UICs higher than their Japanese counterparts (Figure 6). An innovation champion is "an individual who is intensely interested and involved with the overall objectives and goals of the UIC and who plays a dominant role in many of the research-engineering interaction events through some of the stages, overcoming technical and organizational obstacles, and pulling the effort through its final achievement by the sheer force of his or her will and energy" (Chakrabarti, 1974). For four out of seven related survey questions as well as for the total average across all questions,

FIG 5. AMOUNT OF TRUST BETWEEN PARTNERS IN UICS (MEAN VALUES)



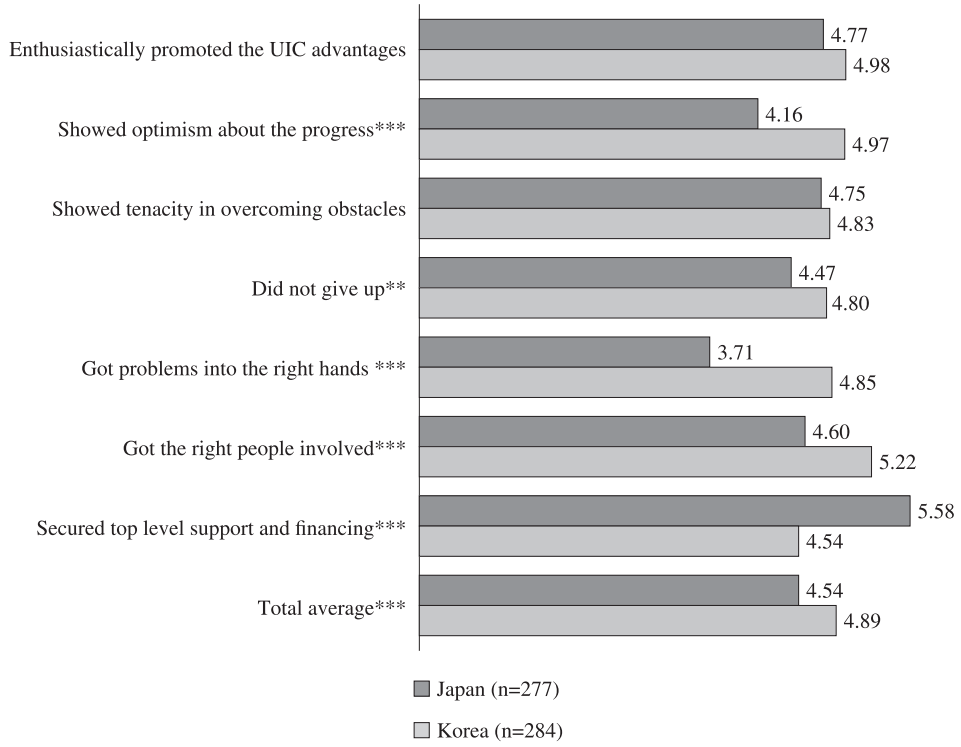
Scale: 1 = strongly disagree – 7 = strongly agree

* significant difference at 0.1-level
** significant difference at 0.05-level
*** significant difference at 0.01-level

the role of such innovation champions is more strongly emphasized in Korea than in Japan ($p < .01$). Only regarding 'securing top level support and financing', the Japanese managers regard the role of product champions as more important than the Koreans.

Finally, we also find some significant differences regarding the perceived outcomes of UICs between the two countries (Figure 7). On various aspects, such as whether the results met expectations, time and efforts spent were worthwhile and the collaboration motivated the firm to do more projects with universities, as well as the extent of technical success, the Japanese

FIG 6. ROLE OF INNOVATION CHAMPIONS IN UICS (MEAN VALUES)



Scale: 1 = strongly disagree – 7 = strongly agree

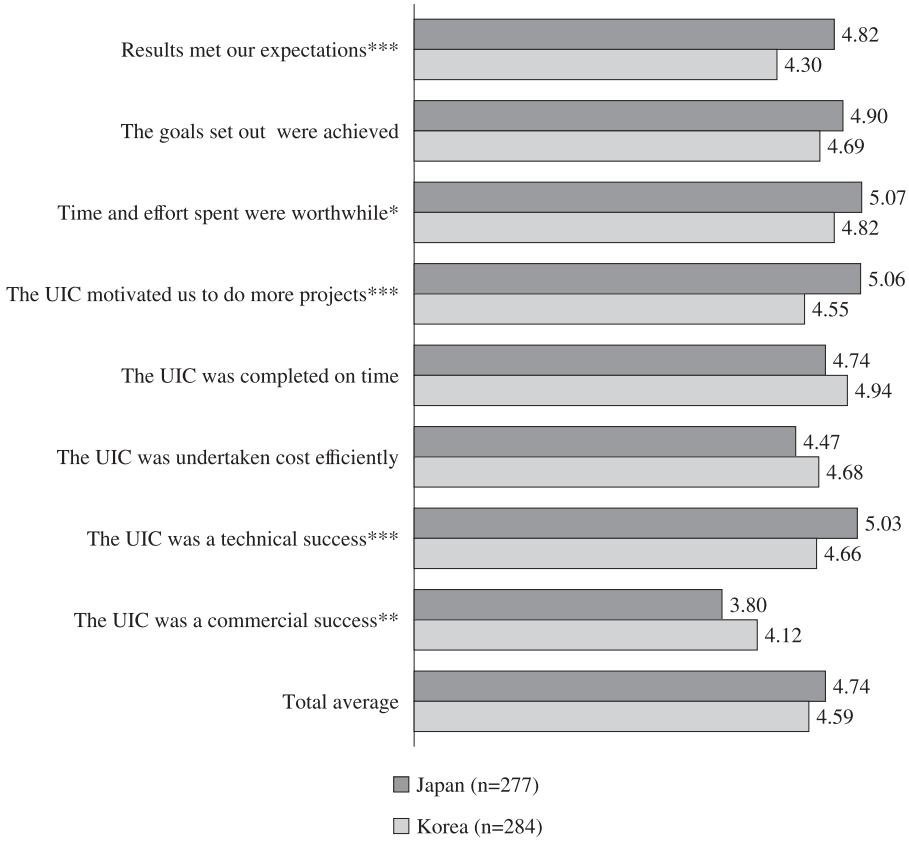
** significant difference at 0.05-level
*** significant difference at 0.01-level

respondents evaluate the outcomes more positively than the Koreans. At the same time, the commercial success of UICs is perceived to be higher by the Korean respondents. For the total average of all related survey questions, the UIC outcome assessments in Japan are slightly higher than in Korea, although the difference is not significant.

3. Discussion

In this study we find a number of differences regarding the organization and outcomes of UICs in Japan and Korea. First, the Japanese firms have more experience with UICs and perceive the success of their previous research collaborations with universities higher than the Korean counterparts. These findings are likely due to the relatively earlier improvements in the conditions and the environment for UICs in Japan. As outlined above, changes in governmental policies and attitude changes in industry and academia on research collaborations in both

FIG 7. FIRMS' SATISFACTION WITH UICs (MEAN VALUES)



Scale: 1 = strongly disagree – 7 = strongly agree

* significant difference at 0.1-level
** significant difference at 0.05-level
*** significant difference at 0.01-level

countries fostered an environment within which UICs could better flourish. However, whereas these changes occurred in Japan since the 1990s, they could be observed in Korea only since the turn of the millennium. UIC research also indicates a virtuous cycle in UICs once a project is successfully completed. Both industry and academia become more skilled and professional in collaborating with each other, which, in turn, breeds additional collaborations (Santoro, 2000). Our findings suggest that Japanese firms may be able to achieve better outcomes in UICs than Korean firms due to their richer experience in this field.

Second, Korean firms rely to a higher extent on the personal network of their managers when searching for university research partners, whereas Japanese firms use other sources of information more intensively in their partner search, such as academic meetings and

publications or the public administration. Moreover, the role of universities and their transfer offices for initiating UICs is more pronounced in Japan than in Korean. This finding indicates that in Japan more diverse networks between different types of organizations are in place than in Korea. It can be related as well to the relatively longer history of widespread collaboration between universities and companies in Japan which may have supported the firmer establishment of various information and contact channels to match partners in UICs.

Third, Japanese companies' managers perceive the IP policies of partner universities as clearer, more flexible and more equitable, whereas Korean managers perceive their transfer offices as being more helpful. This result suggests that universities' IP policies in Japan are strongly based on rules, whereas in Korea the discretionary efforts of the transfer offices' staff are more important for enhancing technology transfer to companies. It can be related also to the longer history of UICs in Japan which led universities to deal with such collaborations in systematic ways. In Korea, in contrast, such clear rules may still lack in many cases, thereby increasing the importance of individual actions by staff members involved.

Fourth, the relative importance of various relational mechanisms also differs between the two countries. Contractual safeguards on many, though not all, aspects of UICs are stronger in Korea than in Japan, whereas Japanese firms trust their university partners to a higher extent than Korean firms. Moreover, the role of innovation champions is perceived as stronger by Korean than by the Japanese managers regarding most aspects in UICs. These results are consistent with observations regarding general cultural features in both countries. Research has found that the level of trust developed between partners in inter-organizational collaborations is higher in Japan than in Korea (Dyer and Chu, 2000, 2003). Fukuyama (1995) suggests that it is more difficult to develop inter-organizational trust in Korea than in Japan, as family-owned firms play a strong role in Korean economic life and trust is often strongly confined to organizational boundaries, whereas networks in Japan are more strongly based on professional principles and more open. In absence of high trust, Korean firms may feel a stronger need using contractual safeguards to reduce relational uncertainty in UICs than Japanese firms. Moreover, the Korean leadership style has been described as more hierarchical than the Japanese one which is more collectivistic in its nature (Hamilton and Biggart, 1997). As a consequence, the behavior of individual managers who play a central role in UICs may be perceived as more important in Korea than in Japan.

Finally, Japanese managers perceive a higher satisfaction with UIC outcomes than their Korean counterparts. In particular, the Japanese respondents see their expectations in such research collaborations fulfilled to a higher extent than the Koreans. This finding can be related again to the relatively higher amount of UIC experience which the Japanese firms possess. As they have conducted more UICs in the past than the Korean firms, they may be more professional in running current collaborations, resulting in better outcomes, and at the same time have more realistic expectations at the onset of the UIC.

Taken together, the results of our study highlight the potential relevance of path dependencies and of national cultural features for the organization and outcomes of research collaborations between companies and universities. The earlier emergence of UICs as a common type of inter-organizational collaboration in Japan than in Korea contributes to explaining various differences in such collaborations between the two countries, such as the use of wider portfolio of network channels when searching for collaboration partners, a more rule-based approach by universities regarding IP policies, and a somewhat higher satisfaction with

UIC outcomes in Japan. At the same time, the stronger difficulties of developing inter-organizational trust and the more intensive use of contractual safeguards as an alternative mechanism to reduce relational uncertainty in Korea are clearly reflected in our data. Moreover, the relatively more important perceived role of innovation champions in Korean UICs can be clearly linked to the relatively more hierarchical leadership style in Korea when compared with Japan.

IV. *Conclusion*

This study gauged the perceptions of the industry perspective on UICs in the biotechnology, microelectronics, and software sectors and provides a number of implications for policymakers and managers dealing with UICs:

- -The investment in knowledge development, acquisition, and exploitation in Japan and Korea is manifested through an extraordinary high ratio of the workforce employed in R&D activities.
- -University transfer centers and faculty play an important and active role in the formation of university-industry partnerships for innovation, maybe more so, than previously acknowledged.
- -Success breeds success. Professional management and favourable outcomes appear to be strongly enhanced by the amount of previous UIC experience. Once Korean firms and universities have learned more on how to collaborate efficiently and professionally, they will be able to reduce the gap that exists today in comparison with more experienced Japanese firms.

Further examination of the under-researched topic of UICs in East Asian countries seems to be a very promising research avenue. Most extant UIC research is focused on Western countries, but such collaborations have become more widespread in East Asia in recent years, yet little is known about their organization and outcomes.

The findings of this research suggest that learning and knowledge transfer processes in UICs are strongly cumulative in their nature. From the perspective of relative newcomers to this type of collaboration, such as many Korean firms, this suggests that continued efforts are needed to achieve better results.

At the same time, our findings indicate that there is no universally best way to run UICs, as their organization is strongly influenced by cultural features which are specific to countries or regions. Japan and Korea face diverse situations including economic, scientific, and political conditions, which differentially facilitate UICs. As discussed above, Japanese firms appear to rely to a high amount on trust when collaborating with universities, whereas their Korean counterparts seem to emphasize contractual safeguards and the role of innovation champions to a higher extent. Thus, efforts by policymakers and managers to identify best practices in supporting and conducting UICs should always take the national or regional cultural and institutional context into account. The non-reflective introduction of policies or management practices from other countries or regions, in contrast, could be detrimental to the outcomes of UICs rather than enhancing them.

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