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Jianzhong Janne Hong

CULTURAL ASPECTS OF GLOBALIZING UNIVERSITY-INDUSTRY KNOWLEDGE INTERACTION IN CHINA

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Supervisors	Professor Kirsimarja Blomqvist School of Business Lappeenranta University of Technology Finland
	Professor Aino Kianto School of Business Lappeenranta University of Technology Finland
Reviewers	Professor Elena Antonacopoulou Management School The University of Liverpool United Kingdom
	Professor Hannu Kärkkäinen Department of Business Information Tampere University of Technology Finland
Opponents	Professor Elena Antonacopoulou Management School The University of Liverpool United Kingdom
	Professor Hannu Kärkkäinen Department of Business Information Tampere University of Technology Finland

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ABSTRACT

Jianzhong Janne Hong
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Previous studies of the local involvement of multinational corporation (MNC) subsidiaries focus on host-country firms and local business partners such as suppliers and customers. The role of *host-country universities* in the same context of innovation networks is neglected. Furthermore, there are many organizational culture- and knowledge-related differences between universities and companies, and this is likely to pose additional challenges for successful collaboration. Early university-industry (U-I) studies have primarily been limited within a national boundary, being concerned with a single level of culture (i.e., at an organizational level) and one-way knowledge transfer from university to industry. Research on more dynamic knowledge interaction in multinational settings is lacking. This is particularly true in the business context of China. In today's globalizing and rapidly changing organizations, addressing cultural differences and clashes is an everyday reality, and inter-cultural U-I collaboration is becoming a key asset for gaining global competitiveness.

This study deals with Finnish MNC subsidiaries' research collaboration with Chinese universities. It aims to explore the essence of such U-I collaboration and knowledge interaction, uncovering the deep functioning mechanisms of culture underlying effective collaborative knowledge creation and innovation. The study reviews critically different bodies of literature including *knowledge management theories and studies*, *U-I collaboration and knowledge interaction*, and *cross-cultural research* in terms of organizational knowledge generation and utilization. It adopts a case study strategy with qualitative research methods, and data is collected through in-depth interviews and participant observation.

The study presents the following major findings: 1. In the light of a comprehensive analysis of U-I collaboration, an effective matching strategy is proposed, in the assumption that good alignment of knowledge interaction strategies and approaches with their corresponding knowledge type, capability development and research task may greatly enhance the effectiveness of cross-cultural U-I collaboration and knowledge interaction. 2. It is proposed that in the Chinese MNC context more dynamic types of knowledge interaction like *knowledge co-creation* should be of key concern particularly when dealing simultaneously with multi-disciplinary applied research of human factors and technologies. U-I knowledge interaction, otherwise, pays attention only to the study of one-way technology and knowledge transfer. 3. It is posited that the influence of culture on collaborative knowledge interaction can be studied in a valuable way when

knowledge-related variables are simultaneously taken into account. A systematic analysis of the role of knowledge in cross-cultural knowledge interaction could best be approached from multi-aspects of knowledge including not only nature, characteristics and types of knowledge but also the process of knowledge (e.g., intensifications of knowledge interaction). 4. The study demonstrates the significant role of aspects of the host-country culture (e.g., Chinese *guanxi)* in U-I collaboration and knowledge interaction. This is evident, for instance, in issues related to interpersonal relationships and trust, true interest and the relatedness of the research, mutual commitment and learning, communication intensity and interaction, and awareness of cultural and knowledge-related differences between collaboration partners. Theoretical and practical implications of the findings are suggested and discussed.

Keywords: Culture, knowledge, knowledge interaction, knowledge co-creation, university-industry collaboration, *guanxi*, multinational corporation (MNC), China, Finland

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TIIVISTELMÄ

Jianzhong Janne Hong
Kulttuurin merkitys kiinalaisten yliopistojen ja elinkeinoelämän kansainvälistyvässä innovaatioyhteistyössä

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Tutkimukset monikansallisten yritysten tytäryhtiöiden toiminnasta kohdekulttuurissa ovat perinteisesti keskittyneet kohdemaan yrityksiin ja paikallisiin liikekumppaneihin kuten alihankkijoihin ja asiakkaisiin. Monikansallisten yritysten innovaatioverkostojen tutkimuksessa liian vähäistä huomiota on kuitenkin saanut kohdemaan yliopistojen rooli. Yliopistojen ja yhtiöiden välillä on organisaatioon liittyviä kulttuuri- ja tietämyseroja, mikä muodostaa usein lisähaasteita yhteistyön onnistumiselle. Tutkimusta tuottavien yksiköiden ja elinkeinoelämän vuorovaikutusta on ensisijaisesti analysoitu kansallisesti, jolloin tarkastelun kohteena on ollut yksi kulttuurin taso (organisaatiossa) ja tiedon yhdensuuntainen siirto yliopistoista yrityksiin. Dynaamista tiedonvaihtoa ei kuitenkaan ole tutkittu riittävästi monikansallisessa kontekstissa, mikä pätee erityisesti Kiinan elinkeinoelämään. Kulttuurierojen ja niiden aiheuttamien törmäystilanteiden sovittelu on arkipäivää kansainvälistyvissä ja alati muuttuvissa organisaatioissa, ja kulttuurienvälinen yliopistojen ja elinkeinoelämän yhteistyö on ratkaiseva menestystekijä kansainvälisen kilpailukyvyn kannalta.

Tässä väitöskirjassa tutkitaan suomalaisten monikansallisten yritysten tytäryhtiöiden tutkimusyhteistyötä kiinalaisten yliopistojen kanssa. Samalla on tarkoitus selvittää tehokkaan, vuorovaikutteisen tiedonluomisen ja innovaatiotoiminnan taustalla olevia kulttuurin toimintamekanismeja. Väitöskirjassa tarkastellaan ja arvioidaan *tietojohtamisen teorioita ja tutkimuksia*, *yliopistojen ja elinkeinoelämän välistä T&K-yhteistyötä ja tiedonvaihtoa* ja *kulttuurienvälistä tutkimusta* organisatorisen tiedontuottamisen ja -jakamisen näkökulmasta. Tutkimus on laadullinen tapaustutkimus, jonka aineisto on kerätty syvähaastatteluissa ja osallistuvan havainnoinnin keinoin.

Tutkimus auttaa muodostamaan kokonaisvaltaisen näkemyksen yliopistojen ja yritysten välisestä yhteistyöstä ja luonnostelemaan strategian kulttuurienvälisen innovaatioyhteistyön parantamiseksi, kun tiedolliset vuorovaikutuskeinot ja -näkemykset sovitetaan yhteen kyseessä olevan tiedon luonteen, osaamisen kehittämisen ja tutkimustehtävän kanssa. Lisäksi erityistä huomiota tulisi kiinnittää dynaamisiin tiedonvaihtoprosesseihin kuten tiedon vuorovaikutteiseen luomiseen Kiinassa toimivissa monikansallisissa yrityksissä, etenkin kun on kyse inhimillisiin tekijöihin ja teknologioihin kohdistuvasta monialaisesta, soveltavasta tutkimustyöstä. Tutkimusta tuottavien yksiköiden ja elinkeinoelämän välisen tietoyhteistyön tutkimuksessa on kiinnitetty huomiota vain yhdensuuntaiseen tiedonsiirtoon. Kun myös tietoon liittyvät muuttujat otetaan huomioon, voidaan saada arvokasta tutkimustietoa kulttuurin

vaikutuksesta yhteistoiminnalliseen tiedonvaihtoon. Tiedon roolia kulttuurienvälisessä viestinnässä voidaan analysoida järjestelmällisesti, kun tietoa tarkastellaan sen eri näkökulmista ottaen huomioon tiedon luonteen, piirteiden ja tyyppien lisäksi sen eri prosessit (esimerkiksi tiedonvaihdon tehostamisprosessit). Tutkimuksessa havaittiin, miten merkittävä asema kohdemaan kulttuurilla (esimerkiksi Kiinassa *guanxilla)* on yliopistojen ja yritysten välisessä yhteistyössä ja tiedonvaihdossa. Se näkyy erityisesti yhteistyökumppaneiden yksilöiden välisissä suhteissa ja luottamuksessa, tutkimustyön todellisessa merkityksessä, keskinäisessä sitoutumisessa ja oppimisessa, yhteydenpidon määrässä ja vuorovaikutuksessa ja kulttuuriin ja tietämykseen liittyvien erojen tiedostamisessa. Lisäksi väitöskirjassa tarkastellaan tutkimustulosten vaikutuksia sekä tietojohtamisen teoriaan että käytäntöön.

Asiasanat: kulttuuri, tieto, innovaatioyhteistyö, vuorovaikutteinen tiedon luominen, yliopistojen ja elinkeinoelämän yhteistyö, *guanxi,* monikansallinen yritys, Kiina, Suomi

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摘要

洪建中
中国全球化校企知识互动文化作用面面观

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以往跨国公司全球范围合作创新的研究多集中在与所在国当地企业和生意伙伴，比如与供应商和客户等的合作。这些研究忽略了与当地大学及研究机构进行合作所带来的积极作用。原因之一是校企之间本身又存在着很多文化及知识等方面的差异，这为跨国公司与当地大学进行有效的合作增加了新的障碍。因此，早期校企合作研究多局限于同一国度，所探求的问题也主要是关于组织层面上文化对知识转移作用的研究，其中知识转移多指单向的由大学向企业的知识传输和转移。跨国企业背景下有关动态性知识互动和合作创新等方面的研究至今仍是寥若星辰，而这一趋势在中国尤为明显。在当今全球化及急剧变化的企业组织中，文化差异及冲突问题越来越为人们所重视。多元文化背景下校企合作及联知创新正成为组织获得全球经济发展竞争力的核心所在。

本研究主要涉及芬兰跨国企业分公司与中国大学的研发合作，旨在探究该类校企合作和知识互动的本质和特点，进而揭示支持有效联知创新的多种深层次的文化机制作用。该研究结合跨学科研究的特点，对以下研究领域的成果和文献都有广泛的涉猎和富有批判性的综述: 比如，对知识管理理论及研究，校企合作及知识互动理论及研究，以及与知识密切相关的跨文化研究等的综述和在此基础上的理论建构。本研究采纳了质的研究方法及个案研究策略，现场数据采集主要使用了深度访谈和参与性观察两种最为常见的质的研究方法。该研究的主要成果可以概述如下: 1. 在分析综合以往研究成果的基础上，该研究提出了一项新的知识互动中有效匹配的管理策略: 主张知识互动的策略和方法应与企业组织中相应的知识类型，能力发展及研究任务相匹配，从而在最大程度上促进跨文化校企合作和知识互动的有效性。2. 在中国跨国企业背景下，尤其是在同时进行人因和技术两种因素的跨学科应用研究时，研究者对诸如知识共创等动态性知识互动的方法应予以特殊的关注。以往校企合作的研究往往只注重对单向的，相对静态的由大学到企业的技术和知识转移的探索和研究。3. 只有当我们同时考虑到与知识有关的种种因素时，文化对知识互动及合作创新的影响作用才有可能得以富有成效的研究。该研究指出，对这一知识调节作用的系统分析不仅应该考虑和探究知识的特性，特点及类型，而且还应进一步考察知识过程的作用 (比如，知识互动的强度等)。4. 研究结果充分表明跨国分公司所在国的当地文化(比如，中国的人际关系)在校企合作及知识互动中所起的重要作用。该作用在本研究背景下表现为与以下诸多因素的种种关联和作用, 比如与人际关系和信任，对研究本身的兴趣，研究内容的相关性，合作者之间的相互承诺和学习，沟通渠道的畅通及相互交往的密度，以及对合作者文化及知识等方面的差异的认同等的联系和作用。在本文该研究对主要成果的讨论同时兼顾了理论启示和实际应用两方面的意义。

关键词: 文化，知识，知识互动，联知创新， 校企合作，人际关系，跨国公司(MNC)，中国，芬兰

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Life is short and has never been stable. Hereby, I wish to express my thoughts and feelings of the moment by simply rephrasing, perhaps rather boldly, part of an old Chinese poem: "May we all be blessed with longevity no matter near or far apart, we could be able to share the beauty of the moon together". Many of us, I also, consider research an endless process; an idea which is already truly reflected in ancient time. As an old Chinese poem goes: "The way ahead is long; I see no ending, yet high and low I'll search with my will unbending."

Lappeenranta, July 2010

Jianzhong Janne Hong

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ABBREVIATIONS

CKC	Collaborative Knowledge Creation
DCs	Dynamic Capabilities
IPR	Intellectual Property Rights
KI	Knowledge Integration
KM	Knowledge Management
MNC	Multinational Corporation
OLKC	Organizational Learning, Knowledge, and Capabilities
TKT	Technology and Knowledge Transfer
U-I	University-Industry

LIST OF PUBLICATIONS

1. Hong, J.Z., Kianto, A. & Kyläheiko, K (2008). **Moving cultures and the creation of new knowledge and dynamic capabilities in emerging markets**. *Knowledge and Process Management*, *15*(3), 196-202.

2. Hong, J.Z. (2008). **Cultural implications of collaborative knowledge interaction**, paper presented at the *Second ISCAR (International Society for Cultural and Activity Research) Congress*, San Diego, September 8-13 (Revised).

3. Hong, J.Z. & Kianto, A. (2009). **The role of knowledge in inter-cultural organizational collaboration** (working paper, submitted for review).

4. Hong, J.Z., Heikkinen, J. & Salila, M. (2010). **The impact of culture on university-industry knowledge interaction in the Chinese MNC context**, 295-320, in D. Harorimana (Ed.), *Cultural Implications of Knowledge Sharing, Management and Transfer: Identifying Competitive Advantage*. Hershey PA: IGI Global.

5. Hong, J.Z. & Olander, H. (2010). **University-industry knowledge interaction: Case studies from Finland and China** (accepted for publication in *International Journal of Healthcare Technology and Management*: Special Issue on Academic Knowledge and Industrial Development, Volume 11).

6. Hong, J.Z., Heikkinen, J. & Blomqvist, K. (2010). **Culture and knowledge co-creation in R&D collaboration between MNCs and Chinese Universities**. *Knowledge and Process Management*, *17*(2), 62-73.

The contribution of Jianzhong Janne Hong to the publications:

1. Lead author for a theoretical exploration into cultural interaction and knowledge co-creation in emerging markets

2. Sole author

3. Lead author for a systematic analysis of the moderating role of knowledge in inter-cultural organizational collaboration

4. Lead author for an early stage of theoretical exploration and responsible for the construction of different knowledge interaction approaches with relevant empirical observations and investigations

5. Lead author: of the paper; the second author focuses on formal governance (e.g., contracts) and the lead author on informal social networking (e.g., Chinese *guanxi* & personal trust) in university-industry knowledge interaction.

6. Lead author, responsible for constructing the theoretical framework, conducting data analysis and leading the discussions.

PART I: OVERVIEW OF THE DISSERTATION

‘Culture’ is a complex concept, yet plays an essential role in current and future knowledge management practices (Awazu, 2007).

1. INTRODUCTION

As tasks and projects increasingly become conducted in globally distributed contexts, the building of innovation networks across geographic and cultural borders is progressively becoming a key strategy of firms and part of operations aimed at gaining global competitiveness (Awazu, 2007; Buckley et al., 2006; Kodama, 2003; 2005; Lindqvist et al., 2007). Due to the changing competitive landscape, external links and international networks directed at the transfer and creation of knowledge are of crucial importance for the innovative performance of firms and the advancement of new technologies (Johnston & Paladino, 2007; Santoro & Gopalakrishnan, 2000; Schartinger et al, 2002). Universities undoubtedly play an important role in such networked innovation systems, and complementary knowledge interaction increasingly and intentionally is becoming a key driver for university–industry (U–I) collaboration (Buckley & Carter, 1999; Santoro & Gopalakrishnan, 2000; Wang & Lu, 2007).

Nearly a decade ago the triple helix model of university-industry-government relations in a national system of innovation was well acknowledged and applied (Etzkowitz & Leydesdorff, 2000). The model entails university, industry and government working together and develops a method and theory of university-industry-government relations as a means to create more effective innovation systems (Lu & Etzkowitz, 2008). A recent feature spurring innovativeness nationally and organization-wide is that knowledge itself as a prime value or basic driver for collaborative innovation is articulated and recognized much more explicitly. As knowledge is increasingly research-based in modern societies, the triple helix model is becoming the core of the innovation system (Etzkowitz, 2008). Consequently, the objective of collaborative innovation and knowledge interaction is no longer limited only to technology innovation, or technology and knowledge transfer. Rather, the way knowledge

interaction is understood has extended to cover other scopes of knowledge creation and innovation in marketing modeling, services and management development. Thus, it is important to note that the very concept of collaborative innovation in terms of knowledge interaction is being transformed from that of new product development (i.e., the first development and application of a new technology) to a new sense of "innovation in innovation" to use Lu and Etzkowitz's term (2008: 7), meaning the restructuring and enhancement of the organizational arrangements that foster innovation.

Recent research indicates the increasing importance of the role of Chinese universities (Hong, 2008) and the urgent need and challenges for implementing the knowledge-based triple helix model in the Chinese innovation system (Lu & Etzkowitz, 2008; Zhou, 2008). In China, economic development and science and technology policies are very much dominated by the government (Lu & Etzkowitz, 2008). A "government-pulled" triple helix model has thus been proposed to promote higher level of innovation in innovation (Zhou, 2008: 109). A key issue in this context is thus how to enhance the independence of academic and industrial actors, so that they may create new initiatives individually, cooperatively and internationally with other actors, as well as respond to government policy direction, thereby increasing society's sources of creative innovation capabilities (Lu & Etzkowitz, 2008). Therefore, investigating globalizing U-I research collaboration and knowledge interaction in China becomes imperative and of far-reaching significance.

In practice, U-I collaboration and knowledge interaction in China, and R&D collaboration between multinational corporations (MNCs) and Chinese universities[1] in particular, present a timely and emerging trend undergoing rapid development. R&D collaboration between MNCs and local partners has grown considerably. In 2002, the number of MNC R&D institutes in China was 400 (Li, 2005), whereas now the number has already risen to over 1200 (People's Daily, 17.3.2010). Since the establishment of the first joint R&D institute in 1994, R&D collaboration between MNCs and Chinese universities has been growing rapidly (Hong et al., 2007; Li, 2010; Lin, 2005; von

[1] In this study universities include also independent public research institutes. For convenience, the term, 'universities' is used to refer to both universities and research institutes.

Zedtwitz, 2007). On the other hand, however, little is known about the nature of such collaboration and how culture may influence the collaboration; and research on these fast emerging and globalizing U-I knowledge interaction activities is called for.

In the field of inter-cultural knowledge management, numerous cross-border knowledge interactions, including knowledge transfer projects, have encountered considerable difficulties or have failed because of significant cultural variations and barriers (Holden, 2002; Li & Scullion, 2006; Lucas, 2005; Qin et al, 2008; Siegel et al., 2003). The key task of global knowledge management, as pointed out by Holden (2001; 2008), is thus to foster and direct collaborative cross-cultural learning and development, in which the essence of the cross-cultural challenge is not about *what* to learn from each other, but *how* to learn.

The present study is especially important in practical R&D contexts of management. Initial observations in China have shown that with the aim of gaining competitive advantage, particularly in future-oriented and developing markets, subsidiary research centres of world-leading MNCs seem to be showing greater interest in more interactive collaboration and interaction (e.g., knowledge co-creation) rather than conventional types of collaboration, which are relatively static and passive (e.g., authorized or contract-based research). This is mainly because of the increasing complexity of the tasks in hand, the pressing need to understand collaboration partners and changing customer behaviour in an unfamiliar business environment, and a decentralizing trend in knowledge flows from university to industry (Hong, 2008). Intensive communication and interaction is assumed to bridge huge cultural differences and knowledge gaps, facilitating the effectiveness of cross-border knowledge interaction. Such a new organizational context demands research on the more interactive types of knowledge collaboration, in which the impact of culture tends to be more evident and intensive.

Systematic research in cross-cultural and multinational contexts can yield better understanding of the issues pursued here and provide more profound theoretical and managerial implications. Inter-cultural knowledge integration defined and studied in this dissertation resembles very much what has recently been recognized from global

research collaboration and practices (Antonacopoulou, 2010a). *First*, the variety of stakeholders in global research practice can no longer be distinguished as 'producer' or 'consumer' of knowledge. Universities in this sense are no longer only a source organization which always provides knowledge, and industries are not merely passive recipients of knowledge. *Second*, the global arena of research collaboration provides for those who both create and use knowledge through research as knowledge co-creators. And *finally*, this collaborative mode of global research practice seeks to address the variety of interests and expectations from research by engaging their respective contributions. Failing to recognize such needs is likely to lead to the termination of good-will collaboration and fruitful knowledge interaction.

1.1 Research gaps and objectives

This study deals with Finnish MNC subsidiaries' research collaboration with Chinese universities. It aims to explore the essence of such U-I collaboration and knowledge interaction, uncovering deep functioning mechanisms of culture underlying effective collaborative knowledge creation and innovation. The study adopts a case study research strategy, in which the two case companies included are MNCs with Finnish roots. The companies are suitable for the study as they come from different fields (ICT and forest industries), are technology-oriented, and have knowledge as a focal element in their competitiveness. Over many years they have both expanded their international businesses and markets all over the world. The topic considered in the dissertation deals widely with several bodies of literature in which the same issue is tackled from different perspectives. The viewpoints include, for instance, *knowledge management theories and studies, U-I collaboration and knowledge interaction*, and *cross-cultural research* in terms of organizational knowledge generation and utilization.

The significance of and necessity for the research can well be understood and encapsulated from the above-mentioned perspectives: knowledge management including MNC knowledge-based studies, U-I collaboration and knowledge interaction, and cross-cultural research. From a knowledge management point of view, the mainstream of current studies focuses primarily on knowledge transfer (see

comprehensive reviews by Argote 2009 and Klijn 2006). In a recent knowledge management conference OLKC2009 (the 4th International Conference on Organizational Learning, Knowledge, and Capabilities), some distinguished discussion panel members and members of the audience even considered today's knowledge management as being tantamount to knowledge transfer management. Nevertheless, one can also see that different and more interactive types of knowledge interaction (e.g., knowledge integration and knowledge co-creation) have attracted attention and have been studied (e.g., Andreeva & Ikhilchik, 2009; Kotlarsky et al., 2009), forming an emerging trend in OLKC studies. Knowledge interaction in this study is understood as not only one-way technology and knowledge transfer, but also interactive knowledge integration and knowledge co-creation in organizational partnerships.

Knowledge-based studies in MNCs have particular features and advantages in knowledge management studies. As Almeida et al. (2004) point out: "The focus on subsidiaries is especially interesting since they are simultaneously embedded in two knowledge contexts: (a) the internal multinational corporation (MNC) comprised of the headquarters and other subsidiaries; and (b) an external environment of regional or host country firms" (p. 847). MNC knowledge-based studies deal with the role of local involvement in MNC innovation networks, referring either to local organizations in general (e.g., Johnston & Paladino, 2007) or collaboration with local suppliers and customers in particular (e.g., Andersson et al., 2005). There are, however, not many studies regarding collaboration and knowledge interaction of MNC subsidiaries with local universities. To better understand innovation networks and the innovative performance of MNCs, study of U-I collaboration in host countries and between home and host countries is necessary.

In previous U-I studies, technology and knowledge transfer has also been a focus (Agrawal, 2001; Santoro, 2006; Sherwood & Covin, 2008; Wang & Lu, 2007) but the study of culture and its influences has been related only to the organizational level, accentuating cultural differences between the two types of organizations, namely universities and companies (Barnes et al. 2002; Cyert & Goodman, 1997; Elmuti et al., 2005; Santoro & Gopalakrishnan, 2000). U-I study of other types of knowledge

interaction and in cross-cultural contexts remains an interesting gap. National or societal culture may significantly influence many kinds of and many aspects of U–I knowledge interaction (Hemmert et al., 2008).

Cultural and developmental work research (e.g., Engeström, Miettinen & Punamäki, 1999; Holland et al., 1998; Holland & Lave, 2009) has drawn attention to the study of culture in the context of workplace situation and work activities. New cross-cultural research informs that the study of national culture should not remain at a level of addressing whether or not national culture makes a difference, but should focus on *how* and *when* it makes a difference (Leung et al., 2005). Study of U-I knowledge interaction activities involving dissimilar cultural contexts provides a work-related situation in which detailed information in terms of the effectiveness of U-I knowledge interaction can be explored and utilized in business and management practices.

1.2 Outline of the study and key research questions

The dissertation focuses on U-I research collaboration in the Chinese MNC context. The study aims to understand and explore the essence of U-I research collaboration and knowledge interaction in cross-cultural settings. Key research questions of the study are as follows:

1. What is the nature and primary mode of university-industry knowledge interaction in the Chinese MNC context?

2. How do cultural factors affect effective university-industry cross-border knowledge interaction?

3. How does knowledge moderate the influence of culture on effective university-industry cross-border knowledge interaction?

The dissertation is article-based and consists of 6 publications. Each of the publications explores different cultural aspects of knowledge interaction at different levels. The

relevance of the publications to the key research questions given above is illustrated in Table 1.

Table 1. Relevance of the publications to the key research questions

Key concern of each publication	Research questions of the dissertation		
	1	*2*	*3*
1. Cultural Interaction: *What is the role of cultural interaction in the creation of new knowledge and capabilities in emerging markets?*		***X***	
2. Culture & activity: *How is culture related to cross-border knowledge interaction?*		***X***	***X***
3. Knowledge: *How do various aspects of knowledge moderate the influence of culture on knowledge-based collaboration?*			***X***
4.Multi-level cultures: *How and when does culture matter in U–I collaboration and knowledge interaction?*	***X***	***X***	
5. Formal & informal governance: *How do both formal governance and informal social networking enable the organizational processes of U-I knowledge interaction?*	***X***	***X***	
6. Role of Chinese culture: *What is the nature of knowledge interaction in U-I R&D collaboration in China?* *How does Chinese culture influence effective U-I R&D collaboration and knowledge interaction?*	***X***	***X***	***X***

In Publication 1, the key concern of the study is the role of cultural interaction, and the fundamental questions asked concern what the driving force for the creation of dynamic capabilities really is and how culture plays a role in the development of new knowledge and capabilities: both issues are related to the key question 2 pursued in the dissertation. A reflective and more direct question can be seen in the reformulation: what is the role of cultural interaction in the creation of new knowledge and capabilities in emerging markets? In Publication 2, the key concern of the study is the alignment of culture and activity and the key question asked is how culture is related to cross-border knowledge interaction activities. In this regard, the study presented in the publication is directly related to the research questions 2 and 3 of the dissertation, focusing on cultural and

knowledge-related factors in collaborative knowledge interaction. In Publication 3, the key concern of the study is the role of knowledge and the key research question addressed is how various aspects of knowledge moderate the influence of culture on knowledge-based collaboration. The focus of the publication is directly relevant to research question 3 raised in the dissertation. In Publication 4, the study explores the role of multi-level cultural influences in U-I knowledge interaction phenomena and focuses on how and when culture matters in U-I knowledge co-creation in China. It is therefore related to both research questions 1 and 2 of the dissertation. In Publication 5, the key concern of the study is formal and informal governance and the key research question asked is how both formal governance and informal social networking enable the organizational processes of U-I knowledge interaction. This question is addressed with a literature review and illustrations from qualitative pilot case studies conducted in Finland and China. The work connects well with the research questions 1 and 2 of the dissertation. In Publication 6, the key concern of the study is the role of the host-country culture and the paper considers the nature of knowledge interaction in U-I R&D collaboration in China and how Chinese culture influences effective U-I R&D collaboration and knowledge interaction. To a certain extent, the research questions of the publication cover in a wide-ranging manner the exploration of all three questions raised in the dissertation.

As it can be seen from Figure 1 below, despite each of the six publications having its own key concern, they all focus on a shared interest in culture and knowledge interaction. The level of exploration, the nature of the research, and the respective and shared aspects of the six publications can be depicted, as in the figure, as forming a multi-level approach to culture and knowledge interaction.

1.3 Research scope and key concepts

As shown in Figure 1, the present study focuses on a shared area of culture and knowledge interaction. Thus, the key concepts of the study include the *culture* and *knowledge* that are involved in cross-border *knowledge interaction*. The foremost

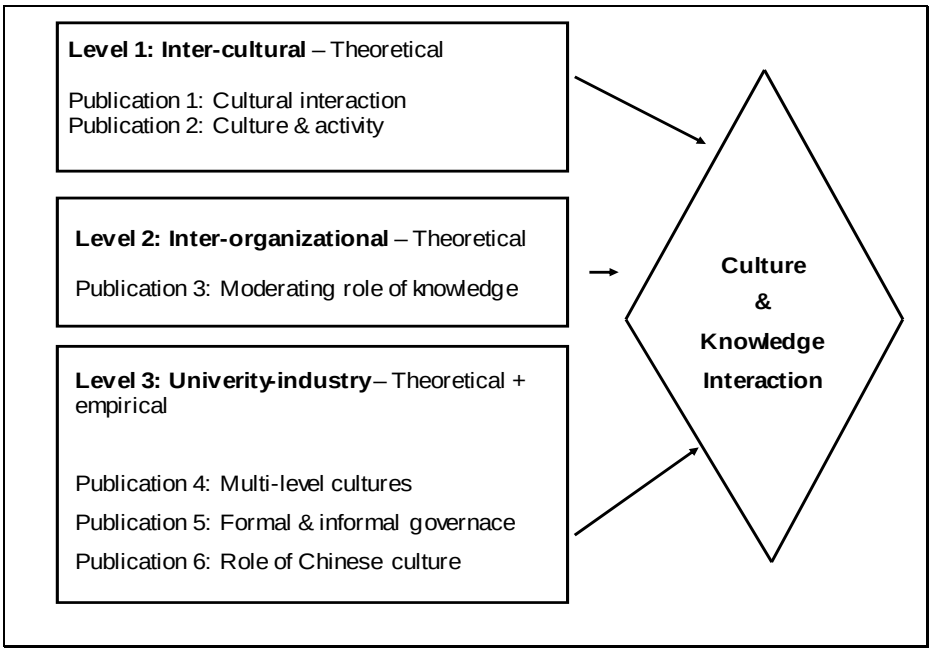

Figure 1. Multi-level approach to culture and knowledge interaction

concept is culture. There are numerous definitions of culture in organizational and cultural studies. Whereas some have defined culture in terms of shared values, beliefs, assumptions (e.g., Sackmann, 1991; Schein, 1985), cultural models (D'Andrade & Strauss, 1992), and figured or cultural worlds (Holland et al., 1998); others place greater emphasis on the material culture and artifacts (e.g., Sojka & Tansuhaj, 1995; Wartofsky, 1979) and the role of language and communications (e.g., Craig & Douglas, 2006; Holden, 2008) that shape and guide social systems, group relations and collaborative activities and processes. In the present study, culture as figured or cultural worlds derived from social practice theory is the focal concern. Related concepts important to the study include cultural interface or interaction, multi-level cultures, moving cultures, multiculturalism, and aspects of the host-country culture (e.g., Chinese *guanxi*). These concepts are clarified in the following chapter on the theoretical background and framework of the work.

A concept inter-related with culture is knowledge. In knowledge management literature, three views seem to be dominant: the cognitive view, the social view, and the activity-based view. The cognitive view assumes that knowledge is a cognitive system of causal relationships and principles (e.g., Sanchez, 2001). The social view considers knowledge as a dynamic human process of justifying personal belief toward the 'truth' (e.g., Nonaka & Takeuchi, 1995). The activity-based view is developed from cultural-historical activity theory in psychology and it presumes that knowledge is an integral component of activities (Scribner, 1985). In the activity-based view, knowing rather than knowledge is underlined (Blackler, 1995). Each of the above views emphasizes respectively one important aspect of knowledge. It is my belief, however, that knowledge, tacit knowledge in particular, is best construed and defined with a comprehensive view that integrates cognitive, social and activity-based features of knowledge so that the term is able to capture the essence and dynamic nature of knowledge.

In this regard, it is useful to differentiate two different types of knowledge: explicit knowledge and tacit knowledge. For Polanyi, tacit knowledge is constructed from individuals' own experience in the world and forms the basis for explicit knowledge (Jasimuddin et al., 2005). According to Nonaka et al. (Nonaka & Takeuchi, 1995; Nonaka et al., 1998), tacit knowledge is personal, context-specific and not as easily communicated (e.g., institutions, unarticulated mental models and embodied technical skills), whereas explicit knowledge is formal, objective and codifiable (e.g., a meaningful set of information articulated in clear language including numbers or diagrams)[2]. The two types of knowledge are mutually complementary entities. They interact with one another and may be transformed from one type to another through

[2] Similar to the tacit-explicit type of knowledge classification, Boisot (2006; 2009) regards the main types of knowledge as *embodied*, *narrative* and *abstract symbolic knowledge*. Embodied knowledge is locked up in sensory experiences and physical behaviors. Narrative knowledge is that subset of embodied knowledge that can be articulated in words. Abstract symbolic knowledge is expressed through symbols, such as letters or numbers. For many purposes, in the view of Boisot, the three types of knowledge have to be combined to be effective. Referring back to the category of explicit and tacit knowledge, interestingly, embodied knowledge here refers more to tacit knowledge and at the other end of the continuum abstract symbolic knowledge assembles explicit knowledge in Nonaka et al's term. It would appear that the difference between the two classifications of knowledge types is minimal. The one developed by Nonaka et al. is perhaps more derived from their empirical studies, whereas the one derived from Boisot might be based more from his theorizing.

individual or collective human creative activities. This social and epistemic process brings about what is termed four modes of knowledge conversion (the SECI model): socialization (from individual tacit knowledge to group tacit knowledge), externalization (from tacit knowledge to explicit knowledge), combination (from separate explicit knowledge to systemic explicit knowledge) and internalization (from explicit knowledge to tacit knowledge). Several KM researches with a culture focus challenge the universal applicability of the SECI model (Andreeva & Ikhilchik, 2009; Glisby & Holden, 2003; Weir & Hutchings, 2005), giving rise to a debate on how significantly national culture may influence KM in general and the SECI model in particular. Moreover, in current KM literature tacit knowledge explicitly refers to both individual and organizational knowledge (Hedlund, 1994; Kogut & Zander, 1992; Spender, 1996). This conceptualization expands Nonaka et al.'s concept of tacit knowledge as fairly individual-based. Another point worth noting is that the distinction between the two types of knowledge is in a relative sense, and there are both advantages and disadvantages in emphasizing either explicit or tacit knowledge in organizations (Jasimuddin et al., 2005).

The supporting mechanisms underlying the types of knowledge seem to be different. Technology sharing provides access primarily to explicit knowledge, whereas personnel movement will be more effective as a means of gaining access to tacit knowledge (Inkpen, 1996). In U-I knowledge transfer, for instance, Fukugawa (2005) argues that the knowledge of university-based scientists that is valuable for industrial innovations is often tacit. Such tacit knowledge is related mostly to applied research (see also Mansfield, 1995) and it requires firms to maintain face-to-face communication with academic scientists. Several studies thus lay special emphasis on the significance of inter-cultural communication (Taylor & Osland, 2003) and partner trust (Santoro & Bierly, III, 2006; Sherwood & Covin, 2008) in the successful acquisition and transfer of tacit knowledge. Santoro and Bierly, III (2006), for instance, found that trust is a significant facilitator of the transfer of tacit knowledge. Increased trust, particularly by one of the partners, enables free, open communication without the worry of opportunism. Similarly, Sherwood and Covin (2008) found that partner trust predicts the successful acquisition of tacit knowledge but not explicit knowledge.

The third key concept is knowledge interaction, which is a term often used without any clear definition or discussion. Mostly, it has just been taken to imply somehow a kind of knowledge exchange between two or more teams, organizations or communities that host different bodies of knowledge. The knowledge collaboration partners may often be complementary (e.g., Bukh & Johanson, 2003; John-Steiner, 2000; Santoro & Gopalakrishnan, 2000), meaning two or more organizations have distinct but mutually synergistic resources necessary for advancing new knowledge. Complementarity is an important factor that enables organizations to acquire and exploit new knowledge (Teece, 1987 / Santoro & Gopalakrishnan, 2000). Knowledge interaction as a concept has mostly been used in U-I collaboration studies (Fukugava, 2005; Perkmann & Walsh, 2006; Santoro & Gopalakrishnan, 2000; Schartinger, 2002; Viljamaa, 2007)[3]. For instance, knowledge interaction is used to describe all types of direct and indirect, personal and non-personal interactions between organizations and/or individuals from the firm side and the university side, directed at the exchange of knowledge within innovation processes (Schartinger et al., 2002). In this research, knowledge interaction includes all types of U-I interactive knowledge strategies, relationships, processes, activities and outcomes, in which the value of knowledge is particularly emphasized. Thus, the emphasis is also on mutual and two-way knowledge exchange and interaction. Important concepts related to knowledge interaction include knowledge interaction theories, strategies and approaches, and these are defined and outlined in Chapter 2.

1.4 Personal motivation and reflexive critique

Researchers' personal motivation for management research includes for example learning, personal development, and research as a means to solve practical problems encountered (Essterby-Smith et al., 2008 / Lampela, 2009). Pertinently, reflexive critique brings up the cognitive and emotional process of de-mystifying the interrelationships between social actors and social practices in the specific context in which they occur (Antonacopoulou, 2010b). Accordingly, to be critical one must start

[3] Elsewhere, the concept of knowledge interaction is used in the design of a new and mutual communication medium (Nishida, 2000; 2002), a study on knowledge channel model and policy (Kubota & Nishida, 2003) and work on its relationship with different types of innovation (Tödtling, 2009).

from being critical of the critical orientation one applies in assessing any situation including one's own reason and practice.

One major reason for me to conduct such a cultural study is that I have a long-standing interest in cross-cultural research. The study is related to my early cross-cultural research in psychology, and in particular, to my personal cross-cultural experience studying, working and living in Finland and China for many years. I grew up in China, and Finland is my first foreign country visited. Since my fist visit to Finland in 1993, I have been in Finland for more than 15 years. In this sense I am "native" in both Chinese and Finnish societies and cultures. In the present study, I have benefited from living in and traveling across two countries, feeling inclined in a way to search for clues and insights within and across cultures. Moreover, many years' experience of my teaching in knowledge management in Lappeenranta has helped me greatly to become familiar with the KM subject, become sensitive and able to discern cultural nuance, understanding better complex issues of culture and knowledge in a meaningful way. An additional advantage is that during my study I have been involved in two larger and successive research projects in the Lappeenranta KM group, I*nnospring Access* and *Janus*, dealing with collaborative innovation. My involvement in these projects has brought me closer to real-world business and Finnish world-leading companies. Thus, it seemed to me a natural process to initiate such a U-I collaboration project of my own to integrate my personal motivation and interest in the broad field of networked innovation and knowledge management.

In my actual empirical study, I had the possibility to choose some of the case companies which were at the time research partners of the *Innospring* project. For the study presented here, I interviewed both university researchers and company practitioners. Participant observation was, however, related only to the two case companies I had chosen, in which U-I workshops were the primary concern. Comparatively, I found it easier throughout the study to get access to university people, thanks to the long tradition of university open innovation and knowledge sharing. On the other hand, company people are more cautious with research proposals and interviews, as well as in what is said in the interviews. Furthermore, companies move fast and tend to undergo

constant, often dramatic, change, and personnel changes are recurrent. This creates difficulty for the "slow" research field, particularly when the researchers' key contact person is transferred. Finally, it is sometimes challenging to argue the benefit of academic research in the face of the company's practical day-to-day business issues and solutions of the moment.

U-I R&D collaboration is possible, but it is by no means easy and it may take time. My study is a kind of research on research collaboration between academia and industry. In a broad sense, it appears exactly the same as U-I collaboration. For my case, for instance, I started my research project completely from the point of view of a university. First of all, I had to introduce clearly my research project to the case companies: what the topic is; what benefits the project might bring to the companies; what kind of information I was seeking from the companies; who and how many people need to be interviewed; and when and how long it might take, etc. During the project I learnt that one has to actively and consistently contact key managers who one would like to interview or from whom one could get access to colleagues. As a Chinese proverb goes, "to persist is to win."

One major contribution of my dissertation lies in the emphasis on the significance of Chinese *guanxi* in U-I collaboration and knowledge interaction. How did the concept of *guanxi* become part of my dissertation research? When I started the research, I realised that *guanxi* is of course very important in the Chinese context, but it was perhaps too general and had perhaps been discussed and researched already too much. Furthermore, China is undergoing rapid economic transformation and major social change and in this context it is rather challenging to recognize and capture the real meaning of the concept with regard to the various changes. I avoided the concept, even intentionally, for the time being. This attitude changed when I interviewed a senor innovation manager of one case company in relation to my participant experience and observation in their U-I workshop in Beijing. I suddenly realized that the issue of *guanxi* was durably and robustly alive in the context of my study and it was closely-related to the issues of culture I had been researching for some time. The point is that particularly in exploratory and complex management research, one must remain open-minded, flexible

and be sensitive to data and the possible directions in which it may lead. The connotation of *guanxi* is changing in China. Nevertheless, as Faure and Fang (2008) have noted, in terms of the thinking process, modern Chinese society remains anchored in that which has gone before, being good at keeping up with paradoxes and making good balance of the opposite ends *yin* and *yang*. In handling *guanxi*, it seems evident that Chinese do not intend to eliminate *guanx*i because of its negative or dark side but tend to make use of it by balancing both positive and negative sides of *guanxi*!

1.5 Structure of the dissertation

The dissertation aims to explore different cultural aspects of knowledge interaction at different levels. It continues in *Chapter 2* with presentation of the theoretical background and framework of the research, which elaborates and discusses further the key concepts introduced in Chapter 1. The focus of Chapter 2 is on dynamic inter-connections evident in the following important streams of literature: the evolution of knowledge management theories, knowledge interaction in research partnerships (theories, strategies and approaches), knowledge interaction in knowledge management, cross-cultural research and theories in terms of knowledge development, and U-I knowledge interaction studies with a focus on culture. The chapter ends with a conceptual framework of the present study. The work then moves to *Chapter 3* considering research methodology and methods. It argues for the legitimacy of qualitative research in general and case study in particular in connection with the issues studied and data analyzed. In *Chapter 4*, a review and summary of the major findings from the publications are provided, in which the objective and main findings of each study with its unique contributions are identified and clarified. Three different levels of research exploration are differentiated, namely inter-cultural, inter-organizational, and U-I knowledge interaction. The last chapter of the dissertation, *Chapter 5* summarizes the major findings of the study in terms of the key research questions. It then addresses several important issues: critique of knowledge management as knowledge transfer management, emphasis of the role of Chinese *guanxi* as it is related to trust and inter-organizational knowledge interaction, and consideration of effective cross-border

knowledge interaction. Theoretical and managerial implications of the research are then discussed, limitations recognized, and future research proposed.

2. THEORETICAL BACKGROUND AND FRAMEWORK

The study is conducted in the field of knowledge management. In this chapter, the knowledge management background, theories and activities are defined and outlined as they relate to the study. The key concepts of culture, knowledge and knowledge interaction, introduced in Chapter 1, are further explored based on a systematic and critical literature review, and a conceptual framework of the study is proposed.

Due to the wide scope of the study, the literature selected from business and management studies deals with several research areas, each with their own research traditions and dominant theoretical lenses. These areas include 1) knowledge management theories and studies including MNC knowledge-based studies in emerging markets, 2) U-I collaboration and knowledge interaction, and 3) cross-cultural research in terms of organizational knowledge generation and utilization. Figure 2 illustrates the inter-related research areas. Each literature stream is highlighted and reviewed in the following sections of the chapter. It is evident that different bodies of the reviewed literature overlap considerably, the focus of the review is, however, on cultural aspects of U-I knowledge interaction such as the nature of knowledge interaction, fundamental cultural influences, and the interplay of culture and knowledge interaction.

2.1 Knowledge management in transition

In the dissertation, the discussion of knowledge management is related to the evolution of knowledge management theories and the related area of knowledge development of MNCs in inter-organizational research collaboration in emerging markets. Cultural issues in global knowledge management are also discussed in connection with MNC knowledge-based studies.

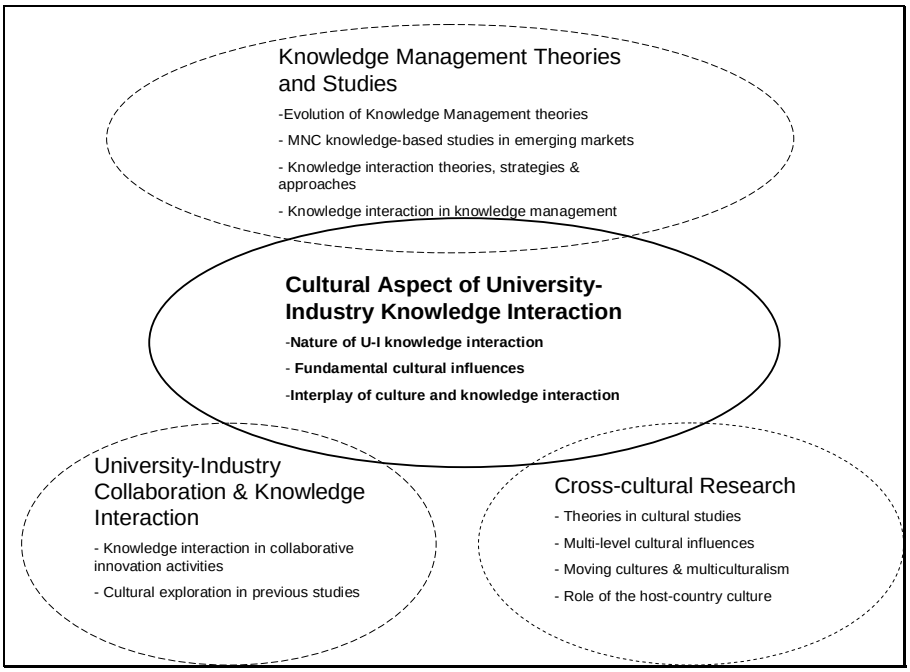

Figure 2. Overview of the relevant literature with key elements of the review

2.1.1 Evolution of knowledge management theories

Knowledge management is relatively a new concept in business and management studies. It first evolved in the 1990s, thus having a short history of less than 20 years. Knowledge management research and practice have evolved rapidly, as have related theories and concepts. The evolution of the field is reflected in discussion of knowledge management generations and their related activities; a topic which has been considered and debated by several authors (Ahonen et al., 2000; Snowden, 2002; Tuomi, 2002; von Krogh, 1999).

Drawing from previous research, Hong and Ståhle (2005) have clarified and identified three knowledge management generations. First generation knowledge management

was aimed at *knowledge identification and capturing*. Typical for the time is management application of information and knowledge databases which is primarily based on codified and measurable knowledge, skills and competences of individual workers. Second generation knowledge management is for *knowledge sharing and transfer*. Nonaka and Takeuchi (1995), arguably founders of the field of knowledge management, introduce the knowledge conversion model from tacit to explicit knowledge, which is a good illustration of, in my opinion, second generation knowledge management theory. This is because the focus of the SECI model is on the conversion of two types of knowledge rather than the creation of qualitatively different new knowledge. Third generation knowledge management is for *knowledge creation and innovation*, the term used in this study referring especially to collectively creating something new. Engeström's expansive learning model based on activity theory (Engeström et al., 1999; Engeström, 2001) is becoming widely-known in management circles. His model emphasizes the mutual learning and collaborative work development of activity-based communities, which may represent an emerging trend of third generation knowledge management. Several other efforts and influential contributions are also related to the development of the third generation of knowledge management (e.g., Antonacopoulou, 2009b; van Aalst, 2009).

The three theories of, or approaches to, knowledge management identified above seem to differ significantly from each other. Fundamentally, the notion of 'managing' knowledge is different in each approach and it could be argued that they each have a different take on what is knowledge. *First*, the major concern addressed by each approach is different, which relates to issues such as how we understand the primary function of knowledge management and its essence. *Second*, interpretations of the nature of knowledge are different in each approach, which touches upon questions such as what constitutes knowledge, what is the meaning of knowledge, and how context affects knowledge. *Third*, understanding of the prime knowledge carriers and artifacts involved varies, which has much to do with different understandings of fundamental knowledge management questions such as where knowledge is located and how it is dispersed. *Fourth*, the key tool or method constructed and applied in each approach is different, which touches upon the question of how to 'manage' knowledge. *Fifth*, the

temporal considerations vary in terms of the types of knowledge and skills needed, for instance, in the present or in the future.

Since the theories of the different knowledge management generations have different focuses in many of the essential aspects of knowledge management, as summarized above, the dominant disciplinary perspectives and the related concepts that have been or can be applied must be different. For instance, since information technology plays a key role in the early stage, the technological disciplinary perspective naturally dominates the research and practice. Given the complex and changing nature of knowledge and knowledge management, the multi-disciplinary perspectives adopted in the third generation of knowledge creation and innovation are required to be integrated. In other words, they should incorporate the different disciplinary approaches found, amongst others, in economics and business, technology, sociology and organization, philosophy and psychology. The different disciplinary perspectives with their distinctive features as they relate to knowledge management generation theories are summarized in Table 2.

The differentiation of the three knowledge management generations is in a relative sense. They may exist simultaneously in an organization; they have a lot of overlap; and they are in the same continuum. What is normally seen is a dominant form with its revealing features. The three generations do not have the feature of being per se "good" or "bad".

The three knowledge management generations usually correspond to the three managerial environments or cultures proposed by Ståhle and Grönroos (2000). In their theorizing, an organization is described as *a self-renewal system* based on systems theory consisting of three organizational dimensions in which the presence of all – mechanical, organic and dynamic - is mandatory to achieve success. These business environments can also be called *knowledge environments* because in knowledge-intensive business, the added value is extracted from knowledge.

A mechanical environment generates stability and reliable quality. The mechanical environment is based on a hierarchical top-down management style and strictly defined

Table 2. Disciplinary perspectives on knowledge management generations (adapted from Hong & Ståhle, 2005)

	1st Generation: KM for knowledge identification and capturing	**2nd Generation:** KM for knowledge sharing and transfer	**3rd Generation:** KM for knowledge creation and innovation
Dominant disciplinary perspectives (based on Prusak, 2001)	technological perspective	sociological & organizational perspective	multi-disciplinary perspectives including philosophical & psychological, economic & business, and others
Main KM concern (von Krogh, 1999)	identification of existing knowledge	exploitation of existing knowledge	exploration of new knowledge
Nature of knowledge (Ahonen et al, 2000; Blackler, 1995; Snowden, 2002;)	rational/cognitive; explicit; context-free; embedded, embodied, & embrained	communicative; tacit; situated	interpretative/narrative; situated/intuitive; context-bound; encultured knowledge and collective understanding
Prime knowledge carrier (Ahonen et al, 2000; Blackler, 1995)	database, individual brain; individual-knowledge focus	collective/community; group-knowledge focus	system(s) such as activity systems and innovation networks
Key KM tool (Snowden, 2002; Tuomi, 2002; Tong, 2008)	information technology, Web 1.0	social interaction and communication, Web 2.0	self-renewing organization, Web 3.0
Temporal consideration (Ahonene et al, 2000)	skills needed at present	preparing for the challenges of the near future	capacity to create new knowledge needed in the distant future

organizational structures. The management style found in the military favors such a system. When found in companies, all activities are likely to be strictly documented. Knowledge prevalent in the mechanical environment is explicit and scarce, i.e. formally documented, delivered in a top-down manner, and not open for discussion.

An organic environment generates controlled development and sustained growth. The organic environment is based on dialogue and an interactive organizational culture in which empowered management and cooperation hold a prominent place. Universities, a

focus of this research, are full of continuous innovations and improvements, while at the same time the management style is still very conservative. In such a system, a remarkable and often very valuable part of knowledge is the tacit knowledge of the personnel that is delivered and developed through discussions and cooperation.

A dynamic environment generates the ability for organizational self-renewal and innovativeness. The essential features of a dynamic environment are uncertainty and difficulty anticipating and managing the future. Relations and dependencies are very complex; a small change may have a great impact. In order to succeed, top management has to support continuous change rather than rely on supervision and control. The IT industry changes very fast and in an unpredictable way, compared with traditional business sectors. Innovation progresses very quickly and knowledge workers are motivated to collaborate in a system like OSSD (open source software development). In this context, to support change does not mean to control change but, rather, to have the ability to take risks while having the desire and the capability to adapt quickly and cooperate under sudden contingencies. Decisions often have to be made on the basis of weak signals and intuitive and potential knowledge, where a fast, rich and often chaotic flow of information via internal and external networks plays a major role.

The organization is a living instrument for fulfilling the company's strategy; it is a three-dimensional system capable of choosing purposeful ways to act. Successful management recognizes what kind of operational mode and management culture is appropriate to achieve the desired goals. An exclusively mechanical organization never meets innovative strategic goals, and an exclusively dynamic organization never fulfils the targets set for effective assembly lines. An organization, as a three-dimensional system, according to Ståhle and Grönroos, always consists of *know-how*, *relationships* and *the flow of information.* All three factors are necessary for effective, value-adding communication in all knowledge environments, even if they are very different in nature. Information cannot be enhanced without relationships, and even the best relationships do not help to add value without proper competence and knowledge. These elements of communication and development are manifested very differently in the three different

knowledge environments; they can also act as tools for identifying organizations' potential to meet strategic targets.

From the above, it can be understood that different knowledge management generations demand different knowledge environments and knowledge management can be successful only when appropriate knowledge management strategies and activities are carried out in appropriately matched knowledge environments.

2.1.2 MNC knowledge-based studies in emerging markets

Emerging markets are now seen as a major source of global innovation and knowledge management (Fu et al., 2006; Hutchings & Mohannak, 2007; Pillania, 2005). China's high priority effort to become a more knowledge-based economy and learning society means that knowledge management (e.g. the timely transfer and use of business knowledge) is increasingly important. Chinese businesses have acquired knowledge from a variety of domestic and foreign sources while also beginning to create knowledge of their own (Burrows et al., 2005). The development of new knowledge and capabilities is consequently relevant and salient in emerging and changing markets like China (Hong et al., 2008; Khavul et al., 2007; Li & Scullion, 2006; Tsui, 2004). Specifically for China, as claimed by Jacobson (2007): "The speed with which China has acquired the ability to build high quality research and knowledge centers has been phenomenal. A handful of Chinese companies such as Hai'er, Huawei, and Suntech (Shangde) have become world leaders in their own sectors." (pp. 26-27). Jacobson believes that within the next decade or so, there will be news of ground-breaking innovative research done in China.

For China to step further into the world economy and global innovation, recent research assumes an increasingly important role for universities (Hong, 2008), and a more dynamic and flexible triple helix model of university-industry-government relationships and collaboration is strongly proposed (Lu & Etzkowitz, 2008; Zhou, 2008). In this fast changing landscape, R&D collaboration between MNCs and Chinese universities

presents a rapidly growing trend in China (Hong et al., 2007; Li, 2010; Lin, 2005; von Zedtwitz, 2007). On the research side, however, little is known about the nature of such collaborative innovation and knowledge co-creation. U-I studies in multinational and cross-cultural settings, and research effort on how Chinese culture may influence U-I research collaboration and knowledge interaction are seriously lacking.

The study of MNCs and their subsidiaries is of particular value when simultaneously investigating multi-knowledge contexts (Almeida & Phene, 2004) and examining the interplay of culture and knowledge interaction in the global context of U-I collaboration. This study extends the research context also to the host-country culture and research organizations. There are more advantages that can support the study of MNCs and their subsidiaries. Firstly, MNCs are considered social communities that are better able to transfer organizational knowledge (Kogut & Zander, 1993) and secondly, the value of knowledge interaction in MNCs can be particularly high because foreign markets often provide access to new ideas and stimuli that can subsequently be applied in other countries (Hedlund, 1986; Bartlett & Ghoshal, 1989).

Cultural issues have not been well acknowledged in knowledge management until recent years. Nowadays, however, there are signs of growing interest in the role of culture in knowledge management (e.g., a special issue of the journal *Knowledge and Process Management* on the role of culture, 2007). Particularly in MNC knowledge-based studies, key cultural influences have been identified from previous knowledge management studies, including, for instance, cultural distance across national borders (Bhagat et al., 2002; Buckley et al., 2006; Lucas, 2006; Qin et al., 2008; Simonin, 1999) and partner relationship across organizations (Evaristo, 2007; Inkpen, 1996; Inkpen & Pien, 2006; Pak & Park, 2004; Santoro & Bierly, 2006). Researchers are in agreement that achieving effective knowledge interaction across countries and cultures is a challenging undertaking.

In international strategic alliances, U-I collaboration has become an increasingly frequent innovation strategy, especially in the West (Hemmert et al., 2008). However, much less is known about such research collaborations in China (Liu & Jiang, 2001;

Wang & Lu, 2007). Thus there is a clear requirement for studies on U-I collaboration and knowledge interaction in emerging markets such as China.

2.2 Knowledge interaction in research partnerships

In this section, knowledge interaction theories, strategies and approaches, and knowledge interaction in knowledge management are the main concerns of the review.

2.2.1 Knowledge interaction theories and strategies

There has been considerable debate in knowledge and learning literature on whether *knowledge exploitation* or *knowledge exploration* should be the focus of a firm to achieve effective knowledge interaction and value creation (March, 1991; Grant & Baden-Fuller, 2004; Gupta et al., 2006; Spender, 1992). In the MNC context, Gupta et al. (2006) emphasize the consistency between conceptual and empirical definitions of exploitation and exploration and raise a key question: How should organizations find a balance between exploration and exploitation? Their research addresses the two distinctive mechanisms of ambidexterity and punctuated equilibrium. *Ambidexterity* refers to the synchronous pursuit of both exploration and exploitation via loosely coupled and differentiated subunits or individuals, each of which specializes in either exploration or exploitation. In contrast, *punctuated equilibrium* refers to temporal rather than organizational differentiation and suggests that cycling through periods of exploration and exploitation is a more viable approach than a simultaneous pursuit of the two.

In understanding strategic alliances, Grant and Baden-Fuller (2004) promote *a knowledge accessing theory* in which they argue that the primary advantage of alliances over both firms and markets is in *accessing* rather than *acquiring* knowledge. Building upon the distinction between knowledge exploitation (application) and knowledge exploration (generation), the knowledge accessing theory focuses on the role of strategic

alliances, not in acquiring but in accessing knowledge resources of other organizations. The authors contend that access to knowledge provides the predominant motive for alliance formation, especially within the knowledge-based sectors where alliance activity has been especially prevalent (e.g., telecommunications). They believe that their proposed knowledge accessing theory of alliances offers the advantages of greater theoretical rigor and consistency with general trends in alliance activity and corporate strategy, and the advantages of alliances are especially apparent under conditions of uncertainty and early mover advantages.

Practitioners and researchers may understand knowledge interaction and its strategies differently. Some may intensively refer to a *knowledge exploitation* or *codification strategy*, emphasizing the application of existing knowledge; others may employ a *knowledge exploration* or *personalization strategy*, stressing knowledge creation through collaboration. The two strategies have been differentiated and conceptualized further by Jasimuddin et al. (2005). The exploitation strategy focuses chiefly on explicit knowledge and allows knowledge to be carefully codified and stored in databases, where it is made available for use. The exploration strategy tends to focus on tacit knowledge and addresses the storage of knowledge in human minds and its transfer from person-to-person.

2.2.2 Knowledge interaction approaches

Depending on the knowledge theories and strategies adopted in the inter-organizational knowledge interaction, the following knowledge interaction approaches have been identified: *Technology and knowledge transfer, knowledge integration*, and *collaborative knowledge creation* (Hong et al., 2007).

Technology and knowledge transfer (TKT)

In simple terms, *technology and knowledge transfer* **(**TKT) is the communication of technology and knowledge from one agent to another (Hedlund & Nonaka, 1993). The

agent that provides the needed knowledge is the knowledge source or supplier, and the agent that gets the knowledge is the knowledge recipient. Not synonymous with technology transfer, knowledge transfer implies a broader, more inclusive construct that is directed more toward understanding the "whys" for change. Technology transfer is a narrower and more targeted construct that usually embodies certain tools for changing the environment (Gopalakrishnan & Santoro, 2004). It is argued that the knowledge transfer process consists of transformation absorption, culminating in a behavioral change by the recipient organization (Davenport & Prusak, 1998).

Knowledge transfer is a key concern in knowledge management and it is therefore the aspect most studied (see comprehensive reviews by Argote 2009 and Klijn 2006). Based on a review of Argote (2009), knowledge transfer deals widely with knowledge scope within organizations (e.g., Argote & Ingram, 2000), between organizations (e.g., Epple et al., 1991; Hansen, 1999; Szulanski, 1996), and among organizations, communities and societies (Holland, 1998). Studies on micro-foundations of knowledge transfer include, for instance: 1) effective mechanisms of knowledge transfer such as personal movement (Almedia & Kogut, 1999), social networks (Reagans & McEvily, 2003) and alliances (Gulati, 1999); and 2) conditions that facilitate or impede knowledge transfer such as the characteristics of the source (e.g., reliability, Szulanski, 2000), the characteristics of the recipient (e.g., absorptive capacity, Cohen & Levinthal, 1990), the characteristics of the knowledge (tacitness, Hassen, 1999; causal ambiguity, Szulanski, 1996), and the characteristics of the relationship between the source and recipient (e.g. superordinate identity, Kane, Argote & Levine, 2005). TKT in this study refers to one-way technology and knowledge transfer. For a growing number of authors, the concept is also understood as an interactive process of knowledge interaction, in which technology and knowledge transfer is not mechanical, but interactive and embedded in existing capabilities on both collaboration sides and in the social relationships between both partners of the transaction (e.g., Grandori & Kogut, 2002).

Knowledge integration (KI)

Distributed knowledge can be applied either through transfer or through integration (Alavi & Tiwana, 2002). *Knowledge integration* (KI) emphasizes the process of integrating and transforming *the acquired knowledge* for the firm's specific use. It seems that the concept of KI emphasizes the knowledge fit (e.g., the knowledge structure that exists prior to the process of knowledge integration) between the source and the recipient organizations. Thus, TKT is making knowledge clear to others and letting them be able to learn and use it directly, whereas KI is making knowledge available to others and letting them be able to choose the part they need and allowing them to use it in their own ways.

Comparatively, integrating knowledge takes less time in the learning process than transferring knowledge. Grant (1996) argues that transferring knowledge is not an efficient approach to integrating knowledge. He claims that: "if production requires the integration of many people's special knowledge, the key to efficiency is to achieve effective integration while minimizing knowledge transfer through cross-learning by organizational members" (p.114). Given the above assumption about the characteristics of knowledge and the knowledge requirements of production, Grant conceptualizes the firm as an institution for integrating knowledge. Earlier studies focus on teams within an organization as a primary means of KI (Alavi & Tiwana, 2002; Mengis & Eppler, 2006; Okhuysen & Eisenhart, 2002). This study, however, considers not only teams but also organizations as a base for the exploration of U-I knowledge exchange and integration.

Collaborative knowledge creation (CKC)

Collaborative knowledge creation (CKC) refers to a situation when two or more partners join and work together to create new information and knowledge which can be used for the benefit of both or all sides, and which has potential for future innovation and development (van Aalst, 2009; Engeström et al., 2003; Holland & Lave, 2009; Inkpen, 1996; Vuola & Hameri, 2006). The focus of the approach is on creating and

developing new knowledge. In CKC, a common understanding of the shared vision is considered essential throughout. CKC is the key concept underlying collaborative innovation at both individual and organizational levels (Hermans & Castiaux, 2007; Hong et al., 2007; Nonaka & Takeuchi, 1995; Nonaka, 2007; Popadiuk & Choo, 2006). In CKC studies, the focus has shifted from knowledge creation within an organization to inter-organizational collaboration and interaction (Drejer & Jørgensen, 2005; du Chatenier et al., 2009; Jakubik, 2008), and from individual-level knowledge creation to multi-level or collective endeavors in organizations (Engeström, 1999; van Aalst, 2009). A new framework developed by Salisbury (2008) focuses on the use of performance objectives for managing the 'right' knowledge during a CKC process. The study shows that every knowledge product has a set of criteria, or performance objectives, that need to be met by its developers for its successful completion. These performance objectives tell an organization what needs to be done and how well it should be done. Moreover, measuring how much time is spent in creating a new knowledge product provides data relating to scheduling and costs for the knowledge product.

In this study, it is posited that the creation of new knowledge is not merely a matter of conversion between tacit and explicit knowledge as Nonaka and Takeuchi propose, rather, a change creating a new and qualitatively different form (see also Engeström, 1999). Therefore, knowledge creation in Nonaka and Takeuchi's term would be more like KI in the conceptualization of this study. Moreover, the identified knowledge interaction strategies and approaches are often mixed. Some can be clarified into knowledge transfer and others into KI and/or CKC. In practice and in many cases, the boundary between the knowledge interaction approaches (i.e., TKT, KI, & CKC) is not clear and the division is made in a relative sense and more for purposes of analysis.

2.2.3 Knowledge interaction in knowledge management

Knowledge interaction takes different shapes in knowledge management and is very much subject to what knowledge management is being referred to. It is also evident that the intensity of knowledge interaction varies a lot due to different knowledge

management generation theories and environments, as previously reviewed. The intensity of knowledge interaction appears to increase from first to second to third generation knowledge management.

In the first generation of knowledge management, knowledge interaction takes place more between human beings and intelligent machines. The key knowledge management questions are: What kind of knowledge is there in an organization? And how will it be identified and captured? In the second generation of knowledge management, knowledge interaction is more between knowledge suppliers and recipients (i.e. from knowledge suppliers to recipients). The key knowledge management question is how useful knowledge will be effectively shared and transferred. In the third generation of knowledge management, knowledge interaction is more between knowledge partners involved at a more or less equal level, and it is most intense since it requires that both or all knowledge partners are strongly committed before anything new is produced. The key knowledge management question is how new knowledge will be created through such commitment and collaboration. The dominant mode of knowledge interaction in the different knowledge management generations is, respectively: TKT, KI, and CKC. The intensity of knowledge interaction in the different generation knowledge management activities and environments is presented in Table 3, along with the different features and key knowledge management questions.

2.3 Cross-cultural research

The impact of culture on organizational behavior, management and business operations has been well acknowledged, although the study of culture is challenging due to its pervasive and complex nature and the increase of *multiculturalism* in today's globalizing businesses, organizations and societies (Craig & Douglas, 2006). Challenging and important issues discussed in this section include theories in cultural studies, multi-level cultural influences, moving cultures and multiculturalism, and the role of the host-country culture.

Table 3. Intensity of knowledge interaction in knowledge management generations and environments (adapted from Hong, 2008)

	1st Generation KM	2nd Generation KM	3rd Generation KM
Interface of knowledge interaction	Between human beings and intelligent machines	Between knowledge suppliers and knowledge recipients	Between knowledge partners involved at a more or less equal level
Key KM question(s)	What kind of useful knowledge is there in an organization? How will it be identified and captured?	How will useful knowledge be effectively shared and transferred?	How will useful knowledge be created through commitment and collaboration?
Mode of knowledge interaction	Technology and knowledge transfer (TKT)	Knowledge transfer and knowledge integration (KI)	Collaborative knowledge creation (CKC)
Intensity of knowledge interaction	Low	Medium	High
KM environments	Mechanical	Organic	Dynamic

2.3.1 Theories in cultural studies

The field of cultural studies encompasses a wide area and many theories have been proposed. Following Alasuutari (1995), cultural studies means that one takes culture seriously without reducing it to a mere effect or reflection of economy and business practices. The real gist of cultural studies is to *make use* of all useful theories and methods in order to gain insights about the phenomena studied. This study adopts several frameworks of the cultural studies reviewed below, namely, social practice theory, cultural-historical activity theory, and an integrated view of culture for organizational analysis. The first two theories have a common root in the Russian cultural-historical school originally developed by Vygotsky and his colleagues (Vygotsky, 1978). The third framework is a cultural perspective on organizations.

Social practice theory and cultural worlds

In the line of the Russian cultural-historical school, Holland and colleagues (Holland, 2000; Holland & Lave, 2009; Holland & Reeves, 1994) develop a cultural-historical social practice theory of social learning and knowing, emphasizing the production and interaction of cultural forms in practice. Holland et al (1998) articulated a developmental understanding of the formation of new knowledge, new identities and new practices, which has later been conceptualized as transformative knowledge. The new concept of transformative knowledge addresses the key question of how transformative knowledge (e.g., produced by university-based researchers) is transformed and reaches beyond academic circles to attain wider circulation and greater effect, working to transform social life.

In the view of Holland et al. (1998), *figured worlds* "rest upon people's abilities to form and to be formed in collective realized 'as if' realms" (p.49). These collective "as-if" worlds are socio-historic, contrived interpretations or imaginations that mediate behavior and so, from the perspective of heuristic development, inform participants' outlooks. The ability to sense (see, hear, touch, taste, feel) the figured world becomes embodied, over time, through continual participation. Thus, a figured world can be defined as "a socially and culturally constructed realm of interpretation in which particular characters and actors are recognized, significance is assigned to certain acts, and particular outcomes are valued over others" (p.52).

Figured or cultural worlds were developed based on the concept of cultural models. However, they differ from one another. The concept of cultural models has been around in cognitive anthropology since the 1970s (For a history, see Quinn & Holland, 1987). Following the same tradition, D'Andrade and Strauss's work (1992) is important for linking cultural models and motivation, in which cultural models are regarded as a *directive force*. The term 'directive force' refers to "a specific kind of motivation - the moral or quasi-moral sort, where one feels obligation" (D'Andrade, 1992: 37). More specifically, cultural models (i.e., shared cognitive schema) structure individual goals. It is argued that cultural models can have motivational force because these models not

only label and describe the world but also set forth goals (both conscious and unconscious) and elicit or include desires.

The cultural models concepts can easily be generalized and prove useful in the study of cultural worlds. They are quite static however in this sense. Figured or cultural worlds, on the other hand, emphasize the importance of investiments of the self in the world, the social interaction between participants, the production of new models within these interactions and the small and bigger socio-cultural worlds to which the participants belong and in which they act. In this sense, figured worlds are dynamic and more context-specific. With this regard, people's actions and activities are taken into account in the term figured worlds.

A common assumption shared by both cultural-historical social practice theory and cognitive anthropological theory seems to be that cultural models or "figured worlds" are a source of motives. This opens up a new path in which the motivational research can be directed to a group. Traditional psychological research is about the individual mind. Furthermore, traditional psychological research is prone to advocate a universal model for human motives. The proposal that cultural models or figured worlds shape human motives leads to the conclusion that motivation varies from culture to culture. This implies that collaboration between two or more figured worlds can only be possible when the different motives of the cultural worlds are well articulated, understood and negotiated, and a third or hybrid cultural world is produced. It suggests that in U-I research collaboration, it is crucial for collaboration partners to reach a shared understanding, and each party must accept a clear and shared responsibility.

Cultural-historical activity theory and object-oriented activity systems

In any society and culture, activities are learned in and organized by cultural or figured worlds. Cultural worlds take shape within and grant shape to the co-production of activities, discourses, performances, and artifacts. A cultural world is peopled "by the figures, characters, and types who carry out its tasks and who also have styles of

interacting within, distinguishable perspectives on, and orientations towards it" (Holland et al., 1998: 51).

Goodenough (1994) suggests that we should theorize culture in relation to activity. The study of culture is particularly meaningful and makes theory concrete when it is studied in relation to people's actual activities. In cultural-historical activity theory, activity systems are mediated by cultural artifacts (Cole, 1996; Wertsch, 1997). Mediating artifacts include material tools and technologies, but they also encompass sign systems, symbols, concepts, and cultural models (see D'Andrade & Strauss, 1992). Pervasive and long-standing cultural models such as Chinese *guanxi* (interpersonal relationship or informal social networking) may be seen as tertiary artifacts[4], not tied to any specific activities, yet tremendously influential across a wide range of activities (Wartofsky, 1979). Such tertiary artifacts tend to consolidate themselves, becoming sedimented as habitual, unquestioned rules. However, all artifacts, including stable cultural models, are inherently ambiguous and beset by dilemmas. In times of radical societal transformation, both cultural models and cultural worlds are re-articulated, questioned and sometimes qualitatively altered. Often, new cultural worlds are produced. Such changes are initiated in concrete, mundane actions of local problem solving and reflection.

In activity theory, a shared object of an activity system is decisive for any inter-organizational collaboration. U-I collaboration may fail if two organizational systems focus only on their own dominant activity and un-shared object. To collaborate simply means to produce a hybrid activity system in which a common object may be visible to the collaboration partners. Well-shared objects of collaboration can only be produced by collaboration partners through creative dialogue, constructive negotiation and intensive and reflective communication, in which the actors focus on reconceptualizing their own organization and interaction in relation to the shared objects (Engeström et al., 1991).

[4] Wartofsky identifies three interrelated levels of artifacts. Primary artifacts include concrete tools such as hammers. Secondary artifacts are representations or modes of action that enable humans to preserve and transmit the acquired skills and information. Tertiary artifacts are more associated with imaginative perceptual models or overviews which go beyond present actualities (Watofsky, 1979).

Complementary knowledge may serve as such an object of U-I collaboration and interaction. In much U-I collaboration and in many U-I projects, such an object is hard to identify, particularly during the early stage of the collaboration. In other cases, the object is on and off through the whole process of collaboration, meaning the collaboration object is not all the time clear for the collaboration partners, but it is somehow guided by a runaway object in the term of Engeström (2008a). Runaway objects have the potential to escalate and expand up to a global scale of influence and they can also be powerfully emancipatory objects that open up radically new possibilities of development and well-being. The Linux operating system is a well-known example of such a case. Most runaway objects do not start out as big and risky. More commonly, they begin as small problems or marginal innovations, which make their runaway potential difficult to predict and utilize. They often remain dormant, invisible, or unseen for lengthy periods of time, until they burst out into the open in the form of acute crises or breakthroughs (Engeström, 2008b).

Integrated view of culture for organizational analysis

To develop a context-sensitive approach to cultural analysis of organizations, it is important to understand the assumptions different researchers bring to conceptualizing the relationship between culture and organization. Smircich (1983) identifies two ways of examining the concept of culture for organizational analysis. The first is *an instrumental view of organizations*, in which culture is seen as an organizational variable; and the second *an interpretative view of organizations*, in which culture acts as a root metaphor for conceptualizing organizations. The former advocates that a culture is something an organization *has,* and the latter proposes that a culture is something an organization *is.*

The contrasting views are related to two streams of organization and management research. The former is more related to cross-cultural or comparative management and the study of corporate culture, and the latter is more related to organizational cognition, organizational symbolism, and unconscious processes and organization privilege. The distinct features are compared in Table 4 as regards defining culture and seeing values in the study of culture in organizations.

Table 4. Two contrasting views of culture for organizational analysis (Based on Smircich, 1983)

	An instrumental view of organizations: *Culture as an organizational variable*	**An interpretative view of organizations**: *Culture as a root metaphor for conceptualizing organization*
Culture	A culture is something an organization *has*	A culture is something an organization *is*
Organization and management research	Cross-cultural or comparative management, corporate culture	Organizational cognition, organizational symbolism, unconscious processes and organization
Ultimate interest and value	To seek predictable means *for organizational control* and improved means *for organization management*	To explore the phenomenon of organization as a subjective experience and *to investigate the patterns that make organized action possible*

It seems both analytic positions identified by Smircich (1983) are important in the present study and in certain research contexts the contrasting views can be used in one and the same study. When the focus of the study is on cultural influences on U-I knowledge interaction activities, the first position that assumes "a culture is something an organization *has*" seems to be more relevant. When examining the interplay between culture and knowledge interaction, it appears meaningful to adopt the latter position that emphasizes "a culture is something an organization *is*." In this sense, the dichotomy between the two cultural views might be false, and more complex, multi-dimensional and interactive relationships between culture and organization must be considered, in addition to culture and knowledge depending upon the actually pursued topics, research interests and related focii. This study, therefore, adopts *an integrated view of culture* to conduct a complex organizational analysis in the studied context.

Despite the very real differences in research interest and purpose presented here, in view of Smircich (1983), whether one treats culture as a background factor, an organizational variable, or as metaphor for conceptualizing organization, the concept of culture focuses attention on the expressive, non-rational qualities of the experience of organization. It legitimates attention to the subjective, interpretative aspects of organizational life. In

this context, however, culture is thought of as directly bound up with work and its organization: it is a network of embedded practices and representations that shapes every aspect of social life (Frow & Morris, 2000).

2.3.2 Multi-level cultural influences

More recent cross-cultural research considers culture as a multi-level construct which consists of various levels nested within each other from the most macro-level of a global culture, through national cultures, organizational cultures, group cultures, and cultural values that are represented in the self at the individual level (Leung et al., 2005). This view places a special emphasis on the intersection of these aggregate levels and the factors which facilitate cultural change (see Craig & Douglas, 2006) and multi-level cultural influences become more and more evident in organizations and societies. Most of the research addresses culture primarily at the level of either national or organizational culture. In order to take an in-depth look at the culture of an organization, the study of culture at both national and organizational levels and also at functional aspects or subunits/groups is required.

2.3.3 Moving cultures and multiculturalism

The significance of culture to an organization has increasingly been understood as dynamic processes rather than static imposing structures (Pettigrew, 1979; Sackmann, 1991; Hasu et al., 2005; Hong et al., 2008). Furthermore, the accelerating process of globalization, radical social and economic transformation, and the increasing interconnections between cultures involve an unprecedented challenge to academic mainstream conceptions which continue to work in a tradition of cultural dichotomies (Craig & Douglas, 2006; Hermans & Kempen, 1998). In an increasingly interconnected world society, the conceptual idea of independent, coherent, and stable cultures is becoming increasingly irrelevant. The concept of moving cultures undermines the idea

of cultures as internally homogeneous and externally distinctive (Hermans & Kempen, 1998). As Craig and Douglas (2006) point out, the parallel trends of globalization and multiculturalism make it increasingly important to develop a deeper understanding of culture and its various manifestations. Cultural influences are changing dramatically, as cultures are no longer dependent on local resources to formulate their characteristic tastes, preferences and behavior, and are increasingly linked across vast geographic distances by modern communication media.

In this regard, the main challenge for the study of culture is in the understanding of cultural interface or interaction. There are two contrasting views on the interplay phenomenon. One view emphasizes cultural adaptation in which there is always a so-called mainstream culture that takes a lead and is the culture to be adapted. As Berry et al. (1992: 273) claim, "In principle each could influence the other equally, but in practice one tends to dominate the other, leading to a distinction between the *dominant group* and *acculturating group*". The other view focuses on cultural or knowledge co-creation. In understanding cultural dynamics for marketing research, for instance, Craig and Douglas (2006) use *cultural hybridization* to refer to a fusion of two or more elements from different cultures that result in a new cultural element. In the different context of psychological research, Hermans and Kempen (1998) focus on intercultural processes that lead to the transformation of existing cultural practices into new ones and they criticize the idea of cultural uniformity that fails to see the influence that non-Western cultures have been exercising on the West and on one another. The study in this dissertation argues in favor of cultural interaction and the phenomenon of cultural hybridization as defined by Craig and Douglas (2006).

2.3.4 Role of the host-country culture

In relation-oriented cultures, the priority is mostly given to personal solutions and tacit knowledge (Hansen et al., 1999; Bhagat et al., 2002; Boisot & Child, 1996; Li, 2008). In explaining China's path towards modernization, which differs from that of the West, Boisot and Child (1996: 622) contend that China's economic reformation and

decentralization has led "not to markets but to clans and permits the more local and personalized institutional order", called 'network capitalism'. More recently, Weir and Hutchings (2005) claim that key to understanding knowledge management in China is recognizing the networked nature of these societies. In Chinese culture, managers and organizational members will share knowledge only with those with whom they already have a trusting relationship (Huang et al., 2008; Weir & Hutchings, 2005). Knowledge sharing in joint ventures, for instance, is problematic because of the potential of divisions between local employee insiders and foreign management outsiders (Hutchings & Michailova, 2004; Weir & Hutchings, 2005). Kok (2006) concludes from his study of Singapore-based companies that the successful management of tacit organizational knowledge sharing requires a deep understanding of the specific cultural values (e.g., *guanxi*) that underpin both behavior and organizational culture.

Personal ties are thus nurtured in China and people show high loyalty to their personal networks known as ***guanxi,*** which are commonly used to get things done (Huang et al., 2008). *Guanxi* is difficult to translate into English; it can mean roughly interpersonal relationship, personal connection, or informal social networking[5]. The traditional concept of *guanxi* emphasizes role relationships (e.g., the five cardinal relationships defined in Confucian ideology: emperor-subject, father-son, husband-wife, elder-younger brother, and friend-friend) and a set of background factors (e.g., being a relative, having the same place of origin, being former classmates/colleagues, etc.) operative in interpersonal relationships (Hong & Engeström, 2004). Paternalistic notions of *guanxi* stress personal trust and small group relationships. A broader vision of *guanxi* in modern practices focuses, however, also on mutual favor exchanges in diverse social networks (Chang & Holt, 1991; Luo, 1997; Wong, 1998; Yang, 1994). Within the context of business relations and communication, reciprocity is a key ingredient in which mutual favors are granted and "strings pulled" on the basis of *guanxi* that binds people together both within and between organizations (Child & Markoczy, 1994). With respect to this conceptual development, *guanxi* can occur at

[5] In recent organizational and sociological literature, *guanxi* has been compared with concepts such as relational demography (Farh et al., 1998; Tsui & Farh, 1997), relationship marketing (Arias, 1998), social networks (Hsung, 1998), and Japanese *wa,* referring to group harmony and social cohesion (Alston, 1989). *Guanxi* has also been discussed in connection with Bourdieu's conception of social capital (Smart, 1993) and Granovetter's sociological account of strong and weak ties (Bian & Ang, 1997).

both personal and organizational levels. The combination of cultural norms and the socioeconomic and political situation in China means that *guanxi* ties are seen as a core element of Chinese culture (Buckley et al., 2006; Ramasamy et al., 2006), a key determinant of a firm's performance (Luo, 2007), and a unique source for competitive advantage of Chinese capitalism (Yang, 2002).

Formal structure and governance will not work without the support of informal social relationships and networking in organizational communication and knowledge management (Adler, 1993; 2001; Hong & Engeström, 2004; Nonaka & Tacheuchi, 1995; Ring & van de Ven, 1994). Informal social networking or Chinese *guanxi* is particularly important in any meaningful collaboration and all kinds of knowledge interaction in China. The significance of *guanxi* and trust has recently been studied in connection with cross-border knowledge interaction (Buckley et al., 2006; Miesing et al., 2007; Ramasamy et al., 2006). Buckley et al. (2006: 278), for instance, argue that "given the diversity and complexity of the Chinese business environment, even for explicit knowledge to be transferred and absorbed, cultural barriers have to be removed and good inter-partner relationships have to be established." Ramasamy et al. (2006) raise an interesting question whether *guanxi* can serve as a bridge to inter-organizational knowledge transfer. In their research, *guanxi* consists of three components: trust, relationship commitment, and communication. Their results of an interview-based survey with Chinese enterprise general managers show that trust and communication are the two main channels of knowledge transfer. The authors suggest that inter-partner activities tend to be informal in China and so using informal channels (like *guanxi*) to transfer knowledge would be more desirable and practical. Jiang's study (2005) explores the powerful effects of Chinese entrepreneurs' social capital, social interaction ties, and trustworthiness, which are mediated by *guanxi* development, on the success of knowledge transfer in Chinese high-tech firms.

To sum up, in this study it is presumed that in relation-oriented cultures, the adoption of a personalization strategy, a focus on personal solutions, and the priority of tacit knowledge over explicit knowledge are preferable in U-I R&D knowledge interaction. Previous studies show that *guanxi* has a significant role in knowledge interaction,

including knowledge sharing and knowledge transfer (e.g., Buckley et al., 2006; Jiang, 2005; Ramasamy et al., 2006). It has an inter-dependent relationship with trust, which is particularly important when transferring and sharing tacit types of organizational knowledge.

2.4 University-industry knowledge interaction

U–I collaboration and knowledge interaction may take various forms and the driving forces behind them may also vary greatly from case to case. This section briefly reviews reasons for U–I collaboration, considering complementary knowledge interaction for innovation as a primary but emerging concern. It clarifies further, from previous literature and the author's research experience, the major forms of collaboration and then analyzes the nature of U-I knowledge interaction in terms of the identified knowledge interaction theories (e.g., knowledge accessing vs knowledge acquisition), strategies (i.e., exploitation vs exploration), approaches (i.e., TKT, KI & CKC), and related collaboration activities in joint research, education and innovation. Cultural aspects of U-I knowledge interaction in previous studies are examined. At the end of the section, a theoretical framework is proposed which acts as a summary of this and other sections of the chapter, leading to the empirical part of the study in the dissertation.

2.4.1 Knowledge interaction in collaborative innovation activities

This study argues that the primary reason for U–I collaboration is the need to gain complementary knowledge, expertise or competence with the aim of applying it to a commercial end. Universities have access to intellectual resources and can offer a competent basic research infrastructure and conduct high-quality research; companies on the other hand possess practical knowledge and up-to-date technology information, are a contact interface with the international market and financial resources, and offer employment opportunities for new graduates. When discussing such U–I partnership and collaboration, Gustavs and Clegg (2005: 11) refer to it, for instance, as the

interaction between the two modes of knowledge production originally proposed by Gibbons and his colleagues. Knowledge production Mode 1 is defined as being "institutionalized primarily within university structures" and is discipline-based, whereas Mode 2 is characterized as operating "within a context of application" (e.g., workplace knowledge). Knowledge itself as a prime value for U-I collaboration becomes evident through the interaction of knowledge production Modes 1 and 2, which reveals knowledge co-creation and mutual learning between universities and companies.

Typical U–I knowledge interaction is revealed, for instance, in knowledge networks (e.g., direct personal networks such as talks at academic conferences/workshops, and indirect linkages intermediated by third parties such as liaison offices) (Fukugawa, 2005), strategic knowledge alliances focusing on the knowledge-based value in innovation (Lin, 2005), joint R&D projects and institutes and their evolving activities (Hermans & Castiaux, 2007; Johnson & Johnson, 2004; Li, 2005; Li & Zhong, 2003), co-operation in education and training (Ryan, 2007), science-based industrial innovation (Gu & Lundvall, 2006; Guan et al., 2005), university-run enterprises (Eun et al., 2006), and science parks as knowledge organizations (Hansson, 2007). Some types of knowledge interaction are highly interactive and more intense than others.

U-I knowledge interaction approaches

When considering the knowledge interaction approaches previously identified and reviewed, typical TKT practices of U-I knowledge interaction include the transfer of techniques and technologies from one location to another, the commercialization of an innovation (e.g. licensing), or hiring new graduate and young talents from collaboration universities. In the context of U-I collaboration, it would be interesting, for instance, to study the recruitment of graduate students in addition to the conventional focus on patent and paper studies (Agrawal, 2001).

Previous U–I knowledge interaction research focuses primarily on knowledge transfer. In a comprehensive literature review of U-I knowledge transfer, Agrawal (2001)

identifies four research streams. Research in the *firm characteristics* category focuses directly on company issues such as internal organization, resource allocation, and partnerships. Research in the *university characteristics* stream pays special attention to issues relating to the university, like licensing strategies, incentives for professors to patent, and policies such as taking equity in return for intellectual property. The *geography in terms of localized spillovers* stream of research considers the spatial relationship between firms and universities relative to performance in terms of knowledge transfer success. The *channels of knowledge transfer* literature examines the relative importance of various transfer pathways such as publications, patents, and consulting. A number of specific topics in the field of U–I knowledge transfer are of particular interest to the study, namely those which deal with the enabling function of trust and networking (Koschatzky, 2002; Lambooy, 2004; Santoro, 2006: Sherwood & Covin, 2008), the interplay between the characteristics of U–I relationships and the transfer of sticky knowledge (Wang & Lu, 2007), and the potentially moderating role of technical and organizational uncertainties (Daghfous, 2003). Achieving effective knowledge transfer across countries and cultures can be even challenging. As Perrin et al. (2007) note, much knowledge management theory is based on limited and often anecdotal evidence and this is particularly the case for knowledge transfer within and between different cultural contexts.

In U-I collaboration, one example of KI could be when firms request technical and management consultation from university-based scientists. These consultants present solutions, but seldom know what happens afterwards in the firm. Knowledge integration may take very different shapes at early versus later stages. At an early stage, there is much more face-to-face contact and personal interaction involved, which is not the case at a later stage when actions happen internally within the recipient organization.

Studies on knowledge creation in U–I collaborative research projects seem to present an emerging line of research (Hermans & Castiaux, 2007; Johnson & Johnson, 2004) which expands Nonaka and Takeuchi's (1995) theorizing context from within an organization into a wider U–I context. As Nonaka et al. (2000: 30) note: "For the immediate future, it will be important to examine how companies, governments and

universities can work together to make knowledge creation possible." Nonaka et al.'s knowledge creation theory and concepts are also applied and discussed in a number of other U–I studies (Gustavs & Clegg, 2005; Hansson, 2007; Heikkinen et al., 2007). The research on CKC as defined in this study is rarely found in this context.

U-I knowledge interaction in the Chinese MNC context

Based on literature study and research experience, the most prevalent forms and activities of MNCs' R&D collaboration and knowledge interaction with Chinese universities can be identified (see also Eun et al., 2006; Li, 2005; Lin, 2005). They include: 1) *Authorized or contract-based research projects* – normally companies provide research funds and equipment, and the authorized universities return research outcomes back to the companies on the basis of the agreement made. 2) *Joint research projects* – in most cases they are only partially "joint" in the early stage of the project establishment. The research topic is jointly discussed and established according to a common interest or target. 3) *Collaborative training enterprises or programs* – commonly planned and developed by both partners. 4) *Joint R&D institutes* or *laboratories* – focusing on specialized areas in collaboration and creating local talent pools is increasingly becoming the true motivation of MNCs' collaboration with Chinese universities. 5) *Science and technology parks close to university campuses* – these provide a geographically convenient and common ground for U–I interaction. 6) *University-run enterprises* are locally grown MNCs which have university or academic roots. 7) *Technical and management consultation* is a one-way rather than interactive form of knowledge interaction since firms exclusively act as the user of knowledge instead of the co-creator of knowledge. 8) *Licensing* refers to the interest and potential of the firm in applying the inventions of university-based scientists. 9) *Donation* is the firm's long-term strategy to build up relationships with universities with the aim of hiring competent new graduates, although this is the least interactive form of U–I collaboration. Within this category, company-sponsored post-doctoral research positions in universities are nowadays popular. Other forms of collaboration and knowledge interaction involving strategic knowledge alliances (in various forms) and

thematic joint workshops between university researchers and company managers are emerging as new trends in China.

The different forms of U–I collaboration and knowledge interaction are intertwined as shown in Figure 3. The forms of knowledge interaction identified and presented in the figure are in a relative sense and for purposes of analysis. There is much overlapping. It is worth noting that the intensity of knowledge interaction may increase from TKT to KI, and the U-I interaction is most intense in CKC.

Role of trust and knowledge type in U-I knowledge interaction

Recent U-I research indicates that the role of trust is different in different types of knowledge (explicit vs tacit). In a study of knowledge acquisition in U-I alliances, for instance, it has been found that the role of partner trust is different depending on the type of knowledge (Sherwood & Covin, 2008). The role of partner trust is more significant for tacit knowledge rather than explicit knowledge. The findings of the study suggest that partner trust varies in importance in knowledge acquisition, contingent upon the type of knowledge being transferred. Trust in the university partner was not a significant predictor of successful knowledge acquisition for explicit knowledge, but was for tacit knowledge. Although the development of a trusting relationship between the knowledge source and knowledge-seeking parties is generally advisable, firms that seek to acquire explicit technological knowledge from their alliance partners may successfully do so without making significant time and energy investments designed to assure themselves that they can trust their partners. A similar result was confirmed by an early study of Santoro and Saparito (2006). It was found that a trust relationship is subject to differences in the knowledge type (tacit vs explicit knowledge): As knowledge becomes more tacit, the self-interest assumption becomes negatively associated with knowledge transfer while relational trust becomes more strongly positive. The self-interest assumption in Santoro and Saparito's study means when one alliance member perceives that its alliance partner will fulfill their commitments because it is in their self-interest to do so. They propose that a firm's self-interest

U-I knowledge interaction	Technology and knowledge transfer (TKT)	Knowledge integration (KI)	Collaborative knowledge creation (CKC)
Collaboration activities in joint research, education & innovation	Licensing Authorized research projects Partially joint research projects Donation	Technical & management consultation from research organization(s) University science & technology parks	Fully joint research projects Collaborative training institutes and/or programs Joint R & D institutes or labs Thematic joint workshops

The intensity of knowledge interaction increases from TKT to CKC

Figure 3. Knowledge interaction in university-industry joint innovation activities

assumption about their university partner will be appositively associated with knowledge transfer within a university-industry relationship: the reason being that when self-interest assumptions are high, it translates into greater knowledge transfer (Santoro & Saparito, 2006).

2.4.2 Cultural exploration in previous studies

Research on U–I knowledge interaction conducted so far is primarily related to studies on cultural influences across *organizational* boundaries. Universities and companies are different in nature. Their objectives and activities are different and so are their ways of thinking and doing things. From the point of view of the organizational culture, one major difference lies in the value they hold for research and its outcomes. Universities hold basic research in high regard, whereas companies focus on applied research;

universities emphasize the value of research per se, whereas companies most often focus on the practical side of research and the profit maximization that might be derived. Some researchers regard the impact of such differences negatively, as a collaboration barrier (Declercq, 1981); others consider it the very reason for collaboration (Lee, 1996; López-Martinez et al., 1994).

The U–I studies that deal with the fundamental differences between two types of organizations focus particularly on *goal formation, time orientation, language* and *assumptions* (Cyert & Goodman, 1997; Elmuti et al., 2005), *agreeing on priorities and timescales, publishing in the public domain*, and the *academic laissez-faire approach vs industrial lack of flexibility* (Barnes et al, 2002). Cyert and Goodman (1997) believe that the differences between university and company partners manifest themselves in divergent goals (to create and disseminate knowledge vs to produce products and services), time orientations (longer, less well-defined time periods vs quarterly goals), and language and assumptions (reputation outside the university vs supervisors within the company). Searching for an overview of strategic alliances between universities and corporations, Elmuti et al. (2005) highlight the different working cultures of partners and values that may have negative effects on effective alliance collaboration and interaction, and which demand continuous learning and restructuring processes to be overcome. Similar to Cyert and Goodman (1997), essential differences identified in their study include different goals (creating and spreading knowledge vs producing products and services), time approaches (long- vs short-term), and language and assumptions (related to communication efficiency).

Barnes et al. (2002), studying collaborative R&D projects, conclude from their U–I collaboration cases that the main cultural issue to emerge is the need to agree on priorities and timescales. These issues are also discussed in the wider debate on rigor and relevance in relation to collaborative research between academics and business practitioners (e.g., Van de Ven, 2002). Also prominent is the need to manage perceptions and issues on both sides regarding the academic right to publish and the student agenda. This latter factor is related to perceptions of the role of student researchers on such projects. Along with others, Barnes et al. (2002: 282) consider fundamental differences in the relative priorities, perspectives and time horizons of

academia and industry, "a major obstacle to successful university-industry collaborations." On managing the cultural gap as one of the key elements for a good practice model of collaboration management, they refer to the bridging of differing priorities/timescales, publishing in the public domain, the academic laissez-faire approach, industry's lack of flexibility, and IPR and confidentiality.

The study of Santoro and Gopalakrishnan (2000) examines the institutionalization of knowledge transfer activities between industrial firms and university research centers. This is one of few direct studies on the impact of culture on U–I knowledge interaction activities. Their empirical results show that knowledge transfer activities are facilitated when industrial firms have more mechanistic structures, cultures that are more stable and direction-oriented, and when the firm is more trusting of its university research center partner. Thus, they propose that the more stable and direction-oriented an organization's culture, the greater the institutionalization of knowledge transfer activities; in other words, the more flexible and change-oriented an organization's culture, the less the institutionalization of knowledge transfer activities[6]. A key feature of stable and direction-oriented culture is risk-avoidance; preferring stability and status-quo rather than the uncertainty of change. In contrast, flexible and change-oriented cultures encourage risk-taking and a constant search for new knowledge streams. In their research, the institutionalization of knowledge transfer activities ranged from high factor loading activities, like the firm's involvement in curriculum development, to relatively low factor loading activities such as the number of personnel exchanges with the university research center.

As we can see from the brief review above, U–I research on culture is primarily within a local context, and research in cross-cultural settings remains an interesting gap. The national or societal culture, for instance, may significantly influence U–I knowledge interaction. A recent and exceptional study of U-I collaboration in Japan and Korea (Hemmert et al., 2008), for instance, indicates that there is no universally best way to run a collaboration, as it is strongly influenced by cultural features which are specific to

[6] There is also a view in the literature that appreciates the paradoxical nature of organizational culture and structure as entailing elements of both stability and change which are contradictory but also mutually enabling (e.g., Farjoun, 2010).

countries or regions. One interesting cultural difference the authors observed is that Japanese firms appear to rely to a great extent on trust when collaborating with universities, whereas their Korean counterparts seem to emphasize more contractual safeguards and the role of innovation champions. This highlights the potential relevance of national cultural features for the organization and outcomes of research collaboration between companies and universities. Japanese firms use wider networks when searching for collaboration partners. Furthermore, there is a more rule-based approach by universities regarding IPR policies and a somewhat higher satisfaction with U-I collaboration outcomes in Japan. While their Korean counterparts encounter more difficulties of developing organizational trust and therefore use more intensively contractual safeguards as an alternative mechanism to reduce relational uncertainty. Moreover, the more importantly perceived role of innovation champions in Korean U-I collaborations has stronger linkage to the relatively more hierarchical leadership style in Korea when compared with Japan.

2.5 Conceptual framework of the study

Based on the literature review, an overall and conceptual framework guiding the study could be drawn, in which the central theme of the research is on cultural aspects of U-I knowledge interaction in the Chinese MNC context. Theoretically and empirically, the framework includes the following key issues: 1) the nature of knowledge interaction, including perceived knowledge interaction theories (access vs acquisition), strategies (exploitation vs exploration), approaches (TKT, KI, and CKC) and knowledge (explicit vs tacit knowledge) involved in knowledge interaction; 2) fundamental cultural influences (role of the host-country culture and organizational culture); and 3) the interplay of culture and knowledge interaction in the specific context of research collaboration between MNCs and Chinese universities (the moderating role of knowledge, the relative importance of culture in relation to the intensity of knowledge interaction, efficient matching strategies for effective cross-border knowledge interaction). The conceptual framework is depicted in Figure 4.

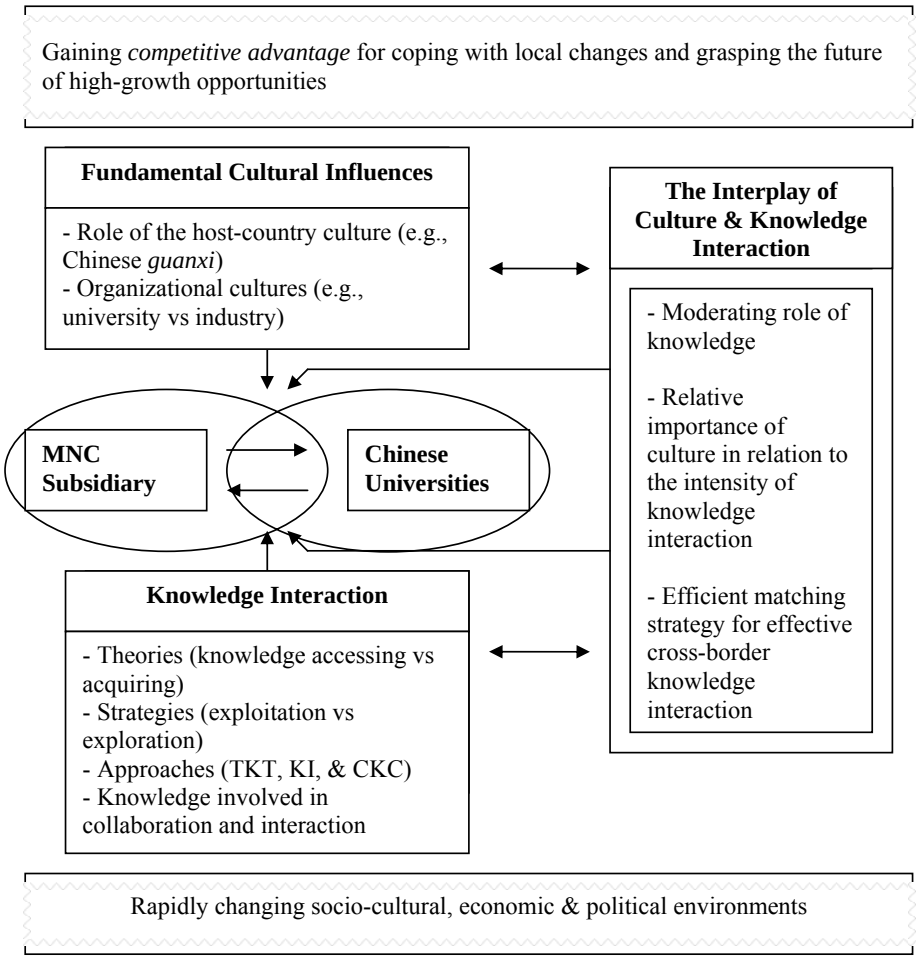

Figure 4. Overall conceptual framework guiding the study

Note: Lines with arrows in the figure represent one-way influence or mutually dependent interaction.

Important theories and approaches underlying the key aspects of U-I knowledge interaction include the knowledge accessing theory (Grant & Baden-Fuller, 2004), the knowledge management generation theories (Ahonen et al., 2000; Snowden, 2002; Tuomi, 2002; von Krogh, 1999), the self-renewal systems approach and knowledge

environments (Ståhle & Grönroos, 2000), new cross-cultural research emphasizing multi-level cultural influences (Craig & Douglas, 2006; Leung et al., 2005), social practice theory and cultural worlds (Holland, 2000; Holland & Lave, 2009; Holland & Reeves, 1994), activity theory and object-oriented activity systems (Engeström, 2008; Engeström et al., 1991), and the integrated view of culture for organizational analysis (Smircich, 1983).

Of the above-mentioned theories, the following three play a pivotal role, in which they also complement each other: knowledge management theories including the knowledge accessing theory, knowledge management generation theories and the self-renewal systems approach; social practice theory; and cultural-historical activity theory.

All three theories address dynamic and collective knowledge processes where shared meaning is important. *Knowledge management theories* were developed specifically to address corporate and business contexts in which researchers and practitioners are able to communicate and understand each other in a profound way in the area of knowledge management. From a KM and management learning point of view, the important point is to bridge the gap and produce actionable knowledge (Argyris, 2004). The key is, according to Antonacopoulou (2009b: 422), the conduct of unlearning, especially in relation to "asking questions with business practitioners and policy makers so that the knowledge generated collaboratively is actionable". *Cultural-historical activity theory* directs our attention to construction of a shared object that stimulates transformation of knowledge and provides analytical tools to help both researchers and practitioners to develop new activity systems. *Social practice theory* focuses on figured worlds and identity in a situation of global changes, providing additional concepts for discussing diverse meanings of work and understanding the relevance of these cultural differences for personal motivation and collaborative possibilities. Thus, it would be fruitful to use an integrated approach of the theories to explore U-I collective learning and knowledge interaction in multi-cultural work settings.

Figure 5 outlines key aspects of the theoretical framework and the reviewed theories related to each publication. The arrows with direction indicate connections of the publications one with another as well as successive enlargement of the research scope.

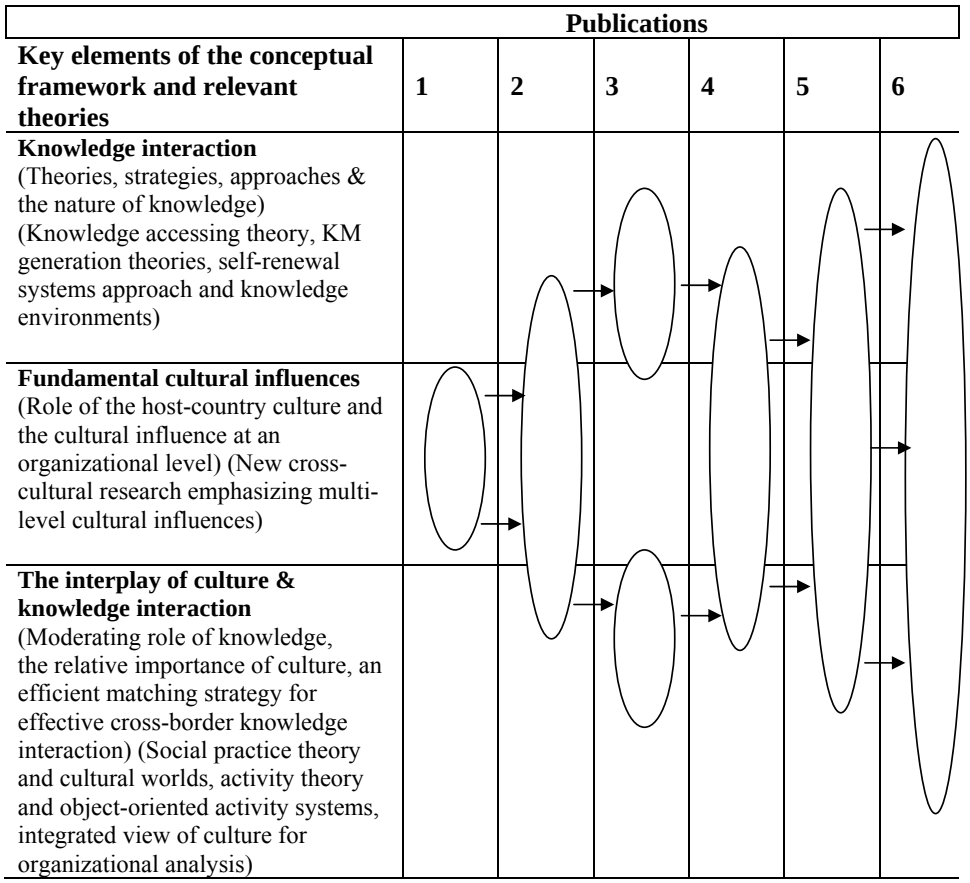

Figure 5. Conceptual framework related to the publications

3. RESEARCH METHODOLOGY AND METHODS

The research design of the dissertation consists of two parts, addressed in six publications: theoretical exploration in Publications 1-3, and theoretical exploration combined with empirical studies in Publications 4-6. The first part of the research was primarily based on literature study and theorizing drawn from previous studies; whereas the second part involved empirical case studies.

3.1 Case study as a research strategy

Case study is employed as a research strategy due to the exploratory nature of the study, focusing as it does on R&D collaboration between MNCs and Chinese universities. Two Finnish MNC subsidiaries operating in China are the main actors in the case study. One is from a world leading ICT MNC, hereafter *ICT Company*, and the other is from a well-known MNC in the forest industry, hereafter *Forestry Company*. The two case companies complement each other as they come from two quite different industries, namely ICT and forestry. Both companies are from the private sector and they are both listed on international stock markets. The companies have a long tradition of U-I collaboration, and through globalization and the collaboration they have extended their businesses into new countries. The case companies are clearly of interest and relevant since they both are highly innovation-driven and knowledge-intensive global organizations. They are, therefore, very well suited to this study, which researches companies' R&D centers and their collaboration with Chinese universities, and more closely, the topic of culture and knowledge co-creation in cross-cultural settings.

Case study is a preferred strategy when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context. Thus, the distinctive need for case study arises out of the desire to understand complex social phenomena. Importantly and specifically, case study is the method of choice when the phenomenon under study is not readily distinguishable from its context (Yin, 2003). This study on U-I knowledge interaction involving dissimilar cultural contexts is a context-sensitive and complex one in which multiple variables need to be studied

simultaneously. The study as such is not on U-I relationships but interactions, focusing not on stable U-I networks or alliances but on active networking, knowledge transfer and especially CKC. As Stake (1995: xi) emphasizes: "A case study is expected to catch the complexity of a single case … We study a case when it itself is of very special interest. We look for the details of interaction with its contexts … coming to understand its activity within important circumstances." As Yin (2003) argues, the case study method allows investigators to retain the holistic and meaningful characteristics of real-life events.

Essential elements of studying interaction suggested by Håkansson (1982) seem to be meaningful also to this investigation and include: 1) the interaction process, 2) the participants in the interaction process, 3) the environment within which interaction takes place, and 4) the atmosphere affecting and affected by the interaction. In this study, not only participants' opinions but also their collaborative environment and the atmosphere of the interaction are taken into account. In a comparative management research study, Teagarden et al. (1995) demonstrate how researchers from different nations and cultural backgrounds can learn from each other and create new knowledge together. The interaction types they identified include: 1) theoretical interaction (research design, survey development), 2) pragmatic interaction (translation, back-translation, survey administration), 3) interpersonal interaction (building commitment, sharing learning), and 4) integrative interaction, which is essential to maximize the synergy of the previously-mentioned items. The synergy that can be developed through the interaction of these interactions is the key to rigorous cross-cultural research. From the research point of view, this is not a survey-based study; therefore, the study is related only to the last two points of cross-cultural interactions, which are especially beneficial for the study in view of the author's many years of cross-cultural learning experience working and living in both Finland and China.

According to Yin (2003) and Auerbach and Silverstein (2003), cases in a case study should be chosen on a theoretical basis and not for statistical reasons; the researcher chooses cases that involve information related to the research concerns in question. Thus, theory rather than randomness determines which cases constitute the sample. The

logic used to choose a single case or multiple cases is to find information-rich cases using purposeful sampling (Patton, 2002) combined with convenience sampling (Auerbach & Silverstein, 2003), meaning cases to which the researchers have access. The cases in this study illustrate the same phenomenon from different perspectives. The aim is not to make statistical generalizations or to find explicit answers but to study the nature and primary mode of knowledge interaction in U-I research collaboration and knowledge interaction, and further, to examine cultural and knowledge-related influences on the effectiveness of the collaboration and interaction.

Stake (2000) divides case studies into two categories: intrinsic casework, and instrumental and collective casework. *Intrinsic casework* regularly begins with cases already identified. *Instrumental and collective casework* regularly requires researchers to choose their cases. In my study, case selection is intrinsic in a way that before my starting dissertation work, I was already involved in a larger research project entitled *Innospring Access* (2005-2007), in which at the time six case companies were involved. The manner in which I selected two Finnish MNCs from the six is instrumental and collective; one is an ICT company, and the other is a forestry company. Both companies are well known home and abroad. The case studies are selected not so much for their representativeness of MNCs, but what could be learned most from the case companies regarding my research topic and questions. It is my view that, as Stake (1995: 4) express it; "The first criterion for selection of cases should be to maximize what we can learn."

3.2 Data collection

Data collection is only directly related to the second part of the research, Publications 4-6. The main data collection methods used in the study are in-depth interviewing and participant observation, the latter of collaborative knowledge development projects or programs in case companies in China, including the newly emerging form of U-I workshops. The workshops are organized either by a research group or MNC subsidiary. From an interaction point of view, the research interest is in data collection and empirical observations at an organizational level, and therefore the basic unit of

analysis of the study is either a MNC research group or subsidiary as a whole working in collaboration with Chinese universities.

Many qualitative researchers use both in-depth interviewing and participant observation as an ideal combination, and a lot of the data gathered in participant observation come from informal interviewing in the field (Eckhardt, 2004; Fontana & Frey, 2000). In-depth interviewing and participant observation as qualitative research methods for explorative-type study in emerging cultural worlds appear to be very much appropriate.

In many Chinese contexts, Eckhardt observes that there is a heightened need for observational fieldwork to accompany verbal self-report research techniques (e.g., depth interviews). This is because in the Chinese educational system, as noted by the author, people are not encouraged to develop individual opinions and be able to express them openly and publicly in a complex and well-developed manner. Furthermore, it is discouraged in Chinese culture for people to speak out openly and publicly on their true inner thoughts and feelings (see also Fiske et al., 1998). This is particularly true when an interviewee faces an unfamiliar situation in which the interviewee considers an interviewer "outsider" or the consequences of the interview is hard to predict. Thus, it is very difficult to get the level of disclosure that can be achieved in interviews in a Western context (Eckhardt, 2004).

3.2.1 In-depth interviewing

In-depth (or ethnographic) interviewing is a major form of qualitative interviewing, and one of the most widely used methods in qualitative research. Given its qualitative nature, it can provide a greater breadth of data than other types of data collation (Fontana & Frey, 2000). In-depth interviewing is typically unstructured or semi-structured. The present study adopted an in-depth interviewing form that is semi-structured. The major advantages of in-depth interviewing include being able to have a more accurate and clear picture of a respondent's position or perspective, being able to ask for further elaboration of answers and attitudes (this is particularly useful when

dealing with complicated or sensitive issues), and being highly suitable for exploratory and inductive types of study. The main challenges, on the other hand, are that in-depth interviewing demands a skilled and cautious interviewer, and that it can be difficult to interpret and analyze the interviews (Ghauri et al., 1995).

Qualitative interviewing is considered by many to be an appropriate and practical way to approach what qualitative researchers see as the central ontological components of social reality (Mason, 2002). A researcher who uses in-depth interviewing commonly seeks "deep" information and knowledge – usually deeper information and knowledge than is sought in surveys, informal interviewing, or focus group work (Johnson, 2002). Comparatively, structured interviewing aims at capturing precise data that can be codified in order to explain behavior within pre-established categories, whereas unstructured or semi-structured in-depth interviewing attempts to understand the complex behavior of members of society without imposing any strong a priori categorization that may limit the field of inquiry (Fontana & Frey, 2000).

3.2.2 Participant observation

Observation has been characterized as "the fundamental base of all research methods" in the social and behavioral sciences (Adler & Adler, 1994: 389) and as "the mainstay of the ethnographic enterprise" (Werner & Schoepfle, 1987: 257 / Angrosino & Mays de Pérez, 2000). "Participant observers" in natural settings deliberately set out to achieve a degree of subjective immersion in the cultures they study, yet still claim to be able to maintain their scientific objectivity (Angrosino & Mays de Pérez, 2000).

Participant observation usually refers to methods of generating data which entail the researcher immersing herself or himself in a research "setting" so that she or he can experience and observe at first hand a range of dimensions in and of that setting. These dimensions might include social actions, behavior, interactions, relationships, and events, as well as spatial, locational and temporal dimensions. Experiential, emotional and bodily dimensions may also be part of the frame (Coffey, 1999 / Mason, 2002).

3.2.3 Data used in Publications 4-6

The data involved in the study was mainly collected during 2006-2009. The empirical data gathering took a long period during which the author was involved in two successive research projects. The focus of the author's part of research in the projects was on MNCs' collaboration with Chinese universities, in which the research approaches and strategies focused on inter-organizational knowledge interaction, including technology and knowledge transfer, knowledge integration and collaborative knowledge creation involving multinational and cross-cultural contexts. The main data sets used in the publications 4-6 were directly collected by the author in collaboration with co-authors. All co-authors of the papers were colleagues of the author from the same research group at the time when the projects were carried out. This permitted convenient and frequent research communication, with all researchers being close to the data used in the publications. All data used in the publications are clarified in Table 5 in terms of related publication, data type, case and time of data collection.

Given that both the number of people interviewed and the field observations are limited, and the pursued subject is rather new, a qualitative research approach was chosen to explore the phenomena under consideration. Data used in each publication shown in Table 5 will be explained in further detail. In Publication 4, two data sets were used for the purpose of empirical illustration in connection with a developed conceptual framework. The first data set consisted of 5 in-depth interviews of qualified researchers from 3 Chinese universities, which was collected in December 2006. Data collection was related to an academic summit organized in China by ICT Company and this data set was collected by the co-authors. The second data set consisted of 19 in-depth interviews of qualified researchers from 5 Chinese universities. The interviews were related to the interests and concerns of Forestry Company.

Table 5. Empirical data used in publications 4-6

Publication	Data	Case related	Time
4	*5 in-depth interviews of researchers* from 3 Chinese universities; *19 in-depth interviews of researchers* from 5 Chinese universities	ICT Company Forestry Company	12.2006 6.2007
5	*3 in-depth interviews of Finnish and Chinese managers* from 2 Finnish organizations; *1 in-depth interview of a researcher* from a Chinese research institute	ICT Company ICT Company	10.2008; 1.2009 7.2008
6	*21 in-depth interviews of researchers & 4 in-depth interviews of managers* ; *participant observation* from 3 U-I workshops 3 follow-up interviews in relation to Workshop 3	both case companies both case companies ICT Company	12.2006; 6.2007; 9-10.2009 12.2006; 4.2007; 7.2008 7-10.2008

In Publication 5, three cases were chosen for the study, namely a Finnish private research center (Case 1), ICT Company (Case 2), and a Chinese research institute (Case 3). These organizations were not a network but separate institutes working in different business areas, although the organizations in Cases 2 and 3 had had a collaborative relationship. In the study, one person in Case 1 (in Finnish) and Case 3 (in Chinese), and two persons in Case 2 were interviewed. In Case 2, one person was interviewed in Finnish and the other in Chinese. In this study, two interviews in Finnish were conducted by the co-author of the paper. The interviews took place in Finland and in China between July 2008 and January 2009.

In Publication 6, two sets of data were collected: The first set consisted of 25 in-depth interviews conducted during 2006-2009, and the second set included participant observations from three U-I workshops and three follow-up interviews in connection with one of the workshops. The interviews and participant observation in the second data set were conducted during 2006-2008. For the first data set, a total of 25 company

experts and managers, and university researchers and professors were interviewed. Each of the interviews took from 40 minutes up to two hours. In December 2006, the second and third authors of the paper attended an academic summit in Beijing, which was organized by ICT Company, and had an opportunity to interview two managers and four professors and researchers of the R&D partners of the company. In June 2007, the first and second authors conducted a second round of interviews related to the forest industry in five Chinese universities. Seventeen persons were interviewed, most of whom were experienced in collaborating with MNCs (two interviews without tape-recording were excluded). In the fall of 2009, to get a better understanding of the issues discussed previously with universities and to get more information also from the company side, the first author interviewed further one leading R&D manager of the headquarter research center and the GM of an Asian R&D Center (operating in China) of Forestry Company. All interviewees were asked how and when culture matters in U–I R&D collaboration and knowledge interaction, and how they cope with cultural challenges (see Appendix).

For the second set data, the study included observations and insights from three U-I workshops in which the authors participated during 2006-2008. The workshops were held in China and were organized by the two case companies. The *first* workshop was held in Beijing in December 2006. It was a one-day workshop organized by ICT Company, in which the second and third authors were invited to participate and the third author was also invited as a panel discussant. The workshop participants were representatives from the case company and representatives from both Finnish and Chinese universities. The *second* workshop was held in April 2007 and was organized by Forestry Company. The workshop was combined with the opening ceremony of the Asian R&D Center of the company, in which the *third* author was invited to participate. The workshop included both keynote speeches and panel discussions of experienced university researchers and industry managers from Finland and China. The event and workshop participants were representatives from the case company, researchers from universities in Finland and China, and representatives from Chinese authorities. The *third* workshop was organized by ICT Company in Beijing in July 2008. It was a two-day workshop, where the first author was invited to participate and give a keynote

speech. For this workshop, all keynote speeches and small group discussions were video-taped by the organizing company, from whom the first author got permission to use them as research data. A portion of the most relevant videotaped materials was transcribed and used in the process of data analysis. The first author also made the field notes of the two-day workshop. After the workshop, the first author interviewed three key participants, among them two keynote speakers.

The data has been collected over a relatively long period and the data used varied somewhat from publication to publication due to the different topics and focuses each publication. There is, however, a lot of overlap in data deployment, utilization and data collection methods. Although the same in-depth interview technique was used in all three studies, the issues focused on and questions asked were not exactly the same in relation to each publication. A general framework, including the issues studied and the open-ended interview questions, is given in Appendix.

3.3 Data analysis methods

Two strategic ways that researchers reach new meaning about cases are through *direct interpretation* of individual instances and through *aggregation* of instances until conclusions can be drawn about them as a class (Stake, 1995). In light of the fact that the studied cases are complex and the data were collected over a relatively long time and differed from case to case, most of the efforts in this study to extract meaning were done through direct research interpretation. Furthermore, as Stake points out, "to devote much time to formal aggregation of categorical data is likely to distract attention to its various involvements, its various contexts" (p. 77).

The data analysis methods employed in the study include: 1) puzzle identification, and 2) within-case and cross-case analysis. They are directly interpretive in nature, although seeking patterns and aggregated evidence is crucially important in both methods. The data analysis does, thus, to a certain extent, use categorical aggregation, although not in a systematic coding way but loosely applied.

3.3.1 Puzzle identification

Data analysis of the study is inspired by and preceded by the technique and conceptualization of *puzzle identification* developed by Mason (2002). The key idea is that identifying a puzzle can be a way to kick-start analysis of a transcript. The puzzle here refers simply to something which the researcher wishes to explain. Once the intellectual puzzle has been found, the best method is often to *work back and forth* through the transcript to see how the puzzle arises and is resolved. This implies a strongly inductive bent to this kind of research. In this study, the method of puzzle identification is expanded such that it is also related to the process of data collection. In this connection, valid questions could be asked already at an early stage of the study, for instance: What are the intellectual puzzles to be resolved in the study? What information is really required from the informants in terms of the chosen intellectual puzzles? And finally, what questions need to be asked in order to get the required information? In this way, the method or technique of data analysis applied here is not exactly a data-driven type and neither is it fully inductive, as Mason may originally suggest.

3.3.2 Within-case analysis and cross-case analysis

Both within-case analysis and cross-case analysis are employed in data analysis of the study (Eriksson & Kovalainen, 2008; Patton, 2002). Analysis of the cases began with analysis of each individual case separately, i.e. *within-case analysis* (Eriksson & Kovalainen, 2008; Patton 2002). The cases were analyzed thematically using theoretical aspects as the basis for the analysis. The themes used in the analysis were, for instance, the ways knowledge interaction is evident in the case and the role of informal social networking, etc. In multiple case studies, this phase is followed by *cross-case analysis,* which involves comparison of the cases in a search for similarities or differences across the cases in terms of the theoretical framework used (Eriksson & Kovalainen, 2008; Patton 2002).

The research process, including research design, data collection and analysis for the theoretical exploration combined with empirical studies (Publications 4-6) is summarized in Table 6 below.

Table 6. Research process in publications 4-6

Publication	**Research design**	**Data collection** (methods)	**Data analysis** (strategies & techniques)
4	Conceptual framework + case illustrations	In-depth interviewing (2006-2009)	Empirical illustrations and discussions in the light of a conceptual model developed by the authors
5	Pilot case studies	In-depth interviewing (2008-2009)	3 cases were analyzed with both within-case and cross-case analysis techniques
6	Case study	In-depth interviewing and participant observation at U-I workshops plus 3 follow-up interviews (2006-2008)	The data were mainly analyzed with both puzzle identification and within-case and cross-case analysis

It can be seen from Table 6 that the empirical research design was gradually developed from Publications 4 to 6: the role of data in different publications varies from *case illustration* in Publication 4 to *pilot case study* in Publication 5, and eventually to the more comprehensive *case study* in Publication 6. Data collection and analysis vary somewhat accordingly. The interview-based data used in Publication 4 serves mainly for the purpose of illustration. In Publication 5, carefully compiled case studies were used to demonstrate the relevance of the data to the proposed conceptual framework. Since each compiled case involved only one or two interviews, the representativeness of each case in terms of the organizations from which the interviewee came could not be generalized to a large extent to cover all opinions prevalent in the organization in question. In the data analysis, both within-case and cross-case techniques were used to increase the validity of the research on the pursued topic. In future research, further interviews, focus groups, or even a survey research design could be considered for each case-study organization in order to evaluate more precisely the validity and reliability of the data received.

4. SUMMARY OF THE PUBLICATIONS

The major findings of the study can be summarized as multi-level exploration and analysis of culture and knowledge interaction at the levels of inter-cultural knowledge interaction (Publications 1-2), inter-organizational knowledge interaction (Publication 3) and U-I collaboration and knowledge interaction (Publications 3-6) (see Figure 1 on p.27). The following section presents a summary of each publication, giving the background and objective as well as the major results and contribution of each study. At the end of the chapter, overall findings of the research as a whole, covering all six publications, are presented and reviewed.

4.1 Inter-cultural knowledge interaction

At the level of inter-cultural exploration of collaborative knowledge interaction, there are two publications: Publication 1 is on the role of cultural interaction in the creation of new knowledge and dynamic capabilities; and Publication 2 is concerned with the influence of culture on knowledge interaction activities.

4.1.1 Cultural interaction and knowledge co-creation (Publication 1)

Publication 1 is about *moving cultures and the creation of new knowledge and dynamic capabilities in emerging markets***.** The objective of the publication is to explore the mechanisms of cultural and communicative interaction for the creation of new knowledge and dynamic capabilities (DCs) in organizations in emerging markets.

The existent literature draws attention to several identifiable sources and processes. These include: resource creation, coordination, entrepreneurship, and asset selection (Teece, 2007; Teece et al., 1997); deliberate learning and the firm's investment, particularly in knowledge codification activities (Zolla & Winter, 2002); and social capital, emphasizing the role of central actors in rent generation and appropriation

(Blyler & Coff, 2003). This line of research lays special emphasis on the crucial role of top management and its direct associates in the creation and development of DCs. An emerging trend is criticism of the neglect of humanistic processes and concerns in organizational life and thus neglect of workers' work ideology and shared mindset specifying broad, tacitly understood rules and organizational principles acknowledged in capability development (Volberda & van Bosch, 2005; Wooten & Crane, 2004). The role of cultural and communicative interaction revealed at the workplace is rarely discussed in this context. This paper argues that *moving communication across* and *the interaction of multi-cultures in* the workplace is a major driver for the creation of the new knowledge and DCs which seems to be evident in Chinese organizations undergoing major transformation.

In today's emerging and rapidly changing markets, the development of new knowledge and DCs is particularly crucial for business success. In China, with its enormous societal, political and economic change, rapid economic development, great uncertainties, and irregularly evolving markets, there are rarely any just-fit-in business models or so-called best practices to follow. The biggest learning and knowledge management challenge is to learn what is actually not yet available (Engeström, 1987) and particularly in this innovative type of organizational learning, conflicts and tensions arise from diverse mental and cultural models and activity systems (e.g., modern practices and networking vs traditional structures, Western task-oriented vs Chinese relation-centered value systems, rule-based governance vs strong personal reinforcement). The authors of Publication 1 believe that intensive communication, cultural interaction and creative dialogue at all levels in organizations, in terms of the resolution of such conflicts and tensions, may give rise to the creation of new knowledge and DCs.

The findings of the publication further imply: 1) DCs are generated not only through macro-micro social and political interaction (Antonacopoulou, 2009a), but also through cultural and communicative interactions within organizations and practiced in organizations' daily routines and activities; and 2) the emphasis on both formal (deliberate learning and knowledge codification) and informal (social capital and

humanistic work ideology and processes) aspects indicates that in order to understand entirely the creation of new knowledge and capabilities, micro-level socio-cultural structures and processes should be taken into account more fully than has been the case in previous literature on DCs. Therefore, the key contribution to the knowledge co-creation and DC debate emanating from this theoretical analysis is to explore and highlight the role of communicative and cultural interaction at all levels in organizations in the creation of new knowledge and DCs in emerging markets.

4.1.2 Culture and knowledge interaction activities (Publication 2)

Publication 2 is about the *cultural implications of collaborative knowledge interaction*. It explores the alignment of culture and activity, emphasizing the study of culture in the context of knowledge interaction activities in light of mutual learning and knowledge creation theorizing based on cultural-historical activity theory (Engeström, 1987; Engeström et al., 1999; John-Steiner, 2000; Lave, 2008; Lave & Wenger, 1991; Scribner, 1985). The objective of the publication is to examine the most relevant studies in terms of culture and knowledge interaction activities and to gain a broad understanding of the cultural implications of collaborative knowledge interaction in preparation for the next step of the study and to inform subsequent empirical exploration.

In Hong et al. (2007), three approaches to collaborative knowledge interaction (i.e., TKT, KI and CKC) are identified. These approaches are further discussed in Publication 2 in connection with knowledge management generation theories and activities proposed by Hong and Ståhle (2005) and knowledge management environments originally developed by Ståhle and Grönroos (2000). The interconnections of the knowledge interaction approaches, knowledge management generation theories and knowledge management environments are presented, and these interconnections are further elucidated with respect to the interface of knowledge interaction, key knowledge management questions, and the intensity of knowledge interaction. Additionally, cultural implications of the most relevant studies on collaborative knowledge interaction

at multi-cultural levels are critically reviewed and analyzed with regards to the following aspects: the specific level of cultural influences, the conceptual connotations of culture, knowledge interaction and cultural implications.

The major findings and contribution of the publication can be summarized as follows. *First*, TKT has been the focus of most of the reviewed studies, and other forms of knowledge interaction such as interactive KI and CKC seem to have been neglected despite the fact that in organizational partnerships they differ substantially from the TKT type of knowledge interaction. The publication finds that future research needs to pay much more attention to CKC and its underlying cultural mechanisms. *Second*, the influence of multiple cultures is all-important, and as Rose (1988) noted, a differentiation perspective of organizational culture (with an emphasis on organizational sub-cultures) may be a more realistic approach, particularly in large complex organizations where changes are evident. *Third*, studies on cultural interaction and the new understanding of cultural diversity based on cultural-historical activity theory indicate that cultural diversity is not something negative but rather a powerful source for creating new knowledge and culture. *Fourth*, knowledge creation, in Nonaka's term, is becoming an emerging line of research in U-I studies. This implies that Nonaka's SECI model has become well recognized not only in KM research, but also in the wider context of U-I collaboration studies. *Fifth*, knowledge interaction approaches in terms of knowledge management generation theories, activities and environments together accentuate the conception of the relative importance of culture in which the significance of culture is subject to the intensity of knowledge interaction: the significance of cultural influences may increase with the increasing intensity of the knowledge interaction. And *finally*, the publication emphasizes the need for understanding of the host-country culture and universities in MNC innovation studies - such study would seem to be a promising area. As reviewed, Santoro and Gopalakrishnan (2000) have conducted an interesting study on culture and U-I knowledge interaction. Their study is within a local and the same context (like other mainstream U-I studies), and research in multinational and cross-cultural settings remains an interesting gap. National or societal culture, for instance, may influence U-I knowledge interaction in a significant way (Hemmert et al., 2008). Moreover, the study calls attention to the fact that the study of

culture in the context of MNC knowledge interaction activities may provide a work-related situation in which detailed information in terms of the effectiveness of cross-border knowledge interaction could be explored and utilized in workplace practices. Cultural studies can therefore progress further in combining culture with work activities, thus not remaining just at an abstract level of research on culture per se.

4.2 Inter-organizational knowledge interaction (Publication 3)

Publication 3 is about *the role of knowledge in inter-cultural organizational collaboration*. The objective of the publication is to examine the interplay of culture and knowledge, proposing a conceptual model for systematically analyzing the moderating role of knowledge in cross-cultural knowledge-based collaboration.

The study identifies cultural distance and partner relationships as key cultural influences, and proposes a systematic way of analyzing knowledge-related variables. In inter-cultural collaboration, sophisticated discussion of cultural influences is likely to be associated with discussion of knowledge. This is understandable because of the intimate relationship between the two (see Nonaka & Tacheuchi, 1995; Sackmann, 1991) and the current stress on the value of context-specific and culturally-bounded tacit knowledge in organizations (Holden, 2008; Hong et al., 2008; Kok, 2006).

Previous studies have mainly discussed two sets of knowledge variables. The first set includes, for instance, the tacit and sticky nature of knowledge (Bhagat et al., 2002; Simonin, 1999; Szulanski, 2003); types of knowledge by content (e.g. technical vs social knowledge) (Bhagat et al., 2002; Buckley et al., 2005; 2006), and knowledge structure (e.g. the Japanese 'organizational' and the British 'professional' models of the organization of knowledge) (Lam, 1997). The second set of variables, collaboration-oriented knowledge concepts, include mainly the common knowledge of cross-border knowledge holders (Grant, 1996; Li & Scullion, 2006), the value or desirability of the knowledge of the source organization (Gupta & Govindarajan, 1991; 2000; Pak & Park, 2004; Szulanski, 2003), and the absorptive capacity of the recipient (Miesing et al., 2007; Pak & Park, 2004; Szulanski, 2003). The above-reviewed studies have

exclusively focused on one-way knowledge transfer from the source to recipient organization. Other forms over and above knowledge transfer are not taken into account. Moreover, the emphasis on the value of the knowledge of the source organization and the absorptive capacity of the recipient seems to be mechanical. Such producer-consumer separation of knowledge tends to become blurred in global research practice in which a dynamic research process and knowledge co-creation becomes prevalent.

Following Hong et al. (2007), Publication 3 clarifies further three modes of knowledge interaction, of which knowledge transfer is only one type. It is argued that in addition to the above-mentioned knowledge variables, the significance of culture may increase with the *intensification of knowledge interaction* from TKT, to KI and CKC. This illustrates the relative importance of culture in inter-cultural organizational collaboration, that is, the more interactive the knowledge interaction, the more significant becomes the role of culture in cross-border knowledge interaction. Thus, a systematic analysis of knowledge-related variables in inter-organizational knowledge interaction could be proposed, consisting of three sets of influences: 1) the nature, content and structure of knowledge; 2) collaboration-oriented knowledge concepts; and 3) modes of and corresponding strategies for knowledge interaction.

The theoretical implications of the publication are multi-faceted. *First*, the paper implies that knowledge and knowledge interaction as a prime value for collaboration have received growing attention in inter-cultural collaboration and cross-cultural management. *Second*, knowledge and knowledge interaction discussed in inter-cultural collaboration literature deal primarily with knowledge transfer, in which the influence of a national culture is most prevalent. It would, however, be useful to consider multi-level cultural influences on knowledge transfer and on other types of knowledge interaction. *Third*, several aspects of knowledge (e.g. the nature of knowledge and collaboration-oriented knowledge concepts) have been identified and clarified in previous studies and it would be important also to consider the intensity of knowledge interaction, which may have a significant role in effective cross-border knowledge interaction.

As regards practical implications, the proposed conceptual model on the moderating role of knowledge in terms of cultural influence can be used as an analytic tool for practitioners who are interested in developing effective inter-cultural collaboration in organizations and societies. Application of the conceptual model could guide inter-cultural organizational collaboration and knowledge interaction in three significant ways. *First*, it emphasizes the simultaneous examination of both cultural and knowledge-related influences, as is often the case when cultural influences are discussed in the context of inter-cultural knowledge interaction. *Second*, various aspects of knowledge are clarified thus permitting cultural influences to be examined in a more careful and sensitive way. And *finally*, the propositions developed under each aspect of knowledge could guide practitioners when dealing with more concrete issues and problems in the context of collaboration in the workplace; without concrete collaboration contexts there is a danger that the propositions remain merely abstract categories of knowledge.

4.3 University-industry knowledge interaction

Three of the publications in this thesis are at the level of U-I knowledge interaction. Each publication presents a particular perspective on culture and U-I knowledge interaction, although they share a common emphasis on the role of Chinese culture in terms of *guanxi*.

4.3.1 Influence of multi-level cultures (Publication 4)

Publication 4 is about *the impact of culture on university-industry knowledge interaction in the Chinese MNC context*. It reviews broadly cross-cultural research, knowledge management literature and U-I studies, and the objective of the publication is to develop a conceptual view of the understanding and analysis of the impact of

culture on U-I knowledge interaction in the Chinese MNC context and to suggest theoretical and practical implications for future research.

The publication reviews relevant cross-cultural and knowledge management research, and discusses U–I studies and cultural relevance in the Chinese MNC context. It indicates that research on U–I knowledge interaction is primarily related to studies on cultural influences across organizational boundaries (Barnes et al., 2002; Cyert & Goodman, 1997; Elmuti et al., 2005; Santoro & Gopalakrishnan, 2000). The study argues that U-I knowledge interaction studies in MNC and cross-cultural settings should address more explicitly cultural issues at both organizational and national levels. Studies on the role of culture in U-I studies in cross-cultural settings are compelling if multi-level cultural influences are taken into account.

As a result of both theoretical and empirical efforts, a tentative conceptual framework is suggested in which both multi-level cultural influences and different modes of knowledge interaction are considered. In the proposed framework, the impact of culture is examined at three levels: local Chinese culture in contrast to foreign or Western cultures (e.g., *guanxi*-based Chinese culture vs task-oriented foreign or Western cultures); organizational culture, focusing on differences and similarities between universities and companies (long-term vs short-term planning; stable and direction oriented vs flexible and change-oriented); and organizational sub-unit cultures (management vs technical personnel). Moderating influences are suggested to include individual, group and situational characteristics, the dynamic processes of culture, and knowledge-related variables. In the framework, the focus of the study is on perceived knowledge theories and strategies (exploitation-exploration) and identified modes of knowledge interaction (TKT, KI, and CKC). It is believed that the proposed framework could help researchers and practitioners examine and identify cultural differences and barriers when building effective MNC U–I knowledge-based collaboration with local universities.

The following implications for future research are drawn. *First*, U–I studies have primarily been conducted in a national context, and research in multinational and cross-

cultural settings remains an interesting gap. In particular, examination of multi-level cultural influences through the study of MNC subsidiaries' R&D collaboration with local universities is identified as possibly providing a very informative case. *Second*, in early studies TKT is obviously the most studied topic. Other forms of more interactive knowledge interaction (e.g., knowledge co-creation) seem to have been neglected to a large extent. Especially in the case of KCK, strong involvement and commitment from two or more collaborative parties are required. In this regard, the role of culture is most evident, which suggests that much more attention needs to be paid to CKC and its deep underlying cultural mechanisms. And *third*, the paper proposes that the significance of the cultural impact may differ based on the intensity of knowledge interaction, and it may increase with increasing intensity of knowledge interaction. The publication notes that it would be interesting to test this proposition empirically.

The most important managerial implication suggested in the publication is related to one of the pressing research needs and challenges of MNCs in coping with changes and the pulse of future markets. Here MNCs' time perspectives are associated with long-term visioning. Based on the theorizing and research experience of the authors of Publication 4, the key to coping with such challenge is foremost to build up *knowledge-based collaboration* with local research communities who actively interact with local marketing environments and customers of all types in order to transfer, integrate and co-create knowledge with the company. Clearly, there seems no shortcut or best method that could be used for direct prediction or modeling purposes in hectic and turbulent business environments, but the construction and maintenance of relatively stable and long-term knowledge-based collaboration and relationships with local research organizations is required. In this regard, building *guanxi* and trust encourages collaboration at both individual and organizational levels.

4.3.2 Formal and informal governance (Publication 5)

Publication 5 is about *university-industry knowledge interaction* and presents *case studies from Finland and China*. The objective of the publication is to provide a

relational view on U-I knowledge interaction in the context of high-tech MNCs, exploring the role of formal governance and informal social networking in collaborative innovation.

The relational view of cooperative strategy states that the relationship between the collaborating organizations may be a source for inter-organizational competitive advantage (Dyer & Singh, 1998). From the relational view, U-I collaboration and knowledge interaction increasingly become key assets for the inter-organizational collaboration and for gaining competitiveness in the global market. The paper argues that a safe ground and common knowledge pool (Olander & Hurmelinna-Laukkanen, 2008) could be built into collaborative innovation by using both formal governance (e.g., contracts and intellectual property rights) and informal social networking (e.g., Chinese *guanxi and* personal trust). The former provides scaffolding for the collaboration, and the latter creates a positive atmosphere for knowledge sharing and co-creation.

Previous U-I studies focus primarily on one-way technology and knowledge transfer and are limited to a local context within the same national boundary. Publication 5 focuses on more interactive types of knowledge interaction such as knowledge co-creation in multinational and cross-cultural settings. U-I collaboration and knowledge interaction across nations are likely to confront cultural issues more explicitly at both organizational and national levels. The study thus contributes to the literature by providing a cross-cultural view of U-I knowledge interaction and presents three pilot case studies from Finland and China offering different perspectives on the phenomenon. As previous studies concentrating on U-I knowledge interaction have not paid great attention to cross-cultural data, Publication 5 acts as starting point for further studies in the field and offers propositions that can be empirically examined more thoroughly in cross-cultural settings.

To improve the effectiveness of cross-border knowledge interaction in high-tech MNCs, several interactive organizational processes of knowledge development are also proposed in the study. They include the building of interpersonal trust, formal

governance with the support of contracts, and informal social networking. From the literature review and the findings presented in the publication, the study concludes that firstly, informal governance, which is related to personal relationships and trust, is pivotal for further developing productive relationships and long-term collaboration. Secondly, clear contracts support communication and interaction between partners by creating trust and transparency, which lead to an increase in informal social networking. And finally, confidentiality is closely related to interpersonal trust and also to the type of organization. Formal contracts do not work properly without personal trust, and in order to preserve trust, universities should be more sensitive to issues of confidentiality.

4.3.3 Role of Chinese culture (Publication 6)

Publication 6 is titled *Culture and knowledge co-creation in R&D collaboration between MNCs and Chinese universities*. The objective of the publication is to examine the role of culture in U-I R&D collaboration and knowledge interaction in the Chinese MNC context. The issue is approached by conducting a critical literature review and undertaking case studies with in-depth interviews and participant observation from Finland and China.

The key findings of the paper, with some of their theoretical and managerial implications, can be seen as follows. *First*, the results of the study confirm the close relationship between the effectiveness of U-I knowledge interaction and good alignment of knowledge interaction strategies and approaches. This finding has profound implications, since increasing the effectiveness of knowledge interaction has important strategic implications for both nations and companies (see also Liu & Jiang, 2001). Based on the study, *an efficient matching strategy* in U-I R&D collaboration would require that the firm or university's adoption of a knowledge interaction strategy and its corresponding approach match up well with the knowledge type involved in the collaboration and interaction (explicit vs tacit knowledge), intended capability development practices (capability exploiting vs capability augmenting) and research tasks (basic research vs applied research).

Second, the paper proposes that the significance of cultural influences is not always the same because of the different degrees of intensification of the knowledge interaction approaches intentionally or unconsciously used in organizations. The significance of culture may *increase with the increasing intensity of knowledge interaction* from technology and knowledge transfer to knowledge integration and collaborative knowledge creation. Theoretically, more interactive types of knowledge interaction are likely to be associated with tacit knowledge and a personalization knowledge strategy. Compared to explicit knowledge, tacit knowledge or organizational know-how is more likely to result in advantages that are sustainable. As Dyer and Singh (1998) noted already a decade ago, to gain inter-organizational competitive advantage, "alliance partners that are particularly effective at transferring know-how are likely to outperform competitors who are not." (p.665).

Third, the paper argues that in the context studied, more interactive types of knowledge interaction like knowledge co-creation should be the key concern. This is particularly true when dealing simultaneously with multi-disciplinary applied research of human factors and technologies, or when the R&D projects are typically future-oriented, strongly IPR-related, strategically significant and exploratory in nature. Earlier U-I studies, however, focus primarily on one-way technology and knowledge transfer. This finding of Publication 6 illustrates a need for future research to re-consider the nature of knowledge interaction in similar organizational and socio-cultural contexts. In practice, much more managerial attention and effort needs to be addressed to the interplay of culture and more interactive types of knowledge interaction.

Finally, China is becoming an increasingly important knowledge pool and marketplace for many MNCs, yet cultural challenges are still a major issue. The crucial role of the host-country culture is underlined in the paper. The preliminary findings of the study emphasize the significant role of Chinese culture (e.g., *guanxi)* in U-I R&D collaboration and knowledge interaction. The study re-confirms earlier findings (see Publication 5) on the significant role of the host-country culture and its related challenges in U-I research collaboration.

4.4 Summary of publications and overall findings

The objective and major findings of each publication are summarized in Table 7. Overall findings of the study can be derived from the publications in terms of multi-level explorations of knowledge interaction.

From a multi-level perspective, the overall findings of the whole study can be reviewed as follows. *First,* as the first two publications focus on a broad and *inter-cultural* level discussion, the role of multiple cultures and cultural interaction in collaborative knowledge interaction activities is underlined. *Second*, the third publication touches particularly upon the moderating role of knowledge in *inter-organizational* knowledge interaction in a systematic way, ranging from the nature, content and structure of knowledge to collaboration-oriented knowledge concepts (e.g. common knowledge, the value of knowledge, and absorptive capacity). Within the same analysis, the intensity of knowledge interaction mediating cultural influences is carefully examined. *Finally*, the remaining publications (three of six) discuss cultural aspects of *U-I* knowledge interaction, in which the influence of the host-country culture in terms of *guanxi* is especially emphasized. The commonality of all three publications is to argue for special attention to be paid to more interactive modes of U-I knowledge interaction. To facilitate such collaboration, each publication has its own focus on the role of multi-level cultures and related mechanisms, involving the influence of a national culture (Publication 4), formal governance and informal social networking (Publication 5), and the role of the host-country culture (e.g., Chinese *guanxi* and personal trust*)* (Publication 6). Together, the publications constitute important cultural and organizational constructs and mechanisms for effective cross-border U-I knowledge interaction.

Table 7. Objective and major findings of each publication

Publication	Objective	Major findings
1	To explore the mechanisms of cultural and communicative interaction for the creation of new knowledge and dynamic capabilities in organizations in emerging markets	1. Emphasis on the development of new knowledge and DCs particularly crucial for business success in today's emerging and rapidly changing markets; 2. Contribution to the role of communicative and cultural interaction at all levels in organizations in the creation of new knowledge and DCs in emerging markets.
2	To examine the most relevant studies in terms of culture and knowledge interaction activities and to gain a broad understanding of the cultural implications of collaborative knowledge interaction	1. Attempt at drawing special attention to an important but neglected concern of activity in the study of culture and its influences; 2. Research effort on bridging collaborative knowledge interaction with knowledge management theories, activities, and environments; 3. Review and analysis of the most relevant studies in terms of culture and activity.
3	To examine the interplay of culture and knowledge, clarifying the moderating role of knowledge in inter-cultural organizational collaboration	1. Cultural distance and partner relationships are identified as key cultural influences in inter-cultural organizational collaboration; 2. A systematic analysis of the role of knowledge in inter-cultural organizational collaboration is suggested, which includes a) the nature, content and structure of knowledge; b) collaboration-oriented knowledge concepts; and c) intensifications of knowledge interaction.
4	To develop a conceptual framework for analyzing cultural impact on U–I knowledge interaction in the Chinese MNC context with empirical illustrations	1. A conceptual model on the understanding and analysis of the impact of culture on U-I knowledge interaction in the Chinese MNC context is proposed and elaborated based on a broad literature review; 2. The role of multi-level cultural influences is particularly emphasized; 3. Knowledge-based collaboration with local research communities is proposed as a way to enhance meaningful prediction and modeling of future-oriented and changing markets.
5	To provide a relational view of U-I knowledge interaction in the context of high-tech MNCs, exploring the role of formal governance and informal social networking in collaborative innovation	1. The roles of formal governance (e.g., contracts) and informal social networking (e.g., Chinese *guanxi* and personal trust) in U-I knowledge interaction is emphasized; 2. Various challenges of informal governance are identified and include, for instance, interpersonal trust, mutual commitment, frequency of communication and interaction, and awareness of cultural and knowledge-related gaps between collaboration partners; 3. Several interactive organizational processes are proposed for effective cross-border knowledge interaction in high-tech MNCs.
6	To examine theoretically and empirically the role of the host-country culture (i.e., Chinese *guanxi*) in U-I R&D collaboration and knowledge interaction in the Chinese MNC context	1. A broad-ranging and efficient matching strategy is proposed, in which good alignment of knowledge interaction strategies and approaches with the corresponding knowledge type, capability development and research task may greatly enhance the effectiveness of U-I R&D knowledge interaction in cross-cultural settings; 2. The relative importance of culture in relation to the intensity of knowledge interaction is postulated; 3. The empirical findings support the significant role of the host-country culture (i.e., Chinese *guanxi)* particularly in U-I R&D collaboration and knowledge co-creation.

5. DISCUSSION AND CONCLUSIONS

The major findings of the study are first summarized, and several important issues in terms of culture and knowledge interaction are then addressed, which include a critique of knowledge management as knowledge transfer management, emphasis on the role of Chinese *guanxi* as it is related to trust and inter-organizational knowledge interaction, and discussion of effective cross-border knowledge interaction. At the end of the chapter, theoretical and managerial implications of the study are discussed, reflections on the research design and process are made, as well as limitations, and future research proposed.

5.1 Major findings

The major findings are first presented in terms of the key research questions raised in the dissertation.

5.1.1 Findings in relation to the research questions

The first question: What is the nature and primary mode of U-I knowledge interaction in the Chinese MNC context? Drawing from the MNC case studies, it seems that in the case companies, the U-I projects or programs were more related to creating new knowledge and innovative ideas rather than directly using existing knowledge gained from university partners in China. It is also noticeable that company people have found it necessary to pay more attention to, and put greater efforts into, more interactive collaboration and interaction (e.g., knowledge co-creation) rather than conventional types of collaboration, which are quite static and passive (e.g., authorized or contract-based research) from a relationship interaction point of view. This finding is directly associated with the context of the case studies. Previous studies in similar research contexts indicated that the nature of U-I collaboration, in general, is innovation-driven (Hemmert et al., 2008; Santoro & Gopalakrishnan, 2000), multi-disciplinary (Hansson,

2007), and future-oriented (Daghfous, 2003; Hermans & Castiaux, 2007). Therefore, this finding has broad and important implications for other similar U-I collaboration worldwide. The specific context for this research, i.e. MNCs R&D collaboration in China leads to an emphasis on inter-cultural aspects, which if U-I studies are conducted in a similar multinational, multicultural context would mean that the generalizability of the results is even higher. This is mainly because the cultural gap between universities and companies in such a context is larger compared with the gap within the same and one national context.

The second key research question is concerned with culture: How do cultural factors influence effective U-I cross-border knowledge interaction? Both the in-depth interviews and participant observation indicated that the key challenge of U-I R&D collaboration and knowledge interaction in the Chinese MNC context was related to Chinese culture in terms of *guanxi* and its deeper and complex *social and cultural mechanisms***.** This included, for instance, interpersonal relationship and trust, true interest and the relatedness of the research**,** mutual commitment and learning, intensive communication and interaction, and being aware of cultural and knowledge-related differences between the collaboration partners. The finding touches upon the key elements of Chinese *guanxi.*

The third research question is: How does knowledge moderate the influence of culture on effective U-I cross-border knowledge interaction? The answers from the study were theoretical in nature. The study suggested that a systematic analysis of the role of knowledge could best be approached from the following perspectives: 1) the nature, content and structure of knowledge; 2) collaboration-oriented knowledge concepts such as the common knowledge of cross-border knowledge holders, the value of the knowledge stock of the source organization, and the absorptive capacity of the recipient; and 3) modes of and corresponding strategies for knowledge interaction of the collaboration partners. In previous studies related to the first two sets of knowledge-related variables, the role of knowledge has mainly been discussed at the level of national culture and one-way knowledge transfer from the source to recipient organization. The present study, however, focuses on different modes of knowledge

interaction, of which knowledge transfer is only one type. It is argued that in addition to the above-mentioned knowledge variables, intensity of the knowledge interaction (i.e., intensification from technology and knowledge transfer to knowledge integration and finally to collaborative knowledge creation) along with the corresponding strategies (i.e., exploitation vs exploration) should be taken into account and examined carefully. A systematic analysis of the role of knowledge in cross-cultural knowledge interaction could best be approached from multiple aspects of knowledge, including not only the nature and characteristics of knowledge but also the process of knowledge (i.e., intensifications of knowledge interaction). An important proposition worth testing empirically is the relative importance of culture: the significance of culture may *increase with increasing intensity of knowledge interaction* from technology and knowledge transfer, to knowledge integration and collaborative knowledge creation. The finding and other related propositions would be most valuable if they were systematically and empirically examined.

As a whole, the results of the study confirm the close relationship between the effectiveness of U-I knowledge interaction and good alignment of knowledge interaction strategies and approaches. *An efficient matching strategy* is what I would like to suggest be adopted (or targeted) when aspiring for effective U-I R&D collaboration and knowledge interaction. That is, the firm or university's adoption of a knowledge interaction strategy and its corresponding approach should match up well with the knowledge type involved in the collaboration and interaction (explicit vs tacit knowledge), intended capability development practices (capability exploiting vs augmenting) and research tasks in hand (applied vs basic research). A knowledge exploitation or reuse strategy, for instance, cannot work efficiently if the type of knowledge involved in the collaboration is largely tacit. Knowledge as such is then not ready for the purpose of exploitation or reuse. A personalization strategy works better in the Chinese relationship-oriented and *guanxi*-based culture. It is very difficult to make tacit knowledge explicit or codified in such a society; moreover, even if the knowledge has been well codified and documented, it is still very hard to implement and utilize it since in such societies, operations tend to be managed by people, not in any sense by information, paper or document. The finding as a whole and the suggested strategy is

more related to relation-oriented cultures. This implies that in addition to China, the strategy may also be valid for other developing and transitional economies, Russia (Hutchings & Michailova, 2004), Arabian countries (Weir & Hutchings, 2005), the Middle East and North Africa (Weir, 2007) and Latin America (Calderón-Moncloa, 2007) where personal relationships and informality rather than impersonal and formal rules and procedures play a dominant role.

5.1.2 Knowledge management as knowledge transfer management

Through the dissertation process the author has learned more about the significance of knowledge transfer in many aspects of working life and everyday practices, including, for example, effective mechanisms of knowledge transfer such as personal movement, social networks and alliances; and conditions that facilitate or impede knowledge transfer such as the characteristics of the source, the characteristics of the recipient and absorptive capacity, the characteristics of knowledge and knowledge processes, and the characteristics of the relationship between the source and recipient. The wide-ranging, multi-volume and insightful studies on knowledge transfer published in the field seem at times to be becoming overwhelming. Nevertheless, it would be a great disappointment if knowledge management is merely seen knowledge transfer management, as suggested earlier in connection with OLKC2009 conference panel discussion. At the same conference other and more interactive types of knowledge interaction were also examined (e.g. knowledge integration and knowledge co-creation), forming an interesting and emerging trend in organizational learning and knowledge management studies. This is much in line with the research findings and argumentations of this dissertation.

5.1.3 *Guanxi,* trust and knowledge interaction

In China, *guanxi* is always related to trust and trust-relationships, which in turn influence further collaboration relationships in knowledge interaction activities. The study demonstrated that *guanxi* initiated, facilitated, and intensified collaboration and

knowledge interaction in cases involving personal connections and various channels of informal social networking. China is determined to develop its economy in a newly reformed way on its path towards the recovery and prosperity of the world economy. China's huge talent pool increasingly attracts MNCs to look for new forms of long-term and deeper collaboration with Chinese research organizations. This provides, locally and globally, a rare opportunity and new scenario for both researchers and practitioners in which knowledge and competence co-creation might be reinforced. In a broader sense, the concept of *guanxi* constantly gains new meanings for business and R&D collaboration, and a broader view of *guanxi* may be assumed at both personal and institutional levels and may be applicable to many other types of alliances and business collaboration in today's networked economy.

5.1.4 Toward effective cross-border knowledge interaction

There are many factors that influence effective cross-border knowledge interaction, for example, real interest and involvement in collaboration (Barbolla & Corredera, 2009), a positive and confident attitude towards the collaboration partner (Barbolla & Corredera, 2009), social connectedness (social contacts between individuals) and partner trust (Santoro & Bierly, 2006; Sherwood & Covin, 2008), the openness of an organization to the external environment (Fontana et al., 2006), and intensive communication between collaboration partners (Lucas, 2005; Sung & Gibson, 2005). In some research, barriers to effective U-I technology transfer such as cultural clashes and cultural misunderstanding have been explicitly emphasized (Siegel et al., 2003). Based on the study conducted here, culture and cultural influences are one of the most influential factors impinging on the success of international collaboration and they seem to be largely neglected. The many cultural aspects articulated in the dissertation are worthy of serious consideration.

5.2 Theoretical contribution

The dissertation focuses on an exploration of the socio-cultural mechanisms underlying U-I knowledge co-creation in research collaboration in the Chinese MNC context. In this regard, the major theoretical contribution and implications are multi-faceted. *Firstly*, the study provides new knowledge on how effective cross-cultural knowledge interaction in strategic alliances can be better understood. The research offers a *typology* that links knowledge interaction strategies and approaches to their corresponding knowledge type, capability development, and research task. Good alignment in the typology can greatly enhance the effectiveness of cross-border U-I knowledge interaction, and thus, efficient matching strategies can be suggested and applied in knowledge management research and practice. *Secondly*, earlier studies on U-I knowledge interaction pay attention only to one-way technology and knowledge transfer whereas this study sheds light on *knowledge interaction processes* in a broader context involving dissimilar cultures, emphasizing more interactive types of collaborative knowledge creation specific to and important in the context of research collaboration between MNCs and Chinese universities. U-I knowledge co-creation through collaboration is an emerging and important research area manifested in inter-organizational and global knowledge management. This study finds that U-I knowledge co-creation is most pronounced when dealing simultaneously with multi-dimensional research of human factors and technologies, or when the research projects in hand are typically future-oriented, strongly IPR-related, strategically important, and mostly exploratory in nature. *Thirdly,* the study proposes that sophisticated cultural research in U-I knowledge interaction should study the *multi-faceted nature of knowledge and the related processes* moderating cultural influences. It suggests that a systematic analysis of knowledge effects should not only consider the characteristics of knowledge (e.g. the nature of knowledge and related concepts), but also needs to examine process variables like the intensity of knowledge interaction in relation to the various approaches or modes of knowledge interaction elaborated in the study. *Finally*, unlike previous research, this study draws special attention to *the significant role of the host-country culture,* which should be considered a significant issue in research in the global business world.

5.3 Managerial implications

The development of new products and innovation should be based on needs expected to exist even several years ahead, and a thorough understanding and proactive assessment of such hidden and future customer needs is particularly challenging for companies (Kärkkäinen et al., 2001). The search of MNCs for a good model or assessment tool to predict what future customers may need in China in the long run (e.g. in 5 or 10 years) would appear to be a vain one. There are too many simultaneously changing variables, making reliable prediction and assessment unlikely. To cope with this challenge, firms should build up *knowledge-based collaboration* with host-country research organizations that actively interact with local stakeholders and customers of all types in order to transfer, integrate and co-create knowledge with the company. Knowledge-based collaboration can provide the stability and foundations needed to track the fast changes and pulse of future markets.

The classic view of dynamic capabilities for organizational renewal and knowledge co-creation primarily emphasizes the role of top management. In today's emerging and rapidly changing markets like China, there are rarely any just-fit-in business models or so-called best practices to follow. The biggest learning challenges are no longer addressed only to top management, but rather to the organization at all levels (Sanchez, 2004). In this type of organizational learning, conflicts and tensions arise from the diverse mental and cultural models and activity systems present (Hong & Engeström, 2004). The study suggests that much more attention should be placed on intensive communication, cultural interaction and creative dialogue at all organizational levels in terms of the resolution of such conflicts and tensions. Such a focus may greatly increase the likelihood of the creation of new knowledge and dynamic capabilities.

To promote effective U-I strategic alliances and fruitful knowledge interaction, it is important for both universities and companies to understand the significance of the whole process of knowledge interaction. According to Cyert and Goodman (1997), university researchers typically lack the motivation and skill to move beyond the prototype, and there is a lack of understanding from the company side of the explicit

and tacit knowledge inherent in prototypes. Particularly for companies, it is important to understand both the tacit and explicit knowledge inherent in prototypes when moving from prototype to commercial product.

5.4 Reflections on the research design and process

Validity and reliability are complex issues in qualitative research. *Validity* in qualitative research has to do with description and explanation and whether or not the explanation fits the description (Janesick, 2000). Unlike quantitative research, the quality of qualitative research is often ambiguously evaluated (Denzin & Lincoln, 2000), and there is no single set of policies for ensuring its accuracy (Shank, 2006). Auerbach and Silverstein (2003: 80) even consider striving for validity and reliability as "pursuing the unreachable ideal". However, Stake (2000) argues that the case researcher needs to provide grounds for validating both the observation and generalization. I believe that it would be useful to have an overall view of the study and reflections on the research design and process, giving a big picture and better position for others to evaluate the quality of the research as a whole.

Yin (1989) suggests four logical tests or criteria for judging the quality of research design in conducting case studies. They are: construct validity, internal validity, external validity and reliability. Following Kidder, Yin defines the terms as follows: 1) *Construct validity*: establishing correct operational measures for the concepts being studied; 2) *Internal validity* (for explanatory or causal studies only, and not for descriptive or explorative studies): establishing a causal relationship, whereby certain conditions are shown to lead to other conditions; 3) *External validity*: establishing the domain to which a study's findings can be generalized; and 4) *Reliability*: demonstrating that the operations of a study – such as the data collection procedures – can be repeated, with the same results. The emphasis here is on doing the same case over again and being still able to generate the same results by different investigators.

Assessing the study using the above-mentioned tests, I find all except Criterion 2 to be relevant considerations. This is because Criterion 2 is concerned with causal but not explorative studies. To ensure *construct validity*, the study defines carefully what the key concepts of the study mean in the section "1.3 Research scope and key concepts". Following Holland et al. (1998), the concept of culture in the study, for instance, is regarded as figured or cultural worlds based on social practice theory and the host-country Chinese culture is defined and elaborated in terms of *guanxi*. Knowledge is defined with a comprehensive view that integrates cognitive, social and activity-based features of knowledge in practice. U-I knowledge interaction is based on all types of direct and indirect, personal and non-personal interactions between organizations and/or individuals from the firm side and the university side (Schartinger et al., 2002) and three approaches identified as technology and knowledge transfer, knowledge integration and collaborative knowledge creation (Hong et al., 2007). Thereafter, their expanded and complex connotations are discussed more thoroughly in Chapter 2 where the theoretical background and framework are introduced. As regards *external validity*, the study first tries to apply the empirical findings discovered in one case (ICT Company) to another (Forestry Company), and external quality can also be found in the section discussing major findings (see "5.1.1 Findings in relation to the research questions", pp.96-9) where generalizations and broad implications of each of the findings are evaluated. Reflections on earlier studies can increase the generalizability of findings (Eskola & Suoranta, 1998 / Ellonen, 2006), and thus the role of literature is emphasized in reviewing the overall findings of the dissertation. When considering *reliability*, detailed information on research design, data collection and analysis is provided in Chapter 3, where the research methodology and methods are delineated. The research process is depicted succinctly in Table 6 (p.81) and the outline of interviewing conducted in the study is attached at the end of the introduction as Appendix (p.135), which gives the focusing issues and topics of the study, and the open-ended interview questions. This detailed information may help readers gain a more concrete view of exactly how the research and the interviews were conducted as a whole.

5.5 Limitations and future research

The dissertation and its enclosed publications have suggested several conceptual models and propositions which I believe are important but not yet fully tested empirically. They include, for instance: a systematical analysis of knowledge-related variables in terms of the theoretical model and the corresponding propositions developed in Publication 3; a conceptual model for examining multi-level cultural influences proposed in Publication 4; the proposition on the relative importance of culture in relation to the intensity of the knowledge interaction discussed in several publications; and a conceptual model and typology to support an efficient and overall matching strategy, well recognized and articulated particularly in later publications. In future research, similar studies on the pursued topic could focus more on empirical investigations in relation to the conceptual models and propositions. The current research has collected only some of the relevant empirical data from the cases regarding the positive impacts of inter-cultural and knowledge interaction for facilitating an organization's innovativeness and knowledge co-creation capability. In future study, it would be appealing if research could focus more on systematic examination of case organizations, gaining more direct empirical evidence in support of the theoretical framework and related propositions suggested by the dissertation research.

Moreover, future research would be meaningful and fruitful if the role of organizational sub-cultures in U-I collaboration and knowledge interaction could be systematically and empirically examined. Currently, almost all cultural studies of cross-border organizational knowledge interaction focus exclusively on cultures either at an organizational level or at a national level. In order to gain an in-depth view of culture, study of culture at functional or subunit/group would be necessary.

From the study, I found that cultural influences could sometime be very difficult to differentiate from societal settings and work systems (e.g., Japanese "organizational" versus the British "professional" societal settings referred to by Lam, 1997), and they are often mixed with institutional factors (e.g., IPR regimes and employee systems evident but different in the US and Japan in the study by Appleyard, 1996). Cultural

studies with an institutional and political consideration of broader contexts may add new value. It is also beneficial, as Aycan (2005: 1113) points out, "to examine the interaction between cultural and institutional/structural contingencies to distil under which institutional/structural conditions culture matters most". In future study, it would be important to consider institutional aspects at the same time as examining cultural influences.

Another concern is that in most developed countries, most funding for R&D effort is obtained from business enterprises. In China, contrary to this pattern, the Government is the main funding source (Gao & Tisdell, 2004). The study implies that in future research there is an urgent need to study government involvement in U-I collaboration and knowledge interaction, an issue which was left outside of the scope of the present study.

Finally, the strengthening of U-I collaboration and the role universities play in a knowledge society have been widely discussed and some even argue that economic development through technology transfer has become a "third academic mission" in addition to universities' traditional missions of teaching and research (Abreu et al., 2009; Krücken, 2003). However, as the emphasis on such a third mission continues to grow, it would be important to understand what it is its impact, how it may be demonstrated, and what would qualify as impact, based on what indicators, and subject to what conditions (Antonacopoulou, 2010c). In this wider context, the cultural and knowledge-related variables identified in the dissertation could serve as a useful conceptual framework for understanding better the nature of U-I collaboration, its impact and scholarship. In particular, they could be of great help in understanding better what is effectiveness in cross-border knowledge interaction and how effective collaborative research in general and U-I collaboration and knowledge interaction in particular could be developed. Finland seems to be at the forefront of U-I collaborative research, and research on socio-economic impacts of public research organizations is under way (Lähteenmäki-Smith et al., 2006). This orientation towards research practice and scholarship shifts our attention from technology and knowledge transfer to knowledge integration and collaborative knowledge creation.

REFERENCES

Adler, P.A., & Adler, P. (1994). Observational techniques. In N.K. Denzin & Y.S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 377-392)). Thousand, CA: Sage Publications.

Adler, P.S. (1993). The "learning bureaucracy": New United Motor Manufacturing Inc. *Research in Organizational Behavior, 15*, 111-194.

Adler, P.S. (2001). Market, hierarchy, and trust: The knowledge economy and the future of capitalism. *Organization Science, 12*(2), 215-234.

Abreu, M., Grinevich, V., Hughes, A., & Kitson, M. (2009). Knowledge exchange between academics and the business, public and third sectors, Report of UK Innovation Research Center, University of Cambridge.

Agrawal, A. (2001). University-to-industry knowledge transfer: Literature review and unanswered questions. *International Journal of Management Review*s, *3(*4), 285-302.

Ahonen, H., Engeström, Y., & Virkkunen J. (2000). Knowledge Management - The second generation: Creating competencies within and between work communities in the Competence Laboratory. In Y. Malhotra (Ed.), *Knowledge Management and Virtual Organizations (*pp. 282-305). Hershey & London: Idea Group Publishing.

Alasuutari, P. (1995). *Researching Culture: Qualitative Method and Cultural Studies*. London, Sage Publications.

Alavi, M., & Tiwana, A. (2002). Knowledge integration in virtual teams: The potential role of KMS. *Journal of the American Society for Information Science and Technology, 53*(12), 1029-1037.

Almeida, P., & Phene, A. (2004). Subsidiaries and knowledge creation: The influence of the MNC and host country on innovation. *Strategic Management Journal, 25*, 847-864.

Alston, J.P. (1989). *Wa, guanxi*, and *inhwa:* Managerial principles in Japan, China, and Korea. *Business Horizons*, *32*, 26-31.

Ambos, B., & Schlegelmilch, B.B. (2008). Innovation in multinational firms: Does cultural fit enhance performance? *Management International Review, 48*(2), 189-206.

Andersson, U., Björkman, I., & Forsgren, M. (2005). Managing subsidiary knowledge creation: The effect of control mechanisms on subsidiary local embeddedness. *International Business Review, 14*, 521-538.

Andreeva, T.E., & Ikhilchik, I. (2009). Applicability of the SECI model of knowledge creation in the Russian cultural context: Theoretical analysis, Paper presented at *the 4th International Conference on Organizational Learning, Knowledge and Capabilities* (OLKC2009), Amsterdam, April 26-28.

Angrosino, M.V., & Mays de Pérez, K.A. (2000). Rethinking observation: From method to context. In N.K. Denzin & Y.S. Lincoln (Eds.), *Handbook of Qualitative Research*, second edition (pp. 673-702). Thousand Oaks: Sage Publications.

Antonacopoulou, E.P. (2009a). Strategizing as practicing: Strategic learning as a source of connection. In L.A. Costanzo and R.B. McKay (Eds.), *Handbook of Research on Strategy and Foresight* (pp.375-398). London: Sage.

Antonacopoulou, E.P. (2009b). Impact and scholarship: Unlearning and practicing to co-create actionable knowledge. *Management Learning, 40*(4), 421-430.

Antonacopoulou, E.P. (2010a). Global research: Transcending boundaries when learning to collaborate and learning from collaboration. In C. Cassell and W.J. Lee (Eds.), *Management Research: Challenges and Controversies*. London: Routledge.

Antonacopoulou, E.P. (2010b). Making the business school more 'critical': Reflexive critique based on phronesis as a foundation for impact. *British Journal of Management, 21*, 6-25.

Antonacopoulou, E.P. (2010c). Beyond co-production: Practice-relevant scholarship as a foundation for delivering impact through powerful ideas. *Public Money & Management*, July, 219-226.

Appleyard, M.M (1996). How does knowledge flow? Interfirm patterns in the semiconductor industry. *Strategic Management Journal, 17*, 137-154.

Argote, L. (2009). Past, present and future directions in organizational learning and knowledge management research, Keynote paper presented at *The 4th International Conference on Organizational Learning, Knowledge and Capabilities* (OLKC2009), Amsterdam, April 26-28.

Argote, L., & Ingram, P. (2000). Knowledge transfer: A basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes, 82*(1), 150-169.

Arias, J.T.G. (1998). A relationship marketing approach to *guanxi. European Journal of Marketing*, *32*(1/2), 145-156

Auerbach, C.F., & Silverstein, L.B. (2003). *Qualitative Data: An Introduction to Coding and Analysis*. New York: New York University Press.

Awazu, Y. (2007). Managing knowledge within and across geographic borders: The role of culture. *Knowledge and Process Management*, *14*(3), 145-147.

Aycan, Z. (2005). The interplay between cultural and institutional/structural contingencies in human resource management practices. *Int. J. of Human Resource Management, 16*(7), 1083-1119.

Barbolla, A.M.B., & Corredera, J.R.C. (2009). Critical factors for success in university-industry research projects. *Technology Analysis & Strategic Management, 21*(5), 599-616.

Barnes, T., Pashby, I., & Gibbons, A. (2002). Effective university-industry interaction: A multi-case evaluation of collaborative R&D projects. *European Management Journal, 20*(3), 272-285.

Bartlett, C.A., & Ghoshal, S. (1989). *Managing Across Borders: The Transnational Solution*. Boston, MA: Harvard Business School Press.

Berry, J.W., Poortinga, Y.H., Segall, M.H., & Dasen, P.R. (1992). *Cross-Cultural Psychology: Research and Applications*. Cambridge: Cambridge University Press.

Bhagat, R.S., Kedia, B.L., Harveston, P.D., & Triandis, H.C. (2002). Cultural variation in the cross-border transfer of organizational knowledge: An integrative framework. *Academy of Management Review, 27*(2), 204-221.

Bian, Y., & Ang, S. (1997). *Guanxi* networks and job mobility in China and Singapore. *Social Forces*, *75*(3), 981-1005.

Blackler, F. (1995). Knowledge, knowledge work and organizations: An overview and interpretation. *Organization Studies, 16*(6), 1021-1046.

Blyler, M., & Coff, R.W. (2003). Dynamic capabilities, social capital, and rent appropriation: Ties that split pies. *Strategic Management Journal, 24*, 677-686.

Boisot, M. (2006). How much knowledge should a business give away? *European Business Forum, 24*, 7-8.

Boisot, M. (2009). Generating knowledge in a connected world: The case of the ATLAS Experiment at CERN, Keynote paper presented at *The 4th International*

Conference on Organizational Learning, Knowledge and Capabilities (OLKC2009), Amsterdam, April 26-28.

Boisot, M., & Child, J. (1996). From fiefs to clans and network capitalism: Explaining China's emerging economic order. *Administrative Science Quarterly, 41*, 600-628.

Buckley, P.J., & Carter, M.J. (1999). Managing cross-border complementary knowledge: Conceptual development in business process approach to knowledge management in multinational firms. *Int. Studies of Mgt. & Org*., *29*(1), 80-104.

Buckley, P.J., Carter, M.J., Clegg, J., & Tan, H. (2005). Language and social knowledge in foreign-knowledge transfer to China. *International Studies of Management & Organization, 35*(1), 47-65.

Buckley, P.J., Clegg, J., & Tan, H. (2006). Cultural awareness in knowledge transfer to China – The role of *guanxi* and *mianzi*. *Journal of World Business, 41*, 275-288.

Burrows, G.R., Drummond, D.L., & Martinsons, M.G. (2005). Knowledge management in China. *Communications of the ACM, 48*(4), 73-76.

Calderón-Moncloa, L.F. (2007). Latin American cultural values and their impact on knowledge management. In K. Hutchings & K. Mohannak (Eds.), *Knowledge Management in Developing Economies: A Cross-Cultural and Institutional Approach (*pp. 173-189). Cheltenham, UK: Edward Elgar.

Chang, H.C., & Holt, G.R. (1991). More than relationship: Chinese interaction and the principle of *kuan-hsi*. *Communication Quarterly, 39*, 251-271.

Child, J., & Markoczy, L. (1994). Host country managerial behavior in Chinese and Hungarian joint ventures: Assessment of competing explanations. In M. Boisot (Ed.), *East-West Business Collaboration: The Challenge of Governance in Post-Socialist Enterprises*. London: Routledge.

Cohen, W., & Levinthal, D. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly, 35*, 128-152.

Cole, M. (1996). *Cultural Psychology: A Once and Future Discipline*. Cambridge: Harvard University Press.

Craig, C.S., & Douglas, S.P. (2006). Beyond national culture: Implications of cultural dynamics for consumer research. *International Marketing Review*, *23*(3), 322-342.

Cyert, R.M., & Goodman, P.S. (1997). Creating effective university-industry alliances: An organizational learning perspective. *Organizational Dynamics, 25*(4), 45-57.

D'Andrade R. (1992). Schemas and motivation. In R.G. D'Andrade and C. Strauss (Eds.), *Human Motives and Cultural Models* (pp. 23-44). Cambridge: Cambridge University Press.

D'Andrade R, & Strauss C. (1992). *Human Motives and Cultural Models;* Cambridge: Cambridge University Press.

Declercq, G.V. (1981). A third look at the two cultures: The new economic responsibility of the university. *International Journal of Institutional Management in Higher Education*, 5(2), 117-122

Daghfous, A. (2003). Uncertainty and learning in university-industry knowledge transfer projects. *Journal of American Academy of Business, 3*(1/2), 145-151.

Drejer, I., & Jørgensen, B.H. (2005). The dynamic creation of knowledge: Analysing public – private collaborations. *Technovation, 25*, 83-94.

Davenport, T. H., & Prusak, L. (1998). *Working Knowledge: How Organizations Manage What They Know*. Boston, MA: Harvard Business School Press.

du Chatenier, E., Verstegen, J.A.A.M., Biemans, H.J.A., Mulder, M., & Omta, O. (2009). The challenges of collaborative knowledge creation in open innovation teams. *Human Resource Development Review, 8*(3), 350-381.

Dyer, J.H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *The Academy of Management Review*, *23*(4), 660-679.

Ellonen, H-K. (2006). *Exploring the Strategic Impact of Technological Change – Studies on the Role of Internet in Magazine Publishing*. Acta Universitatis Lappeenrantaensis 261. Lappeenranta: Lappeenranta University of Technology.

Elmuti, D., Abebe, M., & Nicolosi, M. (2005). An overview of strategic alliances between universities and corporations. *The Journal of Workplace Learning, 17*(1/2), 115-129.

Engeström, Y. (1987). *Learning by Expanding: An Activity-Theoretical Approach to Developmental Research*. Helsinki: Orienta-Konsultit.

Engeström, Y. (1999). Innovative learning in work teams: Analyzing cycles of knowledge creation in practice. In Y. Engeström, R. Miettinen & R.L. Punamäki (Eds.), *Perspectives on Activity Theory* (pp. 377-406). Cambridge: Cambridge University Press.

Engeström, Y. (2001). Expansive Learning at Work: Toward an activity theoretical reconceptualization. *Journal of Education and Work*, *14*(1), 129-152.

Engeström, Y. (2008a). *From Teams to Knots: Activity-Theoretical Studies of Collaboration and Learning at Work.* Cambridge: Cambridge University Press.

Engeström, Y. (2008b). The future of activity theory: A rough draft. Keynote paper presented at the ISCAR Conference, San Diego, September 8-13.

Engeström, Y., Brown, K., Christopher, C., & Gregory, J. (1991). Coordination, cooperation and communication in courts: Expansive transitions in legal work. *The Quarterly Newsletter of the Laboratory of Comparative Human Cognition, 13*, 88-97.

Engeström, Y., Engeström, R., & Kerosuo, H. (2003). The discursive construction of collaborative care. *Applied Linguistics, 24*, 286-315.

Engeström, Y., Miettinen, R., & Punamäki, R-L (Eds.) (1999). *Perspectives on Activity Theory*. Cambridge: Cambridge University Press.

Eriksson, P. & Kovalainen, A. (2008). *Qualitative Methods in Business Research*. Los Angeles: Sage Publications

Etzkowitz, H. (2008). *The Triple Helix: University-Industry-Government Innovation in Action*. London: Routledge.

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: from national systems and "Mode 2" to a triple helix of university-industry-government relations. *Research Policy, 29*, 109-123.

Eun, J.H., Lee, K., & Wu, G. (2006). Explaining the "university-run enterprises" in China: A theoretical framework for university-industry relationship in developing countries and its application to China. *Research Policy, 35*, 1329-1346.

Evaristo, J.R. (2007). Knowledge transfer across borders: A process model. *Knowledge and Process Management, 14*(3), 203-210.

Farh, J.L., Tsui, A.S., Xin, K., & Cheng, B. (1998). The influence of relational demography and *guanxi*: The Chinese case. *Organization Science*, *9*(4), 471-488.

Farjoun, M. (2010). Beyond dualism: Stability and change as a duality. *Academy of Management Review, 35*(2), 202-225.

Faure, G.O., & Fang, T. (2008). Changing Chinese values: Keeping up with paradoxes. *International Business Review*, 17(2), 194-207.

Fontana, A., & Frey, J.H. (2000). The interview: From structured questions to negotiated text. In N. K. Denzin and Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 645-672*)*. Thousand Oaks: Sage.

Fontana, R., Geuna, A., & Matt, M. (2006). Factors affecting university-industry R&D projects: The importance of searching, screening and signaling. *Research Policy, 35*, 309-323.

Frow, J. & Morris, M. (2000). Cultural studies. In N. K. Denzin and Y.S. Lincoln (Eds.), *Handbook of Qualitative Research*, second edition (pp. 315-346). Thousand Oaks: Sage Publications.

Fu, P.P., Tsui, A.S., & Dess, G.G. (2006). The dynamics of *guanxi* in Chinese high-tech firms: Implications for knowledge management and decision making. *Management International Review*, *46*(3), 277-305.

Fukugawa, N. (2005). Characteristics of knowledge interactions between universities and small firms in Japan. *International Small Business Journal, 23*(4), 379-401.
Gao, Z.C., & Tisdell, C. (2004). China's reformed science and technology system: An overview and assessment. *Prometheus, 22*(3), 311-331.

Ghauri. P., Gronhaug, K., & Kristianslund, I. (1995). *Research Methods in Business Studies: A Practical Guide*. New York: Prentice Hall.

Glisby, M., & Holden, N. (2003). Contextual constraints in knowledge management theory: The cultural embededness of Nonaka's knowledge-creating company. *Knowledge and Process Management, 10*(1), 29-36.

Gopalakrishnan, S., & Santoro, M. D. (2004). Distinguishing between knowledge transfer and technology transfer activities: The role of key organizational factors. *IEEE Transactions on Engineering Management*, *51*(1), 57-69.

Goodenough, W. (1994). Towards a working theory of culture. In R. Borofsky (Ed.), *Accessing Cultural Anthropology* (pp. 262-273). New York: McGraw-Hill.

Grandori, A., Kogut, B. (2002). Dialogue on organization and knowledge. *Organization Science 13*(3), 224-231.

Grant, R.M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, *17*, 109-122.

Grant, R.M., & Baden-Fuller, C. (2004). A knowledge accessing theory of strategic alliances. *Journal of Management Studies, 41*(1): 62-84.

Gu, S.L., & Lundvall, B.-Å. (2006). Policy learning as a key processes in the transformation of the Chinese innovation systems. In B-Å. Lundvall, P. Intarakumnerd, & J. Vang (Eds.), *Asia's Innovation Systems in Transition*. Cheltenham, UK: Edward Elgar.

Guan, J.C., Yam, R.C.M, & Mok, C.K. (2005). Collaboration between industry and research institutes/universities on industrial innovation in Beijing, China. *Technology Analysis & Strategic Management, 17*(3), 339-353.

Gupta, A.K., & Govindarajan, V. (1991). Knowledge flows and the structure of control within multinational corporations. *Academy of Management Review, 16*(4), 768-792.

Gupta, A., & Govindarajan, V. (2000). Knowledge flows within MNCs. *Strategic Management Journal, 21*, 473-496.

Gupta, A.K., Smith, K.G., & Shalley, C.E. (2006). The interplay between exploration and exploitation. *Academy of Management Journal, 49*(4), 693-706.

Gustavs, J., & Clegg, S. (2005). Working the knowledge games? Universities and corporate organizations in partnership. *Management Learning*, *36*(1), 9-30.

Hansen, M.T., Nohria, N., & Tierney, T. (1999). What's your strategy for managing knowledge? *Harvard Business Review, March-April*, 106-116.

Hansson, F. (2007). Science parks as knowledge organizations – The "*ba*" in action? *European Journal of Innovation Management*, *10*(3), 348-366.

Hasu, M., Helle, M., & Kerosuo, H. (2005). *Ethnography in Expansion – Emergent Trends and Future Challenges*. Paper presented at the First ISCAR Congress, Seville September 20-24.

Hedlund, G. (1986). The hypermodern MNC – a heterarchy? *Human Resource Management*, *25*(1), 9-35.

Hedlund, G. (1994). A model of knowledge management and the N-form corporation. *Strategic Management Journal, 15*, 73-90.

Hedlund, G., & Nonaka, I. (1993). Models of knowledge management in the West and Japan. In P. Lorange, B. Chakravarthy, J. Roos, & A. van Der Ven (Eds.), *Implementing Strategic Processes: Change, learning and co-operation*. Oxford, UK: Blackwell Business.

Heikkinen, J., Blomqvist, K., & Hong, J.Z. (2007). *Ba for knowledge creation in Sino-Western university-industry collaboration*. Paper presented in the Conference of EBRF

2007 - Research Forum to Understand Business in Knowledge Society, Agora - Jyväskylä, Finland, September 25-27.

Hemmert, M., Okamuro, H., Bstieler, L., & Ruth, K. (2008). An inquiry into the status and nature of university–industry research collaborations in Japan and Korea. *Hitotsubashi Journal of Economics, 49*, 163-180.

Hermans, J., & Castiaux, A. (2007). Knowledge creation though university-industry collaborative research projects. *The Electronic Journal of Knowledge Management*, *5*(1), 43-54.

Hermans, H.J.M., & Kempen, H.J.G. (1998). Moving cultures: The perilous problems of cultural dichotomies in a globalizing society. *American Psychologist, 53*(10), 1111-1120.

Holden, N.J. (2001). Knowledge management: Raising the spectre of the cross-cultural dimension. *Knowledge and Process Management, 8*(3), 155-163.

Holden, N.J. (2002). *Cross-Cultural Management: A Knowledge Management Perspective*. Harlow, UK: Pearson Education.

Holden, N.J. (2008). Reflections of a cross cultural scholar: Context and language in management thought. *International Journal of Cross Cultural Management, 8*(2), 239-251.

Holand, D. (2000). On the shoulders of Bakhtin and Vygotsky: Towards a cultural-historical, social practice theory of identity and social movements. Keynote paper at the *3nd International Conference for Sociocultural Research - New Conditions of Knowledge Production: Globalization and Social Practices*. São Paulo, July 16-20.

Holland, D., Lachicotte Jr., W., Skinner, D., & Cain, C. (1998). *Identity and Agency in Cultural Worlds*. Cambridge MA: Harvard University Press.

Holland, D., & Lave, J. (2009). Social practice theory and the historical production of persons. *Actio: An International Journal of Human Activity Theory, 2*, 1-15.

Holland, D., & Reeves, J.R. (1994). Activity theory and the view from somewhere: Team perspectives on the intellectual work of programming. *Mind, Culture, and Activity, 1*(1/2), 8-24.

Hong, W. (2008). Decline of the center: The decentralizing process of knowledge transfer of Chinese universities from 1985 to 2004. *Research Policy, 37*, 580-595.

Hong, J.Z. (2008). Cultural implications of collaborative knowledge interaction, Paper presented at *The Second ISCAR (International Society for Cultural and Activity Research) Congress*, San Diego, September 8-13.

Hong, J.Z., & Engeström, Y. (2004). Changing communication principles between Chinese managers and workers: Confucian authority chains and *guanxi* as social networking. *Management Communication Quarterly, 17*, 552-585.

Hong, J.Z., Heikkinen, J., & Niemi, M. (2007). Collaborative knowledge creation and innovation between MNCs and Chinese universities, *Proceedings of the 8th European Conference on Knowledge Management* (Consorci Escola Industrial de Barcelona Spain September 6-7), 486-491.

Hong, J.Z., Kianto, A., & Kyläheiko, K. (2008). Moving culture and the creation of new knowledge and dynamic capabilities in emerging markets. *Knowledge and Process. Management*, *15*(3), 196-202.

Hong, J.Z., & Ståhle, P. (2005). The co-evolution of knowledge and competence management. *International Journal of Management Concepts and Philosophy*, *1(*2), 129-145.

Hsung, R.M. (1998). The concepts of social networks and *guanxi*: The application to Taiwan studies. Paper presented in an international conference of *Social Networks and Social Capital*, October 30-November 1, Duke University.

Huang, Q., Davison, R.M., & Gu, J. (2008). Impact of personal and cultural factors on knowledge sharing in China. *Asia Pacific J Manage, 25*, 451-471.

Hutchings, K., & Michailova, S. (2004). Facilitating knowledge sharing in Russian and Chinese subsidiaries: The role of personal networks and group membership. *Journal of Knowledge Management, 8*(2), 84-94.

Hutchings, K., & Mohannak, K. (2007). *Knowledge Management in Developing Economies: A Cross-Cultural and Institutional Approach*. Cheltenham: Edward Elgar.

Håkansson, H. (1982) *International Marketing and Purchasing of Industrial Goods: An Interaction Approach*. New York: John Wiley & Sons.

Inkpen, A.C. (1996). Creating knowledge through collaboration. *California Management Review 39*(1), 123-140.

Inkpen, A.C., & Pien, W. (2006). An examination of collaboration and knowledge transfer: China-Singapore Suzhou Industrial Park. *Journal of Management Studies, 43*(4), 779-811.

Jakubik, M. (2008). Experiencing collaborative knowledge creation processes. *The Learning Organization, 15*(1), 5-25.

Jakobson, L. (2007). China aims high in science and technology: An overview of the challenges ahead. In L. Jakobson (Ed.), *Innovation with Chinese Characteristics: High-Tech Research in China* (pp. 1-36). New York: Palgrave Macmillan.

Janesick, V.J. (2000). The choreography of qualitative research design: Minutes, improvisations, and crystallization. In N.K. Denzin & Y.S. Lincoln (Eds.), *Handbook of Qualitative Research,* second edition (pp. 379-399). Thousand Oaks: Sage Publications, Inc.

Jasimuddin, S.M., Klein, J.H., Connell, C. (2005). The paradox of using tacit and explicit knowledge: strategies of face dilemmas. *Management Decision 43*(1), 102-112.

Jiang, C. (2005). The impact of entrepreneur's social capital on knowledge transfer in Chinese high-tech firms: The mediating effects of absorptive capacity and *guanxi* development. *International Journal of Entrepreneurship and Innovation Management, 53* (4), 269-283.

Johnson, J.M. (2002). Indepth-interviewing. In J. F. Gubrium and J. A. Holstein (Eds.), *Handbook of Interview Research: Context and Method* (pp. 03-120). Thousand Oaks, CA: Sage Publications.

Johnson, W.H.A., & Johnson, D.A. (2004). Organisational knowledge creating processes and the performance of university-industry collaborative projects. *International Journal of Technology Management*, *27*(1), 93-114.

John-Steiner, V. (2000). *Creative Collaboration*. New York: Oxford University Press.

Johnston, S., & Paladino, A. (2007). Knowledge management and involvement in innovations in MNC subsidiaries. *Management International Review*, *47*(2), 281-302.

Khavul, S., Bruton, G.D., Zheng, C.C., & Wood, E. (2007). Learning during and after internationalization by entrepreneurial firms from emerging economies. *Academy of Management Proceedings*, 1-6.

Klijn, E. (2006). *Knowledge Transfer between Partners of International Joint Ventures: Knowledge Acquisition, Knowledge Accession, and Eloquent Capacity*. Doctoral dissertation: University of Leeds.

Kodama, M. (2003). Knowledge creation through the synthesizing capability of networked strategic communities: Case study on new product development in Japan. *Knowledge Management Research & Practice*, *1*, 77-85.

Kodama, M. (2005). New knowledge creation through dialectical leadership: A case of IT and multimedia business in Japan. *European Journal of Innovation Management, 8*(1), 31-55.

Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science, 3*(3), 383-397.

Kogut, B., & Zander, U. (1993). Knowledge of the firm and the evolutionary theory of the multinational corporation. *Journal of International Business Studies, 24*(4), 625-645.

Kok, H.C. (2006). Cultivating knowledge sharing: An exploration of tacit organization knowledge in Singapore. *Journal of Asian Business, 22*(2-3), 169-197.

Koschatzky, K. (2002). Networking and knowledge transfer between research and industry in transition countries: Empirical evidence from Slovenian innovation system. *Journal of Technology Transfer*, *27*(1), 27-38.

Kotlarsky, J., van den Hooff, B., & Huysman, M. (2009). The role of a transactive memory system in bridging knowledge boundaries, Paper presented at *The 4th International Conference on Organizational Learning, Knowledge and Capabilities* (OLKC2009), Amsterdam, April 26-28.

Krüecken, G. (2003). Mission impossible? Institutional barriers to the diffusion of the "third academic mission" at German universities. *Int. J. Technology Management, 25*(1/2), 18-33.

Kubota, H., & Nishida, T. (2003). Channel design for strategic knowledge interaction. In *Proceedings of the KES 2003* (pp. 1037-1043).

Kärkkäinen, H., Piippo, P., Puumalainen, K., & Tuominen, M. (2001). Assessment of hidden and future customer needs in Finnish business-to-business companies. *R&D Management, 31*(4), 391-407.

Lam, A. (1997). Embedded firms, embedded knowledge: Problems of collaboration and knowledge transfer in global cooperative ventures. *Organization Studies, 18*(6), 973–996.

Lambooy, J.G. (2004). The transmission of knowledge, emerging networks, and the role of university: An evolutionary approach. *European Planning Studies*, *12*(5), 643-657.

Lampela, H. (2009). *Inter-organizational Learning within and by Innovation Networks*. Acta Universitatis Lappeenrantaensis 345. Lappeenranta: Lappeenranta University of Technology.

Lave, J. (2008). *Apprenticeship in Critical Ethnographic Practice*. University of Chicago Press.

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation.* Cambridge: Cambridge University Press.

Lee, Y.S. (1996). Technology transfer and the research university: A search for the boundaries of university-industry collaboration. *Research Policy, 25*, 843-863.

Leung, K., Bhagat, R.S., Buchan, N.R., Erez, M., & Gibson, C.B. (2005). Culture and international business: Recent advances and their implications for future research. *Journal of International Business Studies*, *36,* 357-378.

Li, J.D. (2005). *A Study on R&D Collaboration between MNCs and Chinese Universities* (in Chinese). Unpublished master's thesis, Tsinghua University, China.

Li, J.T. (2010). Global R&D alliances in China: Collaboration with universities and research institutes, *IEEE Transactions on Engineering Management*, *57*(1), 78-87.

Li, P.P., (2008). Toward a geocentric framework of trust: An application to organizational trust. *Management and Organization Review, 4*(3), 413-439.

Li, S., & Scullion, H. (2006). Bridging the distance: Managing cross-border knowledge holders. *Asia Pacific Journal of Management*, *23*, 71-92.

Li, J., & Zhong, J. (2003). Explaining the growth of international R&D alliances in China. *Managerial and Decision Economics, 24*, 101-115.

Lin, L. (2005). *Study on the University-Enterprise Knowledge Alliance based on the Theory of Knowledge Activity System* (in Chinese). Unpublished doctoral dissertation, Dalian University of Technology: Dalian.

Lindqvist, J., Blomqvist, K., & Saarenketo, S. (2007). The role of sales subsidiary in MNC innovativeness - Explorative study and emerging issues on knowledge transfer. In R.R. Sinkovics and M. Yamin (Eds), *Anxieties and Management Responses in International Business*. Houndmills, Basingstoke, UK: Palgrave MacMillan.

Liu, H., & Jiang, Y.Z. (2001). Technology transfer from higher education institutions to industry in China: Nature and implications. *Technovation, 21*, 175-188.

López-Martinez, R.E., Medllin, E., Scanlon, A.P., & Solleiro, J.L. (1994). Motivations and obstacles to university-industry cooperation (UIC): A Mexican case. *R& D Management, 24*(1), 17-30.

Lu, L., & Etzkowitz, H. (2008). Strategic challenges for creating knowledge-based innovation in China: Transforming triple helix university-government-industry relations. *Journal of Technology Management in China, 3*(1), 5-11.

Lucas, M.J.W. (2005). *Bridging a Cultural Divide: Strengthening Similarities and Managing Differences in University-Industry Relationships*. Doctoral dissertation, University of Toronto.

Lucas, L. (2006). The role of culture on knowledge transfer: The case of the multinational corporation. *The Learning Organization*, *13*(3), 257-275.

Luo, Y.D. (1997). *Guanxi*: Principles, philosophies, and implications. *Human System Management*, *16*, 43-51.

Luo, Y.D. (2007). *Guanxi* and Business. New Jersey: World Scientific.

Lähteenmäki-Smith, K., Hyytinen, K., Kutinlahti, P., & Konttinen, J. (2006). Research with impact: Evaluation practices in public research organisations. VTT Tiedotteita – Research notes 2336, VTT Technical Research Centre of Finland, Finland (ISBN 951-38-6784-6).

Mansfield, E. (1995). Academic research underlying industrial innovations: Sources, characteristics, and financing. *The Review of Economics and Statistics, 77*(1), 55-65.

March, J.G. (1991). Exploration and exploitation in organizational learning. *Organization Science, 2*(1), 71-86.

Mason, J. (2002). *Qualitative Researching,* second edition. London: Sage Publications.

Mengis, J., & Eppler, M.J. (2006). Seeing versus arguing: The moderating role of collaborative visualization in team knowledge integration. *Journal of Universal Knowledge Management, 1*(3), 151-162.

Miesing, P., Kriger, M.P. and Slough, N. (2007). Towards a model of effective knowledge transfer within transnational: The case of Chinese foreign invested enterprises. *J Technol Transfer, 32*, 109-122.

Nishida, T. (Ed.). (2000). *Dynamic Knowledge Interaction.* Boca Ranton, FL: CRC Press.

Nishida, T. (2002). A traveling conversation model for dynamic knowledge interaction. *Journal of Knowledge Management*, *6*(2), 124-134.

Nonaka, I. (2007). The knowledge-creating company. *Harvard Business Review*, *85*(7/8), 162-171.

Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. New York: Oxford University Press.

Nonaka, I., Toyama, R., & Konno, N. (2000). SECI, *ba* and leadership: A unified model of dynamic knowledge creation. *Long Range Planning*, *33*, 5-34.

Nonaka, I., Umemoto, K., & Sasaki, K. (1998). Three tales of knowledge-creating companies. In von Krogh, G., Roos, J., Kleine, D. (Eds), *Knowing in Firms. Understanding, Managing and Measuring Knowledge*. London: Sage Publications.

Okhuysen, G.A., & Eisenhardt, K.M. (2002). Integrating knowledge in groups: How formal interventions enable flexibility. *Organization Science, 13*(4), 370-386.

Olander, H., & Hurmelinna-Laukanen, P. (2008). Value creation and value capturing in innovative networks. *4th EIASM Worskhop on Visualizing, Measuring and Managing Intangibles and Intellectual Assets*. Hasselt, Belgium, October 22-24.

Olson, G.M., & Luo, A. (2007). Intra- and inter-cultural collaboration in science and engineering. In *Intercultural Collaboration* (pp. 249-259). Heidelberg: Springer Berlin.

Pak, Y.S., & Park, Y-R. (2004). A framework of knowledge transfer in cross-border joint ventures: An empirical test of the Korean context. *Management International Review, 44*(4), 417-434.

Patton, M.Q. (2002). *Qualitative Research & Evaluation Methods*, 3rd edition. Thousand Oaks: Sage Publications

Perkmann, M., & Walsh, K. (2006). *Relationship-Based University-Industry Links and Open Innovation: Towards a Research Agenda* (AIM Research Working Paper Series, 041-July-2006). Loughborough University.

Perrin, A., Rolland, N., & Stanley, T. (2007). Achieving best practices transfer across countries. *Journal of Knowledge Management, 11*(3), 156-166.

People's Daily Overseas Edition, The number of MNCs' R&D centers in China goes over 1200, 17.3.2010 (in Chinese).

Pettigrew, A. (1979). On studying organizational cultures. *Administrative Science Quarterly, 24*, 570-581.

Pillania R.K. (2005). New knowledge creation scenario in Indian industry. *Global Journal of Flexible Systems Management, 6*(3&4), 49-57.

Popadiuk, S., & Choo, C.W. (2006). Innovation and knowledge creation: How are these concepts related? *International Journal of Information Management*, *26*(4), 302-312.

Prusak, L. (2001). Where did knowledge management come from? *IBM Systems Journal, 40*(4), 1002-1007.

Qin, C., Ramburuth, P., & Wang, Y. (2008). Cultural distance and subsidiary roles in knowledge transfer in MNCs in China. *Chinese Management Studies, 2*(4), 260-280.

Quinn, N., & Holland, D. (1987)..Culture and cognition. In D. Holland & N. Quinn (Eds.), *Cultural Models in Language and Thought* (pp. 3-40). New York: Cambridge University Press.

Ramasamy, B., Goh, K.W., & Yeung, M. C.H. (2006). Is *guanxi* (relationship) a bridge to knowledge transfer? *Journal of Business Research*, *59*, 130-139.

Ring, P.S., & von de Ven, A.H. (1994). Developmental processes of cooperative interorganizational relationships. *Academy of Management Review, 19*(1), 90-118.

Ryan, L. (2007). Developing a qualitative understanding of university-corporate education partnerships. *Management Decision, 45*(2), 153-160.

Rose, R.A. (1988). Organizations as multiple cultures: A rules theory analysis. *Human Relations*, *41*(2), 139-170.

Sackmann, S.A. (1991). *Cultural Knowledge in Organizations: Exploring the Collective Mind*. Newbury Park, CA: Sage.

Salisbury, M. (2008). A framework for collaborative knowledge creation. *Knowledge Management Research & Practice, 6*, 214-224.

Sanchez, R. (2001). *Knowledge Management and Organizational Competence*. Oxford: Oxford University Press.

Santoro, M. (2006). Self-interest assumption and relational trust in university-industry knowledge transfer. *IEEE Transaction on Engineering Management*, *53*(3), 335-347.

Santoro, M.D., & Bierly, III, P.E. (2006). Facilitators of knowledge transfer in university-industry collaborations: A knowledge-based perspective. *IEEE Transactions on Engineering Management, 53* (4), 495-507.

Santoro, M.D., & Gopalakrishnan, S. (2000). The institutionalization of knowledge transfer activities within industry-university collaborative ventures. *J. Eng. Technol. Manage. 17*, 299-319.

Santoro, M.D., & Saparito, P.A (2006). Self-interest assumption and relational trust in university-industry knowledge transfers. *IEEE Transactions on Engineering Management, 53*(3), 335-347.

Schartinger, D., Rammer, C., Fischer, M.M., & Fröhlich, J. (2002). Knowledge interactions between universities and industry in Austria: Sectoral patterns and determinants. *Research Policy, 31*, 303-328.

Schein, E.H. (1985). *Organizational Culture and Leadership: A Dynamic View*. San Francisco, CA: Jossey-Bass.

Scribner, S. (1985). Knowledge at work. *Anthropology and Education Quarterly*, *16*(3), 199-206.

Seigel, D.S., Waldman, D.A., Atwater, L.E., & Link, A.N. (2003). Commercial knowledge transfers from universities to firm: Improving the effectiveness of university-industry collaboration. *Journal of High Technology Research*, *14*, 111-133.

Shank, G.D. (2006). *Qualitative Research: A Personal Skills Approach,* second edition. Upper Saddle River, New Jersey: Pearson Education.

Sherwood, A.L., & Covin, J.G. (2008). Knowledge acquisition in university – industry alliances: An empirical investigation from a learning theory perspective. *The Journal of Product Innovation Management, 25*, 162-179.

Silverman, D. (2005). *Doing qualitative research: A practical handbook*, second edition. Los Angeles: Sage Publications.

Simonin, B. (1999). Transfer of marketing know-how in international strategic alliances: An empirical investigation of the role and antecedents of knowledge ambiguity. *Journal of International Business Studies*, *30*(3), 463-490.

Smart, A. (1993). Gifts, bribes, and *guanxi*: A reconsideration of Bourdieu's social capital. *Cultural Anthropology*, *8*(3), 388-408.

Smircich, L. (1983). Concepts of culture and organizational analysis. *Administrative Science Quarterly, 28*, 339-358.

Snowden, D. (2002). Complex acts of knowing: Paradox and descriptive self-awareness. *Journal of Knowledge Management, 6*(2), 100-111.

Sojka, J.Z., & Tansuhaj, P. (1995). Cross-cultural research: A twenty-year review. *Advances in Consumer Research*, 461-474.

Spender, J.-C. (1992). Limits to learning from the West. *The International Executive*, *34*, 389-410.

Spender, J-C. (1996). Making knowledge the basis of a dynamic theory of the firm. *Strategic Management Journal, 17*, 45-62.

Stake, R.E. (1995). *The Art of Case Study Research*. Thousand Oaks: Sage Publications.

Stake, R.E. (2000). Case studies. In N.K. Denzin & Y.S. Lincoln (Eds.), *Handbook of Qualitative Research,* second edition (pp. 435-454). Thousand Oaks: Sage Publications, Inc.

Ståhle, P., & Grönroos, M. (2000). *Dynamic Intellectual Capital, Knowledge Management in Theory and Practice*. Porvoo, Helsinki: WSOY.

Szulanski, G. (2003). *Sticky Knowledge: Barriers to Knowing in the Firm*. London: SAGE.

Teagarden, M.B. et al. (1995). Toward a theory of comparative management research: An idiographic case study of the best international human resources management project. *Academy of Management Journal*, *38*(5), 1261-1287.

Teece, D.J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28, 1319-1350.*

Teece, D.J, Pisano, G., & Shuen A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*, 509-533.

Tong, H. (2008). An invited talk for the workshop on *Future Mobile UI & UE*, Nokia Research Center, July Beijing.

Tsui, A.S. (2004). Contributing to global management knowledge: A case for high quality indigenous research. *Asia Pacific Journal of Management*, *21*(4), 491-513.

Tsui, A., & Farh, J.L. (1997). Where *guanxi* matters: Relational demography and *guanxi* in the Chinese context. *Work and Occupations*, *24*(1) 56-79.

Tuomi, I. (2002). The future of knowledge management. *Lifelong Learning in Europe, 2*, 69-79.

Tödtling, F., Lehner, P., & Kaufmann, A. (2009). Do different types of innovation rely on specific kinds of knowledge interactions? *Technovation*, *29*, 59-71.

van Aalst, J. (2009). Distinguishing knowledge-sharing, knowledge construction, and knowledge creation discourses. *Computer-Supported Collaborative Learning, 4*, 259-287.

Van de Ven, A.H. (2002). Strategic directions for the academy of management: This academy is for you! *Academy of Management Review, 27*(2), 171-184.

Viljamaa, K. (2007). Technological and cultural challenges in local innovation support activities – Emerging knowledge interactions in Charlotte's motor sport cluster. *European Planning Studies*, *15*(9), 1215-1232.

Volberda, H., van Bosch, F.A.J. (2005). Why management matters most? *European Business Forum, 22***,** 36-41.

von Krogh, G. (1999). Developing a knowledge-based theory of the firm, Retrieved January 5, 2005, from http://www.dialogonleadership.org/vonKrogh-1999cp.html.

von Zedtwitz, M. (2007). *Innovation in China – From an R&D perspective*. Presentation in Lotus Flower Day, VTT Espoo, May 9.

Vuola, O., & Hameri, A-P. (2006). Mutually benefitting joint innovation process between industry and big-science. *Technovation, 26*, 3-12.

Vygotski, L.S. (1978) (Edited by Cole, M., John-Steiner, V., Scribner, S. & Souberman, E.). *Mind in Society: The Development of Higher Psychological Processes*, Cambridge: Harvard University Press.

Wang, Y., & Lu, L. (2007). Knowledge transfer through effective university-industry interactions. *Journal of Technology Management in China, 2*(2), 119-133.

Wartofsky, M. (1979). *Models: Representation and Scientific Understanding*. Dordrecht, The Netherlands: Reidel.

Weir, D. (2007). Managing knowledge in the Middle East and North Africa. In K. Hutchings & K. Mohannak (Eds.), *Knowledge Management in Developing Economies: A Cross-cultural and Institutional Approach* (pp. 156-172). Cheltenham, UK: Edward Elgar.

Weir, D., & Hutchings, K. (2005). Cultural embeddedness and contextual constraints: Knowledge sharing in Chinese and Arab cultures. *Knowledge and Process Management, 12*(2), 88-98.

Wertsch, J.V. (1997). *Mind as Action.* Oxford: Oxford University Press.

Wong, Y.H. (1998). The dynamics of *guanxi* in China. *Singapore Management Review, 20*, 25-42.

Wooten, L.P., & Crane, P. (2004). Generating dynamic capabilities through a humanistic work ideology. *The American Behavioral Scientist, 47*(6), 848-866.

Yang, M.M. (1994). *Gifts, Favors, and Banquets: The Art of Social Relationships in China*. Ithaca, NY: Cornell University Press.

Yang, M. (2002). The resilience of *guanxi* and its new deployments: A critique of some new *guanxi* scholarship. *The China Quarterly*, 459-476.

Yin, R.K. (1989). *Case Study Research: Design and Methods*. Newbury Park: Sage Publications.

Yin, R.K. (2003). *Applications of Case Study Research,* second edition. Thousand Oaks: SAGE.

Zhou, C.Y. (2008). Emergence of the entrepreneurial university in evolution of the triple helix: The case of Northeastern University in China. *Journal of Technology Management in China, 3*(1), 109-126.

Zollo, M., & Winter, S.G. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization Science, 13,* 339-351.

APPENDIX

The focusing issues and open-ended interview questions of the study

The focusing issues and topics of the study

The interview is more like an open discussion, and the major topics include: 1. Motivation factors for the collaboration with multinational corporations (MNCs); 2. Creation of the relationship between MNC and Chinese universities; 3. The process of typical collaboration project(s); 4. Knowledge interactions for collaborative innovation; and 5. Cultural issues and challenges in U-I collaboration.

The open-ended interview questions

Industry-University Collaboration (Basic questions)

1) Why do you like to collaborate with universities?
2) Do you find it easy to collaborate? Why?
3) So far, have you been satisfied with your collaboration? What are satisfied with and what not?

Knowledge Interaction (Focusing issues)

1) Perspective and ways of interacting with universities – *How important do you see knowledge exchange and interaction in university-industry collaboration?*

2) Process of the knowledge interaction (e.g., one successful and one unsuccessful event or story) – *What do you think are critical factors that facilitate or impede university-industry knowledge interaction?*

3) Current challenges in university-industry knowledge interaction – *What are they? What are available coping mechanisms? What would you like to do in the future?*

PART II: PUBLICATIONS

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■ *Research Article*

Moving Cultures and the Creation of New Knowledge and Dynamic Capabilities in Emerging Markets

Jianzhong Hong*, Aino Kianto and Kalevi Kyläheiko

The School of Business at Lappeenranta University of Technology, Finland

Dynamic capabilities are vital as they have been considered the major source for *creating new knowledge and capabilities* needed in today's rapidly changing markets. The existent literature draws our attention to several more or less identifiable sources and strategy level processes for the creation of such capabilities, primarily emphasizing the role of top management. In our view, however, these often quite ad hoc explanations cry for more detailed micro foundations that really open up and reveal underlying micro structures and processes. Hence, our paper argues that *moving communication across and the interaction of multi-cultures* at the workplace is a major driver for the creation of new knowledge and dynamic capabilities in organizations undergoing major transformation. The paper is theoretical in nature, and practical implications for innovation and knowledge management in emerging markets like in China are suggested. Copyright © 2008 John Wiley & Sons, Ltd.

INTRODUCTION

The concept of dynamic capabilities has widely been discussed in innovation studies and knowledge management. It is often associated with strategic attempts to sustain competitive advantage during the conditions of rapid change (Eisenhardt and Martin, 2000; Ferdinand *et al*., 2004; Jantunen, 2005; Kyläheiko *et al*., 2002; Pöyhönen/Kianto, 2004; Teece *et al*., 1997; Winter, 2003). More specifically, dynamic capabilities are considered as tools that manipulate resource configurations (Einsenhardt and Martin, 2000), the support to organizational renewal (Antonacopoulou, 2005), and the major source for creating new knowledge and capabilities needed in today's dynamic markets (Eisenhardt and Martin, 2000; Teece *et al*., 1997; Teece, 2007).

The dynamic capability view proposes that capacities for mastering change are the most essential elements of sustaining a firm's competitive advantage, which becomes of increasing interest to both academics and practitioners in knowledge creation and innovation activities. In this connection the most fundamental questions are *what the driving force for the creation of such capabilities really is* and *how culture plays its role in the development of new knowledge and capabilities*.

The existent literature draws our attention to several identifiable sources and processes including resource creation, coordination, entrepreneurship, and asset selection and orchestration (Teece *et al*., 1997; Teece, 2007), deliberate learning and the firm's investment particularly on knowledge codification activities (Zolla and Winter, 2002), and social capital emphasizing the role of central actors in rent generation and appropriation (Blyler and Coff, 2003). This line of research lays a special emphasis on the crucial role of top management and its

*Correspondence to: Jianzhong Hong, P.O.Box 20, FI-53851 Lappeenranta, Finland. E-mail: jianzhong.hong@lut.fi

direct associates in the development of dynamic capabilities. An emerging trend is the criticism of the ignorance of humanistic processes and concerns in organizational life and thus workers' work ideology and a shared mindset specifying broad, tacitly understood rules and organizational principles acknowledged in capability development (Volberda and van Bosch, 2005; Wooten and Crane, 2004).

Nevertheless, the role of cultural and communicative interaction revealed at the workplace is rarely discussed in this context. Our paper argues that *moving communication across and the interaction of multi-cultures* at the workplace is a major driver for the creation of new knowledge and dynamic capabilities, which seems to be evident in Chinese organizations undergoing major transformation. Emerging markets are seen as a major source of global innovation and knowledge management (Pillania, 2005). India has high expectations from her knowledge industries and exploratory studies that emphasize leveraging knowledge and building knowledge sharing culture have accordingly been conducted (Pillania, 2006, 2007). China's high-priority effort to become a more knowledge-based economy and learning society means that knowledge management is increasingly important (Burrows *et al.*, 2005). The development of new knowledge and capabilities is particularly relevant and salient in emerging and changing markets like in China (Khavul *et al.*, 2007). Some researchers have even proposed an approach of integrating dynamic capabilities perspective and the knowledge-based view for future research on strategic and knowledge management in China (Zhou and Li, 2007). We believe that our discussion of knowledge creation and the development of dynamic capabilities in this context may enhance our understanding of the nature and complexity of change and development in a broader way.

CULTURE AND CULTURAL INTERACTION

The intimate and interactive relationship between *culture, organizational knowledge,* and *capabilities* has been acknowledged in early knowledge management literature (e.g., Nonaka and Takeuchi, 1995), and more recently there shows a sign of growing interest in cultural issues in knowledge management (e.g., a special issue of the journal *Knowledge and Process Management* on the role of culture, 2007). The concept of knowledge creation is often traced back to Nonaka and Takeuchi and their model of knowledge conversion between tacit and explicit knowledge. For them, culture is important in knowledge creation, because, first, ''a good part of our knowledge has been learned as culture from older generations'' (p. 54); and second, the tacit part of knowledge mostly consists of culture. Thus, the close connection of culture with tacit knowledge, continuous improvements, and capability development has been emphasized. The knowledge creation model developed by Nonaka and Takeuchi treat organizations as cognitive and epistemological entities; therefore, their discussion on the topic remains very much at an individual level.

Researchers such as Cook and Yanow (1993) see organizations as *cultural* rather than cognitive entities. This means that learning and knowledge creation are a collective enterprise to be done by the organization as a whole, not just by individuals within it. According to them, ''when organizations are seen as cultures, they are seen to learn through activities involving cultural artifacts, and that learning, in turn, is understood to entail organizations' acquiring, changing, or preserving their abilities to do what they know how to do'' (p. 378). It implies that organizations are more than individual plus, and complex, interactive and dynamic systems and processes of knowledge and knowing need to be explored.

Culture may influence organizational behavior and knowledge management activities through various cultural artifacts at different levels. Wartofsky (1979) identifies three interrelated levels of artifacts. Primary artifacts include concrete tools and technologies such as hammers and computers. Secondary artifacts are representations or modes of action that enable humans to preserve and transmit the acquired skills and information (e.g., sign systems as language). As for tertiary artifacts, they are more associated with imaginative perceptual models or overviews which go beyond present actualities (e.g., cultural models). Mediating artifacts include material tools and technologies, but they also include sign systems, symbols, concepts, and cultural models (see D'Andrade and Strauss, 1992). Pervasive and long-standing cultural models may be seen as tertiary artifacts, not tied to any specific activities and actions, yet tremendously influential across a wide range of organizational behaviors and activities (Hong and Engeström, 2004). In today's marketplaces, cultural influences are at all levels. In many cases even in a single organization multi-cultures co-existed.

The mediating function of culture does not mean that culture or cultural models impose on organizational routines, knowledge behaviors and capabilities, but that organizational culture is both *embedded in* and *built through* routines and static and

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dynamic capabilities. On the other hand, the shared culture plays a central role in mediating functioning. Thus, we assume that the significance of organizational culture should be understood in terms of dynamic processes rather than static structures. Cultural and communicative interaction is the key to understanding the complex and recursive relationships between culture, knowledge, routines, and capabilities in dynamic environments.

Culture as a changing phenomenon has been noted by a number of authors in organizational studies. Pettigrew (1979) notes that a focus on culture over time is a more appropriate way to understand patterns of change than getting a snapshot at one point in time. Sackmann (1991) emphasizes not only the structural but also the developmental aspects of culture in understanding the construction of cultural knowledge and organizational development. She writes that ''the structural components of culture are interesting not only at one moment in time, they somehow emerge, develop, become institutionalized, and may change over time'' (p. 25). Recently, Hasu *et al*. (2005) have redefined culture not as a unified and stable structure, but as a fragmented, pervasive phenomenon under constant transformation and change in practice.

All artifacts, including stable cultural models, are inherently ambiguous and problematic. In times of radical societal and economic transformations like what is happening in today's China, cultural models in general and organizational cultures in particular are re-articulated, questioned, and sometimes qualitatively altered. Such changes are initiated in concrete, mundane actions and routines of local problem solving and reflection (Hong and Engeström, 2004). The accelerating process of globalization, radical social and economic transformation and the increasing interconnections between cultures involve an unprecedented challenge to academic mainstream conceptions which continue to work in a tradition of cultural dichotomies (e.g., individualistic vs. collectivistic; see Hermans and Kempen, 1998).

Mainstream of previous studies of culture and its impact on knowledge processes are seeing culture as a static, single or unified entity. The nature of moving cultures and role of cultural interaction tend to be neglected. As Craig and Douglas note, ''Traditionally, culture has been viewed as localized and defined by territorial boundaries. Cultural behavior patterns are viewed as delimited within a given locality, with little interaction or overlap with other cultures'' (2006: 330). In their view, examination of the extent to which individuals in a given society are embracing non-traditional values from other societies, for instance, would be important to document the extent of change.

Some exceptional studies, however, are illuminating. They shed light on a number of interesting areas of research such as the rise of the creative class in the US resulting from an underlying culture that is open-minded and diverse (Florida, 2002), positive values of cultural diversity for constructing knowledge base and learning (Boyle, 1999), and mutual adjustment and learning in joint ventures operating in China (Child, 1994). This has put learning in a situation in which learning is not aimed at adapting a mainstream culture, but it is rather learning from each other or even from the culture with opposing values so that a third and new culture could possibly be generated. In understanding cultural dynamics for marketing research, Craig and Douglas (2006) use *cultural hybridization* to refer to a similar consequence of global flows and cultural interaction in which a fusion of two or more elements from different cultures results in a new cultural element. The above studies on moving cultures and cultural interaction indicate that cultural diversity is not something negative but rather a powerful source for creating new knowledge and culture.

In international cross-cultural research, China has been connected with the West. As Boisot and Child (1996) have already pointed out, ''China's rapid economic development is being accomplished through a system of industrial governance and transaction that differs from Western experience'' (p. 600). In light of this and others' work, the key dimension we have identified in differentiating two lines of Western versus Chinese organizational cultures and management systems is related to whether it is *task-oriented* or *relation-oriented* (Beamer, 1998; Boisot and Child, 1996; Hong and Engeström, 2004; Martinsons and Westwood, 1997; Nonaka and Takeuchi, 1995; Ramasamy *et al*., 2006; Weir and Hutchings, 2005; Worm, 1997), which may have a profound influence on cross-border knowledge interaction and development. This distinction in cultural orientation may assemble in some aspects to the new dimensions of the GLOBAL project (e.g., performance orientation vs. humane orientation, see House *et al*., 2004) and task versus relation-related criteria for partner selection developed by Geringer (1988). We find this distinction particularly useful for the issue we discuss in the paper, and it would be interesting to be empirically examined.

In research and practice, cultural and communicative interaction may encompass both organizational and national cultures. It may capture the dynamic interrelationships and interactions

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between (1) different managerial assumptions developed through different cultures (swift and/or institutional trust evident in Western organizations vs. strong personal tie and long-term trust important for Chinese organizations); (2) management approaches, systems or management know-how embedded and practiced dominantly in one but not the other type of organization or business environment (performance efficiency emphasized in Western management systems vs. group harmony stressed by Chinese management); and (3) pervasive and long-standing cultural models such as *guanxi* (*interpersonal* connections or informal social networking in China) and *face* which may have a profound influence on managerial and organizational behavior and knowledge management and innovation activities (see also Buckley *et al*., 2005, 2006).

THE CREATION OF NEW KNOWLEDGE AND CAPABILITIES

In strategic management, dynamic capabilities (DCs) are defined as ''the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments'' (Teece *et al*., 1997: 516). This implies that the dynamic capability view (DCV) seeks to provide a coherent framework which can both integrate existing conceptual and empirical knowledge and facilitate prescription. DCs are often described in terms of ''the firm's processes that use resources''. Some of them are *routines to learn routines*, while other DCs are more related to *the gain and release of resources*, which include knowledge creation activities whereby managers and others build new thinking within the firm. They are thus defined as ''the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die'' (Eisenhardt and Martin, 2000: 1107). DCs are not ordinary or ''zero-level'' capabilities that just permit a firm to ''make a living'' in the short term, they are those that operate ''to extend, modify, or create ordinary capabilities'' (Winter, 2003: 991).

DCs have been considered the major source for creating new knowledge and capabilities in dynamic markets (Eisenhardt and Martin, 2000; Teece *et al*., 1997; Teece, 2007). On the other hand, the creation of DCs is based on a broad knowledge base, high-level learning and various knowledge exploration and exploitation activities (Bergman *et al*., 2004; Jantunen, 2005; Marcus and Naveh, 2005; Nielsen, 2006; Sherif, 2006; Verona and Ravasi, 2003; Volberda and van Bosch, 2005). The DCV considers the firm essentially as a knowledge creating, upgrading, and applying entity. To be able to recognize changes in the environment, to sense even the weak signals, and to utilize opportunities, firms make use of processes for acquiring information, assimilating it into their organizational knowledge base, and acting on the knowledge gained (Bergman *et al*., 2004; Jantunen, 2005). Thus, an interactive and interdependent relation between the creation of new knowledge and DCs could be assumed and pursued.

Previous literature has identified several sources and processes for the creation of DCs. They include resource creation, coordination, entrepreneurship, and asset selection and orchestration (Teece, 2007), deliberate learning in terms of knowledge codification activities (Zolla and Winter, 2002), social capital emphasizing the role of central actors (Blyler and Coff, 2003). Teece (2007) has identified several basic sources for developing the firm's DCs. They include *coordination*, *entrepreneurship,* and *asset selection capabilities*. This means, firstly, that routine processes and resource coordination are an essential element of DCs. Secondly, a far more important source of DCs lies in the entrepreneurship—the ability of managers not just to sense the changing market and technological opportunities, but to seize them through effectuating *new combinations*. According to Teece, this is where entrepreneurial aspects of management come into play and where the distinctive transactional competence of the firm meets knowledge/skill competences. Thirdly, the asset selection capabilities are not macro or cross-industrial in nature. They are *situational*. For instance, a management's decision to invest in complementary assets typically involves decisions whether to invest in a greater or lesser degree, namely, they do not implicate the choice of industry. The asset selection component in managerial decisions is also where real option considerations come into play. The value of an asset is not just its current cash flow, but also its option value often based on waiting, i.e., on learning and decreasing uncertainty (Kyläheiko *et al*., 2002).

Even though Teece has highlighted the issue of basic *sources* for developing the firm's DCs, there is still no clear explanation of how they really evolve in time. Zollo and Winter (2002) propose that DCs emerge from the co-evolution of three learning mechanisms: *tacit experience accumulation processes* with *explicit knowledge articulation* and *codification activities*. They have emphasized the point that DCs are structured and persistent, routine-using organizational activities implying strong path dependencies. Thus, DCs take time and money to evolve, and their evolvement benefits from a deliberate learning

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approach (Zollo and Winter, 2002), where operational routines and the associated capability development are intervened in from a strategic point of view (see also Antonacopoulou, 2005). Whether DCs are created or not depends on *the costs and benefits of the investments* relative to ad hoc problem solving (Winter, 2003). The emphasis on deliberate learning draws our attention to the very nature of intervention-based workplace learning as a means for a more systematic and comprehensive way of analyzing capability development in organizations.

Perhaps also in this sense, Blyler and Coff (2003) drew an explicit link between social capital and dynamic capitals, arguing that social capital is essential for the acquisition, integration, and release of resources at the core of a dynamic capability. Social capital might play a key role particularly when firms compete in dynamic environments and in ambiguous social and business settings where individual contributions are hard to observe. They also drew our attention to look for hidden rent which is often neglected in conventional performance measures, but strongly associated with appropriation in firms that rely heavily on social networks such as those with dynamic capabilities. Following Porters, the authors adopt an individual-level definition of social capital as it is ''the ability of actors to secure benefits by virtue of membership in social networks'' (pp. 678–679). By this, they assume central individuals as ''a key source of nimbleness at the heart of a dynamic capability'' (p. 683). One important reason behind this assumption is that top management will need ties with central individuals in order to assure the timeliness of their information and to convey the directives to redeploy resources.

An emerging trend out of the mainstream DC literature is the criticism of the ignorance of humanistic processes and workers' work ideology in capability development (Volberda and van Bosch, 2005; Wooten and Crane, 2004). Wooten and Crane (2004) argue that work ideologies have a significant role in generating DCs. In their view, strategic management research overlooks dynamic capabilities generated from the humanistic side of organizational life, such as relationships, compassions, virtuous actions, and honorable behavior. For them, to create a humanistic work ideology (e.g., passion for their work, egalitarian management styles, and resiliency with confronting adversity) is to generate DCs. Caring about individuals and valuing social relationships is the core of their theorizing and DC modeling. Volberda and van Bosch (2005) believe that developing dynamic capabilities is not exclusively the role of the manager. In their view, while managers play a dominant role in this process in many situations, every employee participates and makes his or her contribution. Therefore, a shared ideology can help facilitate capability development among various parts or subcultures of the company by specifying broad, tacitly understood rules.

It seems that the emphasis on the significant role of social capital and humanistic work ideology in generating DCs is new in DC and strategic management literature. We have, however, seen that the effects they have on DCs are not static but occur through dynamic processes and interactions. DCs are generated not only through macro–micro social and political interaction (Antonacopoulou, 2005), but also through communicative and cultural interactions within organizations and practiced in organizations' daily routines and activities. Moreover, the emphasis on both formal (deliberate learning and knowledge codification) and informal (humanistic work ideology and processes) aspects implies that in order to understand entirely the creation of new knowledge and capabilities, the micro level socio-cultural structures and processes should be taken into account more fully than the previous literature on dynamic capabilities has done.

CONCLUDING REMARKS

As reviewed in our paper, organizations should not be seen as unified cognitive systems in which totally controlled rules and regulations are set by the top management, but as locations of continuous negotiations and re-interpretations between conflicting voices and cultures. We argue that DCs are not confined to top management skills and activities, but are co-constructed by organizational practitioners and their active participation, facilitating artifacts (e.g., Bergman *et al*., 2006), routines and learning activities. Other studies have also shown that successful continuous innovation, renewal and learning require that development activities are conducted at all levels of the organization, and are not solely the business at the managerial level (e.g. Bessant *et al*., 2002; Leonard-Barton, 1995; Weick and Sutcliffe, 2001). Front-line employees have important tacit knowledge and expertise on work-related issues, and can significantly add to the collective knowledge base of the organization if managed in an optimally enabling manner. In sum, the development of DCs, efficient work performance and innovation activities demand intensive and multi-dimensional cultural and communicative interaction within the firm and between the firm and its environment.

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In today's emerging and rapidly changing markets, the development of new knowledge and dynamic capabilities becomes particularly crucial for business success. Like in China, in a vast sea of change, rapid economic development, great amount of uncertainties, and irregularly evolving markets, there are rarely any just-fit-in business models or so-called best practices to follow. The biggest learning challenge is to learn what is actually not yet available there, and particularly in this type of organizational learning, conflicts and tensions arise from diverse mental and cultural models and activity systems (e.g., modern practices and networking vs. traditional structures, Western vs. Chinese value systems, rule-based governance vs. strong personal reinforcement). We believe that intensive communication, cultural interaction and creative dialogue, in terms of the resolution of such conflicts and tensions, may give rise to the creation of new knowledge and dynamic capabilities.

REFERENCES

Antonacopoulou EP. 2005. Micro-foundations of strategic learning: Strategizing as practicing. Paper presented at *the Micro-foundations of Organizational Capabilities & Knowledge Processes Conference* December 1–2, Copenhagen.

Beamer L. 1998. Bridging business cultures. *The China Business Review* May-June: 54–58.

Bergman J, Jantunen A, Saksa JM. 2004. Managing knowledge creation and sharing—scenarios and dynamic capabilities in inter-industrial knowledge networks. *Journal of Knowledge Management* **18**(6): 63–76.

Bergman J, Viljainen S, Kässi T, Partanen J, Laaksonen P. 2006. Managing the exploration of new operational and strategic activities using the scenario method—assessing future capabilities in the field of electricity distribution industry. *International Journal of Production Economics* **104**(1): 46–61.

Bessant J, Knowles D, Briffa G, Francis D. 2002. Developing the agile enterprise. *International Journal of Technology Management* **24**: 484–498.

Blyler M, Coff RW. 2003. Dynamic capabilities, social capital, and rent appropriation: ties that split pies. *Strategic Management Journal* **24**: 677–686.

Boisot M, Child J. 1996. From fiefs to clans and network capitalism: explaining China's emerging economic order. *Administrative Science Quarterly* **41**: 600–628.

Boyle DP. 1999. The road less traveled: cross-cultural, international experiential learning. *International Social Work* **42**(2): 201–214.

Buckley PJ, Carter MJ, Clegg J, Tan H. 2005. Language and social knowledge in foreign-knowledge transfer to China. *International Studies of Management & Organization* **35**(1): 47–65.

Buckley PJ, Clegg J, Tan H. 2006. Cultural awareness in knowledge transfer to China—the role of *guanxi* and *mianzi*. *Journal of World Business* **41**: 275–288.

Burrows GR, Drummond DL, Martinsons MG. 2005. Knowledge management in China. *Communications of the ACM* **48**(4): 73–76.

Child J. 1994. *Management in China During the Age of Reform*. Cambridge University Press: Cambridge.

Cook SDN, Yanow D. 1993. Culture and organizational learning. *Journal of Management Inquiry* **2**: 373–390.

Craig CS, Douglas SP. 2006. Beyond national culture: implications of cultural dynamics for consumer research. *International Marketing Review* **23**(3): 322–342.

D'Andrade R, Strauss C. 1992. *Human Motives and Cultural Models*. Cambridge University Press: Cambridge.

Eisenhardt KM, Martin JA. 2000. Dynamic capabilities: what are they? *Strategic Management Journal* **21**: 1105–1121.

Ferdinand J, Graca M, Antonacopoulou E, Easterby-Smith M. 2004. Dynamic capability: tracking the development of a concept. Adjudged as the best paper at *the Fifth European Conference on Organizational Knowledge, Learning and Capabilities*, April 2–3 Innsbruck.

Florida R. 2002. *The Rise of the Creative Class*. Basic Books: New York.

Geringer JM. 1988. Partner selection criteria for developed country joint ventures. *Business Quarterly* **53**(1): 55–62.

Hasu M, Helle M, Kerosuo H. 2005. Ethnography in expansion—emergent trends and future challenges. Paper presented at *the First ISCA Congress*, Seville 20–24 September.

Hermans HJM, Kempen HJG. 1998. Moving cultures: the perilous problems of cultural dichotomies in a globalizing society. *American Psychologist* **53**(10): 1111–1120.

Hong JZ, Engeström Y. 2004. Changing communication principles between Chinese managers and workers: confucian authority chains and *guanxi* as social networking. *Management Communication Quarterly* **17**: 552–585.

House RJ, *et al*. 2004. *Culture, Leadership, and Organizations: The GLOBE Study of 62 Societies*. Sage: Beverly Hills, California.

Jantunen A. 2005. Dynamic Capabilities and Firm Performance; Acta Universitatis Lappeenrantaensis, 221, Lappeenranta University of Technology.

Khavul S, Bruton GD, Zheng CC, Wood E. 2007. Learning during and after internationalization by entrepreneurial firms from emerging economies. *Academy of Management Proceedings* 1–6.

Kyläheiko K, Sandström J, Virkkunen V. 2002. Dynamic capability view in terms of real options. *International Journal of Production Economics* **80**: 65–83.

Leonard-Barton D. 1995. *Wellsprings of Knowledge: Building and Sustaining the Sources of Innovation*. Harvard Business School Press: Boston.

Marcus A, Naveh E. 2005. How a new rule is adjusted to context: knowledge creation following the implementation of the ISO 9000 quality standard. *International Journal of Organizational Analysis* **132**: 106–126.

Martinsons MG, Westwood RI. 1997. Management information systems in the Chinese business culture: an explanatory theory. *Information and Management* **32**: 215–228.

Nielsen AP. 2006. Understanding dynamic capabilities through knowledge management. *Journal of Knowledge Management* **10**(4): 59–71.

Nonaka I, Takeuchi H. 1995. *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press: New York.

Pettigrew A. 1979. On studying organizational cultures. *Administrative Science Quarterly* **24**: 570–581.

Pillania RK. 2005. New knowledge creation scenario in India industry. *Global Journal of Flexible Systems Management* **6**(3–4): 49–57.

Pillania RK. 2006. Leveraging knowledge for sustainable competitiveness in SMEs. *International Journal of Globalisation and Small Business* **1**(4): 393–406.
Pillania RK. 2007. Leveraging which knowledge in the globalization era? Indian facet. *The Learning Organization* **14**(4): 313–320.
Pöyhönen/Kianto A. 2004. Modeling and Measuring Organizational Renewal Capability; Acta Universitatis Lappeenrantaensis, 200, Lappeenranta University of Technology.
Ramasamy B, Goh KW, Yeung MCH. 2006. Is guanxi (relationship) a bridge to knowledge transfer? *Journal of Business Research* **59**: 130–139.
Sackmann SA. 1991. *Cultural Knowledge in Organizations: Exploring the Collective Mind*. Sage: Newbury Park.
Sherif K. 2006. An adaptive strategy for managing knowledge in organizations. *Journal of Knowledge Management* **10**(4): 72–80.
Teece DJ. 2007. Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal* **28**: 1319–1350.
Teece DJ, Pisano G, Shuen A. 1997. Dynamic capabilities and strategic management. *Strategic Management Journal* **18**: 509–533.
Verona G, Ravasi D. 2003. Unbundling dynamic capabilities: an exploratory study of continuous product innovation. *Industrial and Corporate Change* **12**(3): 577–606.
Volberda H, van Bosch FAJ. 2005. Why management matters most? *European Business Forum* **22**: 36–41.
Wartofsky M. 1979. *Models: Representation and Scientific Understanding*. Reidel: Dordrecht.
Weick K, Sutcliffe K. 2001. *Managing the Unexpected. Assuring High Performance in an Age of Complexity*. Wiley: San Francisco.
Weir D, Hutchings K. 2005. Cultural embeddedness and contextual constraints: knowledge sharing in Chinese and Arab cultures. *Knowledge and Process Management* **12**(2): 89–98.
Winter SG. 2003. Understanding dynamic capabilities. *Strategic Management Journal* **24**: 991–995.
Wooten LP, Crane P. 2004. Generating dynamic capabilities through a humanistic work ideology. *The American Behavioral Scientist* **47**(6): 848–866.
Worm V. 1997. *Vikings and Mandarins: Sino-Scandinavian Business Cooperation in Cross-cultural Settings*. Handelshøjskolens Forlag: Copenhagen.
Zhou KZ, Li CB. 2007. How does strategic orientation matter in Chinese firms? *Asia Pacific Journal of Management* **24**(4): 447–466.
Zollo M, Winter SG. 2002. Deliberate learning and the evolution of dynamic capabilities. *Organization Science* **13**: 339–351.

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Publication 2

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Cultural Implications of Collaborative Knowledge Interaction
对联知及合作创新中文化启示及作用的研究

Jianzhong Janne Hong
The School of Business at Lappeenranta University of Technology, FINLAND
jhong@lut.fi

The paper explores the cultural implications of collaborative knowledge interaction in a broad organizational and networking context. It reviews mainly two bodies of literature on cross-cultural research and knowledge management (KM), focusing on the discovery of cultural mechanisms underlying collaborative knowledge creation and innovation. The objective of the paper is to examine the relevant studies in terms of culture and activity and to gain a broad understanding for the next step into empirical exploration on the pursued topic.

In organizational and business studies, cultural issues on knowledge interaction have mostly been touched upon in relation to knowledge transfer (KT), which is, however, only one form of knowledge interaction. In light of mutual learning and collaborative knowledge creation theorizing based on cultural-historical activity theory (Engeström 1987; Engeström et al. 1999; John-Steiner 2000; Lave 2008; Lave & Wenger 1991; Scribner 1985), the argument here is that the role of culture is most evident in more interactive and collaborative forms of knowledge interaction such as knowledge integration and knowledge co-creation compared with technology and knowledge transfer. Thus, in future research much more attention needs to be paid to collaborative knowledge creation and its underlying cultural mechanisms.

The paper begins with a review of the study of culture and the clarification of the knowledge interaction concept and its approaches in KM. This is followed by an introduction and analysis of studies, which are thought to be the most relevant to the issues under examination in this study. Both the limitations of existent studies and implications for future research will be suggested and discussed at the end of the paper.

The Study of Culture

The impact of the culture on organizational behavior, management and business operations has been well acknowledged, while the study of culture is challenging due to its pervasive and complex nature and the increase of *multiculturalism* in today's globalizing businesses, organizations and societies (Craig & Douglas 2006). The first challenge is to define what the culture is, namely, its conceptualization and operationalization in research. There are numerous definitions in cultural studies. Some have defined culture in terms of the *shared values, beliefs, assumptions* (e.g., Sackmann 1991; Schein 1985), whereas others emphasize more the *material culture and artefacts* and the role of *language and communication* that shape and guide social systems, group relations and collaborative activities and processes (Craig & Douglas 2006; Sojka & Tansuhaj 1995; Wartofsky 1979).

New cross-cultural research considers culture not only as a multi-layered but also a multi-level construct, which consists of various levels nested within each other from the highest macro-level of a global culture, through national cultures, organizational cultures and group cultures to cultural values that are represented in the self at the individual level (Leung et al.

2005). This view places a special emphasis on the intersection of these aggregate levels and the factors that facilitate cultural change (see Craig & Douglas 2006). Multi-level cultural influences become more and more evident in organizations and societies. Most research addresses the culture primarily at the levels of a national or societal culture and organizational culture. In order to take an in-depth look, the study of culture at the functional or subunit/group level is necessary.

The national culture, also known as national character, has been referred to as ”the pattern of enduring personality characteristics found among the populations of nations” (Clark 1990: 66). People are believed to acquire such patterns of thinking, feeling and acting, starting in early childhood and continuing throughout their life (King 2007). Geert Hofstede (1980; 1997) has done pioneering work in the 1980s by developing a model to describe the national culture. For Hofstede, the most distinctive dimension between cultures is *individualism* versus *collectivism*. This emphasizes what kind of relation an individual has to the society’s collectivity he/she is living in. In addition to this, other cultural dimensions developed by Hofstede include *power distance*, *uncertainty avoidance* and *masculinity*. An emerging cultural dimension of *Confucianism* reflects a dynamic, future-oriented mentality, which the authors believe is more associated with the East Asian economic growth (Hofstede & Bond 1988). Subsequent to Hofstede, other works introduced, for instance, new cultural dimensions of values (Schwartz 1994) and GLOBE’s nine cultural dimensions (GLOBE is the acronym for Global Leadership and Organizational Behavior Effectiveness, House et al. 2004). Schwartz’s values may have the potential to explain greater cultural variation than Hofstede’s values (Ng et al. 2006), and the GLOBAL project adds two novel dimensions to Hofstede’s insights: performance orientation and humane orientation, which seem to be meaningful (Leung et al. 2005).

Meyerson and Martin (1987) draw a distinction in their discussion of the *integration* and *differentiation* perspectives of the organizational culture. The integrationist views of the organizational culture propose that a single unified culture exists in an organization (King 2007). It is characterized by consistency across individuals and units in terms of the elements of culture including assumptions, values and artefacts as reviewed. The proponents of the differentiation perspective on culture view the organizational culture as a mix of local cultures, each with their own assumptions, values and artefacts. These *organizational subcultures* may reflect the organizational structure, professional occupations, task assignments, ethnic values, rank in the hierarchy, or technologies used (Bloor & Dawson 1994). Shared assumptions typically form around the functional units of the organization, and could therefore be termed as *functional cultures*. They are often based on members’ similar educational backgrounds or similar organizational experiences (Schein 1996). Rose (1988) notes that the differentiation perspective of the organizational culture may be more realistic particularly in large complex organizations where changes are evident.

The significance of culture to an organization has increasingly been understood as dynamic processes rather than static imposing structures (Pettigrew 1979; Sackmann 1991; Hong & Engeström 2004; Hasu et al. 2005). Furthermore, the accelerating process of globalization, radical social and economic transformation and the increasing interconnections between cultures involve an unprecedented challenge to academic mainstream conceptions, which continue to work in a tradition of cultural dichotomies (Craig & Douglas 2006; Hermans & Kempen 1998). There are some illuminating studies that shed light on a number of interesting areas of research such as the rise of the creative class in the U.S. resulting from an underlying

culture that is open-minded and diverse (Florida 2002), the construction of a new mode of thought relying on and thriving with collaboration (John-Steiner 2000), positive values of cultural diversity for constructing knowledge base and learning (Boyle 1999), and mutual adjustment and learning in joint ventures operating in China (Child 1994). This has put learning and knowledge creation in a situation in which learning is not aimed at adapting a mainstream culture, but it is rather learning from each other or even from the culture with opposing values so that a third and new culture could possibly be generated (cf. Hong et al., 2008). The above studies on moving cultures and cultural interaction indicate that cultural diversity is not something negative but rather a powerful source for creating new knowledge and a culture.

The Term of Knowledge Interaction

Knowledge interaction is often a term freely used in research literature without any definitions or discussion. In most of such cases, it has just been taken or used, implying somehow a kind of knowledge exchange between two or more knowledge bodies which might be complementary (e.g., Bukh & Johanson 2003). In a more serious sense, knowledge interaction has been used in several research areas. It can be seen, for instance, from university-industry (U-I) collaboration studies (Fukugava 2005; Santoro & Gopalakrishnan 2000; Schartinger 2002), the design of a new communication medium (Nishida 2000, 2002) and the study on channel policy (Kubota & Nishida 2003).

Complementarity is one of the driving forces of creative partnerships (John-Steiner 2000). For U-I collaboration, complementary knowledge interaction increasingly serves as a key driver (Lin 2005; Santoro & Gopalakrishnan 2000). In a study by Schartinger et al. (2002), the term knowledge interaction is used to describe all types of direct and indirect, personal and non-personal interaction between organizations and/or individuals from the firm side and the university side, directed at the exchange of knowledge within innovation processes. This is perhaps the best effort so far in seeing knowledge interaction as a research concept. Drawing from their U-I study in Austria, Schartinger et al. identify sixteen types of knowledge interaction, which can be categorized into four major knowledge interaction models. The models can also be seen in an elaboration by Perkmann and Walsh (2006). They are i) joint research (including joint publishing), ii) contract research (including consulting, financing of public research organization research assistants by firms), iii) mobility (staff movement between universities and firms, joint supervision of students) and iv) training (co-operation in education, training of firm staff at universities, lecturing by industry staff). Some types of knowledge interaction are highly active or more intensified than others. Fukugawa (2005) studies the characteristics of knowledge interaction in terms of the firm size and concludes that university-based scientists with high research potential are linked with large firms in broad areas through highly interactive spillover channels such as joint research, whereas university-based scientists with low research potential are linked with small firms through less interactive spillover channels such as technical consultation.

In the design of a new communication medium, Nishida (2000, 2002) defines dynamic knowledge interaction as interaction that brings about mutual understanding and evolution in a community. In a similar vein, Kubota and Nishida (2003) adopt the term of strategic knowledge interaction to design a knowledge channel model and discuss channel policy that represents user intention of interacting with streaming contents. In this paper knowledge interaction is defined as an interactive knowledge relationship, process or activity that

attempts to facilitate the exchange of knowledge for mutual learning and collaborative knowledge creation. It refers to multi-level knowledge interaction between individuals, project teams, organizations and various thought communities in terms of John-Steiner (2000).

Three approaches to collaborative knowledge interaction can be identified, among which *the intensity of knowledge interaction* substantially increases from 1) technology and knowledge transfer, to 2) knowledge integration and to 3) collaborative knowledge creation (Hong et al. 2007). In simple terms, *technology and knowledge transfer (TKT)* is the communication of technology and knowledge from one agent to another (Hedlund & Nonaka 1993). The one that provides the needed knowledge is the knowledge supplier, and the one that gets the knowledge is the knowledge recipient. KT is not equal to technology transfer; it implies a broader, more inclusive construct that is directed more toward understanding the "whys" for change. Technology transfer is a narrower and more targeted construct that usually embodies certain tools for changing the environment (Gopalakrishnan & Santoro 2004). Davenport and Prusak (1998) argued that the KT process consists of transformation absorption, culminating in a behavioral change by the recipient firm. Typical TKT practices include the transfer of techniques and technologies from one location to another, the commercialization of an innovation (e.g. licensing), or hiring new graduate and young talents from collaboration universities. In this line of research, it would be interesting, for instance, to study the recruiting of graduate students in addition to the conventional focus on patent and paper studies (Agrawal 2001).

Knowledge integration (KI) emphasizes the process of integrating and transforming the acquired knowledge for the firm's specific use of that knowledge according to situations and needs in a quite tailored way. Comparatively, integrating knowledge takes less time in the learning process than transferring knowledge, if within the same organization, but will take more time when across organizational boundaries. Given the assumption about the characteristics of knowledge and the knowledge requirements of production, the firm is conceptualized as an institution for integrating knowledge (Grant 1996). One example of KI could be that firms request technical and management consultation from university-based scientists. These consultants provide solutions, but seldom know what afterwards happens in the firm. Knowledge interaction may take very different shapes at early versus later stages. At an early stage, there are much more face-to-face contacts and personal interaction involved, which is not the case at a later stage when everything happens internally only within the recipient organization.

Collaborative knowledge creation (CKC) refers to a situation in which two or more partners come and work together to create new information and knowledge possible to be used for the benefit of both sides to provide potential for their future innovation and development. The focus of CKC is on creating and developing new knowledge. In CKC, we consider common understanding through discussion for the shared vision to be essential. One common practice in U-I collaboration is related to joint research projects or collaborative educational or training programs in which experts from both the universities and firms are actively involved in the whole process of projects or programs. CKC is the key concept underlying collaborative innovation (Hermans & Castiaux 2007; Hong et al. 2007; Nonaka & Takeuchi 1995; Nonaka 2007; Popadiuk & Choo 2006).

The studies on knowledge creation in U-I collaborative research projects seem to represent an emerging line of research (Hermans & Castiaux 2007**;** Johnson & Johnson 2004), which expands the theorizing context of Nonaka and Takeuchi (1995) from within an organization to a wider U-I context. As Nonaka et al. (2000: 30) themselves note: "For the immediate future, it will be important to examine how companies, governments and universities can work together to make knowledge creation possible." The knowledge creation theory and concepts of Nonaka et al. are also applied or discussed in a number of other U-I studies (Gustavs & Clegg 2005; Hansson 2007; Heikkinen et al. 2007). In this line of research, it is worth noting that knowledge creation in Nonaka and Takeuchi's terms is different from what is here understood as CKC: Knowledge creation in their terms would be more similar to KI in this paper's conceptualization. This is because Nonaka and Takeuchi regard knowledge conversion (between tacit to explicit knowledge) as knowledge creation, whereas this paper sees the creation of new knowledge as not a matter of conversion, but created to form a new and qualitatively different form. Moreover, the identified knowledge interaction strategies and approaches are often mixed. Some can be categorized into KT, and others into KI and/or CKC. In practice and in many cases, the boundary of the three knowledge interaction approaches is blurred and the division is made just in a relative sense and for more analytic purposes.

Knowledge Interaction in Knowledge Management

Knowledge interaction takes different shapes in KM. This is very much subject to what KM we refer to. KM is a relatively new concept in business and management studies. It was originated in the 1990s and has a short history of less than 20 years. During the years, KM research and practice have evolved rapidly and dramatically and so have the related theories and concepts. The evolving process could roughly be reflected in KM generations and related activities which have been proposed and discussed by several authors (Ahonen et al. 2000; Snowden 2002; Tuomi 2002; von Krogh 1999).

Drawing from previous research, Hong and Ståhle (2005) have clarified and identified three KM generations. The first generation KM is for *knowledge identification and capturing*. The management application of information and knowledge databases at the time is typical, which is primarily based on codified and measurable knowledge, skills and competences of individual workers. The second generation KM is for *knowledge sharing and transfer*. Nonaka and Takeuchi (1995), well-known KM founders, bring in the knowledge conversion model from tacit to explicit knowledge, which is a good illustration of the second generation KM theory. The third generation KM is for *knowledge creation and innovation*. Engeström's expansive learning model based on activity theory (Engeström et al. 1999; Engeström 2001) is becoming known in the business and management circles. His model emphasizes mutual learning and collaborative work development of activity-based communities, which may represent the emerging trend of third generation KM.

The three theories of KM or its approaches, identified above, seem to differ significantly from each other in the following respects. First, the major concern or aspect each approach addresses is different, which relates to issues such as how we understand its primary function and what its essence is. Second, interpretations of the nature of knowledge are different in each approach, which touches upon questions such as what constitutes knowledge, what the meaning of knowledge is, and whether or not knowledge is context-free. Third, the

understanding concerning the prime knowledge carriers or people and artefacts involved vary, which has much to do with different understandings of fundamental KM questions such as where knowledge is located or distributed. Fourth, the key tool or method constructed and applied in each approach is different, which concerns the question of how to manage knowledge. Fifth, the temporal considerations vary in terms of the types of knowledge and skills needed at present or in the future.

Since the approaches of the different generations have different focuses in all essential aspects of KM, as summarized above, the dominant disciplinary perspectives and the related concepts that have been or can be applied must be different. For instance, since information technology plays a key role in the early stage, the technological disciplinary perspective naturally dominates research and practice. Given the complex and changing nature of knowledge and KM, the multi-disciplinary perspectives adopted in the third generation of knowledge creation and innovation should be mutually constitutive. In other words, they should incorporate different disciplinary approaches in economics and business, technology, sociology and organization, philosophy and psychology, and much more beyond. The different disciplinary perspectives with their distinctive features in connection with KM generation theories are summarized in Table 1.

Table 1: KM disciplinary perspectives in terms of the three KM generations

	1st Generation(1 G): KM for knowledge identification and capturing	**2nd Generation(2 G): KM for knowledge sharing and transfer**	**3rd Generation(3 G): KM for knowledge creation and innovation**
Dominant disciplinary perspectives (based on Prusak 2001)	technological perspective	sociological & organizational perspective	multi-disciplinary perspectives including the philosophical & psychological, the economic & the business, and beyond
Main KM concern (von Krogh 1999)	identification of existing knowledge	exploitation of existing knowledge	exploration of new knowledge
Nature of knowledge (Ahonen et al. 2000; Blackler 1995; Snowden 2002;)	rational/cognitive; explicit; context-free; embedded, embodied, & embrained	communicative; tacit; situated	interpretative/narrative; situated/intuitive; context-bound; encultured knowledge and collective understanding
Prime knowledge carrier (Ahonen et al 2000; Blackler 1995)	Database, individual brain; individual-knowledge focus	collective/community; group-knowledge focus	system(s)
Key KM tool (Snowden 2002; Tuomi 2002; Tong 2008)	information technology, Web 1.0	social interaction and communication, Web 2.0	self-renewing organization, Web 3.0
Temporal consideration (Ahonen et al. 2000)	skills needed at present	preparing for the challenges of the near future	capacity to create new knowledge needed in the distant future

The differentiation of the three KM generations is relative in its nature. They may exist spontaneously in an organization, have a lot of overlapping with each other and are on the same continuum. What we have normally seen is often the dominant form with its revealing features of its core idea or concepts. They do not have such things as being “good” or “bad”.

The three KM generations are usually in correspondence with the three managerial environments or cultures proposed by Ståhle and Grönroos (2000). In their writing, organizations are described as a three-dimensional operational system in which the presence of all three aspects – mechanical, organic and dynamic - is mandatory for them to achieve success. These business environments can also be called *knowledge environments* because in knowledge-intensive business, the added value is extracted from knowledge.

A mechanical environment generates stability and reliable quality. It is based on a hierarchical top-down management style and strictly defined organizational structures. The management style in the army favors such a system. If it is the established style in companies, everything is likely to be strictly documented. The prevalent knowledge in the environment is explicit and scarce, i.e. formally documented, delivered in a top-down manner and not open for discussion.

An organic environment generates controlled development and sustained growth. It is based on dialogues and an interactive organizational culture, where empowered management and cooperation hold a prominent place. In universities there are plenty of continuous innovations and improvements, even though the management style is still very conservative. In such a system, a remarkable and often very valuable part of knowledge is the tacit knowledge of the personnel, which is delivered and improved through discussions and cooperation.

A dynamic environment generates the ability for organizational self-renewal and innovativeness. Its essential features are uncertainty as well as the difficulty to anticipate and manage the future. Relations and dependencies are very complex; a small change may have a great impact. In order to succeed, the top management has to support continuous change instead of relying on supervision and control. Compared with traditional sectors, the IT industry changes rapidly and unpredictably. In particular, innovation goes fast and knowledge workers are motivated to collaborate in a system like OSSD (open source software development). Here, to support does not mean to control change but rather, to have the ability to take risks as well as have a strong will and the capability to quickly adapt and cooperate under sudden contingencies. Decisions often have to be made based on weak signals as well as intuitive and potential knowledge, where fast, rich and often chaotic flow of information via internal and external networks plays a major role.

The organization is a living instrument for fulfilling the company’s strategy; it is a three-dimensional system capable of choosing purposeful ways to act. Successful management recognizes what kind of operational mode and management culture is appropriate and able to achieve the desired goals. The mechanical organization never meets innovative strategic goals, and the dynamic organization never fulfils the targets set for an effective assembly line. An organization, as a three-dimensional system, always consists of *know-how*, *relationships* and *the flow of information.* All three factors are necessary for effective, value-adding communication in all knowledge environments, even if they are very different by nature, as explained above. Information cannot be enhanced without relationships, and even

the best relationships do not help to add value without the proper competence and knowledge. These elements of communication and development are very differently demonstrated in the three different knowledge environments; they can also act as tools for identifying the organization's potential to meet its strategic targets (see Figure 1).

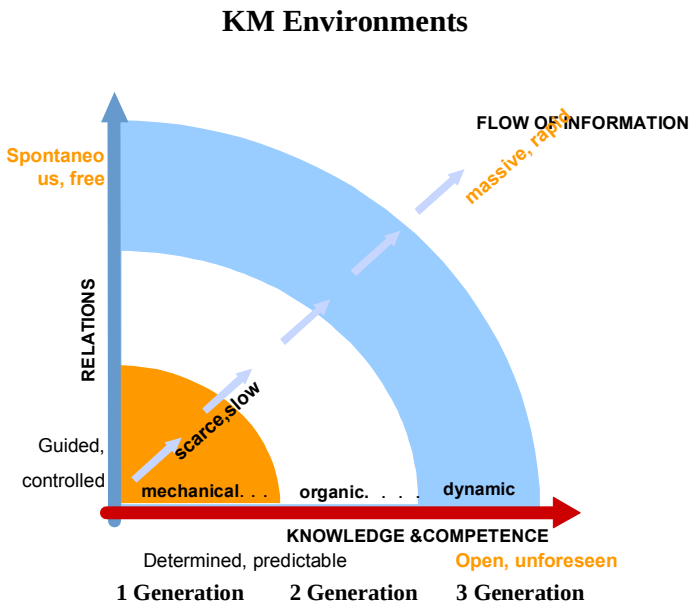

Figure 1: Three KM generations with three knowledge environments (modified from Ståhle & Grönroos 2000)

From Figure 1, it can be understood that different KM generations demand different knowledge environments to support and that KM can be successful only when appropriate KM strategies and activities are carried out in their matched knowledge environments. It can also be seen that the intensity of knowledge interaction varies a lot due to different KM theories and environments. The intensity of knowledge interaction obviously increases from the first to the second and third generation KM.

In the first generation KM, knowledge interaction mainly takes place between human beings and machines. The key KM questions are what kind of knowledge there is in the organization, and how it will be identified and captured. In the second generation KM, knowledge interaction mainly happens between knowledge suppliers and recipients (i.e., from knowledge suppliers to recipients). The key KM question is how useful knowledge will be effectively shared and transferred. In the third generation KM, knowledge interaction is mainly between knowledge partners involved at a more or less equal level, and it is at its most intensive since it requires that both or all the knowledge partners be strongly committed before anything new is produced. The key KM question is how new knowledge will be

created through such commitment and collaboration. The dominant mode of knowledge interaction in different KM generation activities is TKT, KI and CKC, respectively. The intensity of knowledge interaction in different generation KM activities and environments is presented in Table 2, along with its different features and key KM questions.

Table 2: Intensity of knowledge interaction in different generation KM activities and environments

	1st generation KM	**2nd generation KM**	**3rd generation KM**
Interface of knowledge interaction	Between human beings and machines	Between knowledge suppliers and knowledge recipients	Between knowledge partners involved at a more or less equal level
Key KM question(s)	What kind of useful knowledge is there in an organization? How will it be identified and captured?	How will useful knowledge be effectively shared and transferred?	How will useful knowledge be created through such commitment and collaboration?
Mode of knowledge interaction	Technology and knowledge transfer TKT)	Knowledge transfer and knowledge integration (KT & KI)	Collaborative knowledge creation (CKC)
Intensity of knowledge interaction	Low	Medium	High
KM environments	Mechanical	Organic	Dynamic

Cultural Implications

The significance of culture in collaborative knowledge interaction is heavily subject to either cultural or knowledge variables, or to both. Detailed cultural implications can be drawn from the most relevant studies at multi-cultural levels. The impact of the national culture on cross-border KT, for instance, has been under discussion. For Bhagat et al. (2002), *national cultural variations* or transacting cultural patterns in terms of the dimensions of individualism-collectivism and verticalness-horizontalness are identified as the most important factor affecting KT and development across nations. Bhagat et al. assume that different transacting cultural patterns, i.e., vertical individualist, horizontal individualist, vertical collectivist and horizontal collectivist cultures, have a moderating influence on the effectiveness of the cross-border transfer of organizational knowledge.

In discussing the transacting cultural patterns, Bhagat et al. (2002) lay stress on the role of individualism and collectivism, in which they strongly influence the ways of thinking. Specifically, they influence how members of a culture process, interpret and make use of a body of information and knowledge. In essence, people in individualist cultures emphasize explicitness, whereas those in collectivist cultures emphasize tacit information and knowledge. People in individualist cultures prefer knowledge independent of its context, whereas those in collectivist cultures prefer systemic or contextually relevant knowledge. More specifically, a vertical individualist culture (e.g., United States, United Kingdom) has a

clear preference for types of knowledge that is linear (i.e., cause-effect relationships are clearly specified), credible and explicitly logic. It uses "I" more than "we," and puts more emphasis on the content than the context of knowledge. Vertical individualists are more likely to emphasize transfer of knowledge that is explicit and relatively independent of organizational context. A horizontal individualist culture (e.g., Australia, Denmark and Sweden) is self-reliant, and people from this culture do not like those who stick out. They are most comfortable in transferring knowledge that is clearly possible to articulate and organize and logical, and they are likely to pay more attention to the abstract nature of the knowledge and to ignore information concerning hierarchy. In a vertical collectivist culture (e.g., Brazil, China, Egypt, India, Nigeria, Philippines and Venezuela), people are more sensitive to information and clues coming from authorities and to knowledge that includes information on hierarchy. People from a horizontal collectivist culture (e.g., Israel, Japan) focus on giving and taking, think much more interdependently, and explore ideas while emphasizing consensual decision-making. Knowledge that would sustain social harmony would be most effectively utilized in this culture. Europeans learn one thing at a time, whereas the Japanese gain a more comprehensive understanding of the European markets, which enhances their global effectiveness.

Bhagat et al. (2002) conclude that cross-border transfer of organizational knowledge is most effective in terms of both velocity and viscosity when such transfers involve *similar* cultural contexts. In contrast, transfer is least effective when it involves *dissimilar* cultural contexts. In this way they claim a close connection between the effectiveness of cross-border KT and the similarity of cultural contexts: *the farther the cultures are from one another, the more difficult cross-border KT is.* In the same study, the role of knowledge type (simple vs complex, explicit vs tacit, and independent vs systemic) in cross-border KT is discussed at the same time. The significance of cultural influences is subject to the type of knowledge – the more simple, explicit and independent the knowledge is, the easier cross-border KT is.

Buckley et al. (2005; 2006) emphasize the significance of understanding the behavior of people from a different culture in cross-border transfer of organizational knowledge. Buckley et al. (2005) believe that a common language is not sufficient for successful communication and KT within the same multinational corporation (MNC). Social knowledge may also be important for the successful interpretation of language. In a set of four case studies, it was found that KT is more effective when technical and social knowledge are transferred together. Furthermore, rich person-to-person contacts in multinational teams provide an effective means of transferring social knowledge. Here in their study the concept of social knowledge is defined as "knowledge held by individuals, or groups of individuals, that enables them to interpret, understand, and predict the behavior of other individuals and groups" (2005: 49) and corporate social knowledge is differentiated from the organizational culture in a way that they define it "as a tool to interpret, understand and predict the behavior of others" (2005: 49). Thus, it can be expected that the growth of corporate social knowledge precedes the development of a shared organizational culture.

Buckley et al. (2006) examine cultural awareness in KT in China. Cultural awareness is understood as the degree of knowledge about the way of thinking and behaving of people from a different culture. Their research focuses on the role of *Guanxi* and *Mianzi*, which are regarded as the core of the Chinese culture. The authors argue that "given the diversity and complexity of the Chinese business environment, even for explicit knowledge to be transferred and absorbed, cultural barriers have to be removed and good inter-partner

relationships have to be established" (p. 278). Their findings of case studies suggested that foreign investors must be aware of the *Guanxi* and *Mianzi* of the institutions they deal with and better establish institutional connections based on personal connections with local partners and the government. Their research implies that cultural awareness can affect cross-border KT and firm performance.

Also in the Chinese context, Ramasamy et al. (2006) raise an interesting question whether *Guanxi* can serve as a bridge to inter-organizational KT. In their research, *Guanxi* consists of three components: trust, relationship commitment and communication. Their findings from an interview-based survey with Chinese enterprise general managers show that trust and communication are the two main channels of KT. The authors suggest that inter-partner activities tend to be informal in China and so using an informal way (like using *Guanxi*) to transfer knowledge would be more desirable and practical.

Lam (1997) seems to take a bit different tract in examining the impact of the national culture. For him, to understand the nature and organization of knowledge one needs first to understand the work system in which knowledge is formed. He argues that the difficulties in the transfer of knowledge arise not simply from the tacit nature of knowledge itself, but from differences in the degree of tacitness of knowledge and the way in which it is formed, structured and utilized between firms in different countries. The knowledge structure, work system and societal culture are intertwined and cannot be examined separately. As it is expressed in his writing, "… how the nature of knowledge and expertise, its distribution and ownership, and patterns of utilization within the firm are closely interconnected with the way work is organized and coordinated, which in turn is shaped by different societal models of skills formation, labour markets and career systems" (p. 975). Different knowledge structures are likely to be formed in different societal settings or cultures.

Lam's study analyzes the main differences and points of friction between the Japanese organizational and the British professional models of the organization of knowledge in high-level technical work. According to Lam, the contrasts between the Japanese organizational and British professional models are striking. The organizational model emphasizes the flexible and fluid utilization of skills and knowledge. Within this approach, job boundaries tend to be broad and ambiguous, and individuals are likely to undertake a wide range of jobs and duties through job rotation. The diffusion and overlapping nature of knowledge within the organizational model means that knowledge is generated and stored organically in team relationships and the mode of coordination is human-network based. In contrast, the professional model emphasizes individual specialization and job differentiation. Within this approach, job boundaries are clearly delineated and each individual follows a narrow and specialized job path throughout their career. The latter approach encourages individual specialization and ownership of knowledge, in which the dominant mode of coordination and knowledge transmission is document-based.

Often cited as a significant challenge in KM practices is the issue of *organizational culture*. Alavi et al. (2006) believe that there could be either multiple local cultures at work influencing KM practices within a firm, or instead, a single dominant corporate culture driving KM choices, decisions and outcomes. DeLong and Fahey (2000) have identified four ways in which organizational and functional cultures can influence the behaviors central to knowledge creation, sharing and use: 1) the culture – and particularly subcultures – shape assumptions about which knowledge is important; 2) the culture defines the relationships

between organizational and individual knowledge; 3) the culture creates a context for social interaction, and 4) the culture shapes processes for the creation and adoption of new knowledge. Knowledge interaction among organizational members and between the organization and its individual members is therefore implied. The findings of Alevi et al. (2006) highlight the influence of organizational cultural values on the use of KM technologies and the outcomes of such use, implying the cultural influence on the knowledge interaction between human and technology.

The U-I study by Santoro and Gopalakrishnan (2000) is especially interesting. They propose that the more stable and direction-oriented an organization's culture, the greater the institutionalization of KT activities, in other words, the more flexible and change-oriented an organization's culture, the less institutionalized their KT activities are. The key feature of a stable and direction-oriented culture, in the view of Santoro and Gopalakrishnan, is risk-avoiding, preferring stability and status-quo rather than the uncertainty of change. In contrast, flexible and change-oriented cultures encourage risk-taking and always search for new knowledge streams. In their research the institutionalization of KT activities include high factor loading activities like the firm's involvement in curriculum development in relatively low factor loading activities such as the number of personnel exchanges with the university research center.

Schein's research (1996) is one of the few studies that is concerned with functional cultures in terms of organizational learning and knowledge sharing at a team level. In a discussion of the failures of organization learning, Schein (1996) identified three cultures of management and the need of alignment among the three groups. Two of the three cultures are based on occupational communities which have their roots outside the organization and are therefore more fundamentally entrenched in their particular assumptions: 1) the culture of engineers and 2) the culture of executives. The third culture of operators arises in the "line units" of a given organization as it attempts to operate efficiently and safely. For Schein, organizational innovation (e.g., to create new organizational forms & processes) either does not occur or fails primarily because of a lack of alignment among the three cultures of executives, engineers and operators. To create alignment among them is not a case of deciding which one has the right viewpoint, but of creating enough mutual understanding among them to evolve solutions that will be understood and implemented. Schein suggests that we must create such communication by learning how to conduct cross-cultural dialogues.

The above-reviewed studies with their focusing cultural and knowledge-related variable(s) can be seen from Table 3. The table summarizes the relevant studies in the following aspects: the specific level of cultural influences, culture, knowledge interaction and cultural implications. They further address three key questions important for the present study: What does culture mean in each study? What does it mean by collaborative knowledge interaction? And how is culture related to knowledge interaction?

Table 3: Cultural implications of knowledge interaction studies

Studies of Multi-level cultural influences	Culture	Knowledge interaction	Cultural implications
The impact of *national cultural patterns* (Bhagat et al. 2002)	National cultural variations or transacting cultural patterns in terms of the dimensions of individualism-collectivism and verticalness-horizontalness	The cross-border transfer of organizational knowledge across nations	The farther the cultures are from one another, the more difficult cross-border KT is
The significance of knowing the other's behavior from a *foreign culture* (Buckley et al. 2005)	Language and social knowledge	Transfer of knowledge across national borders within multinational enterprises	A common language and the shared social knowledge are necessary to understand and predict the behavior of those engaged in the knowledge transfer process
Cultural awareness of *the host country culture* (Buckley et al. 2006)	Guanxi (personal connections) and Mianzi (social face) as examples of the core of the Chinese culture	Foreign KT to China	Being aware of the host country culture may facilitate effective cross-border KT and firm performance
The role of *the Chinese culture* (Ramasamy et al. 2006)	Guanxi consists of trust, relationship commitment and communication	Inter-organizational KT	Trust and communication are the two main channels of KT
The impact of national or *societal settings* (Lam 1997	National or societal settings in terms of knowledge structure (e.g., the degree of tacitness of knowledge) & work system (e.g., document-based vs human-network-based)	High-technology collaboration and KT in global cooperative ventures	Knowledge structures embedded in work systems in different societal settings have a significant influence on cross-border KT
The impact of *organizational culture* (De Long & Fahey 2000)	Observable cultural elements of values, norms and practices	The behaviors central to knowledge creation, sharing and use within an organization and possibly also between organizations	Four ways are identified in which the organizational culture influences the behaviors central to knowledge creation, sharing and use
The impact of *organizational cultural values* (Alavi et al. 2006)	Organization-wide values (expertise, formalization & innovativeness) and localized values (collaboration and autonomy)	The selection and use of specific KM technologies – human-technology knowledge interaction is implied in terms of patterns of KM tool use	The findings highlight the influence of culture on the use of KM technologies and the outcomes of such use
The impact of *organizational cultural traits* (Santoro & Gopalakrishnan 2000)	Cultural traits of an organization *(*stable & direction-oriented vs flexible & change-oriented)	U-I KT activates and their institutionalization efforts	A stable and direction-oriented culture facilitates effective institutionalization of KT activities
The alignment of different *professional or functional cultures* (Schein 1996)	The three cultures of executives, engineers and operators	Organizational learning and knowledge interaction at a team level across functional units	Cross-cultural dialogues are important for organizational learning and innovation across functional units

In the studies reviewed above, TKT has obviously been the most researched one. Other forms identified as interactive, KI and CKC seem neglected although they differ substantially from the TKT type of knowledge interaction in organizational partnerships. Particularly in CKC, knowledge is not something given but constantly modified, integrated and constructed in collaboration between the parties, and thus requires the strongest involvement and commitment from both or more collaborative parties. In this regard, the role of culture is most significant there. Thus, the significance of cultural influences may differ due to different modes of knowledge interaction, and *it may accumulate with the increasing intensity of knowledge interaction* from TKT, to KI and CKC. In a future study, it would be interesting to test this proposition empirically. It is noteworthy to add that much more attention needs to be paid to CKC and its underlying cultural mechanisms.

With this connection, the choice of studying MNCs and their subsidiaries is particularly relevant and desirous. As Almeida and Phene (2004) write, "the focus on subsidiaries is especially interesting since they are simultaneously embedded in two knowledge contexts: (a) the internal multinational corporation (MNC) comprised the headquarters and other subsidiaries; and (b) an external environment of regional or host country firms" (p. 847). Moreover, MNCs are considered social communities which are better able to transfer organizational knowledge (Kogut & Zander 1993). The value of knowledge interaction in MNCs can also be high because foreign markets often provide access to new ideas and stimuli that can be subsequently applied in other countries (Hedlund 1986; Bartlett & Ghoshal 1989). Nevertheless, the failure of MNCs in cross-border KT, as Kogut and Zander note, is not out of the markets for buying and selling of knowledge, but out of its superior efficiency as an organizational unit by which to transfer this knowledge across borders. The knowledge flows of MNCs and cross-border knowledge interaction as a challenge have been studied vertically between the parent company and its subsidiaries (Gupta & Govindarajan 2000; Michailova & Nielsen 2006), and horizontally among peer subsidiaries (Kohlbacher & Krähe 2007; Lucas 2006) and subsidiaries' collaboration with local organizations (Almeida & Phene 2004; Andersson et al. 2005; Johnston & Paladino 2007). In MNC studies, the role of the host country culture and local universities in MNC innovation networks, however, seems neglected. In future research, the study of U-I knowledge interaction in the MNC context seems to be promising. As reviewed, Santoro and Gopalakrishnan (2000) have conducted an interesting study on the culture and U-I knowledge interaction, even though it was within a local and similar context (like other U-I studies). Therefore, research in multinational and cross-cultural settings remains an interesting gap. The national or societal culture, for instance, may influence U-I knowledge interaction significantly. Importantly, the study of culture in the context of MNC U-I knowledge interaction activities may provide a work-related and rapidly emerging situation in which detailed information in terms of the efficiency of cross-border knowledge production and development could be explored and utilized in workplace practices. Cultural studies can therefore go one step further in combining work activities rather than merely examine abstract and universal formality.

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References

Agrawal, A. (2001). "University-to-industry knowledge transfer: literature review and unanswered questions", *International Journal of Management Reviews*, 3**,** 4, pp. 285-302.

Ahonen, H., Engeström, Y., & Virkkunen J. (2000). "Knowledge Management - The second generation: Creating competencies within and between work communities in competence laboratory", 282 – 305, in Y. Malhotra (Ed.), *Knowledge Management and Virtual Organizations*, Idea Group Publishing: Hershey & London.

Alavi, M., Kayworth, T.R., and Leidner, D.E. (2006). "An empirical examination of the influence of organizational culture on knowledge management practices", *Journal of Management Information Systems*, 22**,** 3, pp. 191-224.

Almeida, P. & Phene, A. (2004). "Subsidiaries and knowledge creation: the influence of the MNC and host country on innovation", *Strategic Management Journal*, 25, pp. 847-864.

Andersson, U., Björkman, I., & Forsgren, M. (2005). "Managing subsidiary knowledge creation: the effect of control mechnisms on subsidiary local embeddedness", *International Business Review*, 14, pp. 521-538.

Bartlett, C.A. & Ghoshal, S. (1989). *Managing across borders: the transnational solution*, Harvard Business School Press: Boston, MA.

Bhagat, R.S., Kedia, B.L., Harveston, & Triandis, H.C. (2002). "Cultural variation in the cross-border transfer of organizational knowledge: An integrative framework", *Academy of Management Review*, 27**,** 2, pp. 204-221.

Blackler, F. (1995). "Knowledge, knowledge work and organizations: An overview and interpretation", *Organization Studies*, 16, 6, pp. 1021-1046.

Bloor, G. and Dawson, P. (1994). "Understanding professional culture in organizational context", *Organization Studies*, 15**,** 2, pp. 275-295.

Boyle D.P. (1999). "The road less traveled: cross-cultural, international experiential learning", *International Social Work*, 42**,** 2, pp. 201-214.

Buckley, P.J., Carter, M.J., Clegg, J., & Tan, H. (2005). "Language and social knowledge in foreign-knowledge transfer to China", *International Studies of Management & Organization*, 35**,** 1, pp. 47-65.

Buckley, P.J., Clegg, J., & Tan, H. (2006). "Cultural awareness in knowledge transfer to China – The role of *guanxi* and *mianzi*", *Journal of World Business*, 41, pp. 275-288.

Bukh, P.N. & Johanson, U. (2003). "Research and knowledge interaction: guidelines for intellectual capital reporting", *Journal of Intellectual Capital*, 4, 4, pp. 576-587.

Child, J. (994). *Management in China during the Age of Reform*. Cambridge University Press: Cambridge.

Clark, T. (1990). "International marketing and national charater: a review and proposal for an integrative theory", *Journal of Marketing*, pp. 66-79.

Craig C.S. & Douglas S.P. (2006). "Beyond national culture: implications of cultural dynamics for consumer research", *International Marketing Review*, 23**,** 3, pp. 322-342.

Davenport, T.H. & Prusak, L. (1998). *Working Knowledge: How Organizations Manage What They Know*, Harvard Business School Press: Boston, MA.

De Long, D.W. & Fahey, L. (2000). "Diagonosing cultural barriers to knowledge management", *Academy of Management Executive*, 14**,** 4, 113-127.

Engeström, Y. (1987). *Learning by Expanding: An Activity-theoretical Approach to Developmental Research*, Orienta-Konsultit, Helsinki.

Engeström, Y. (2001). "Expansive Learning at Work: toward an activity theoretical reconceptualization", *Journal of Education and Work*, 14, 1, pp. 129-152.

Engeström, Y., Miettinen, R., & Punamäki, R-L (Eds.) (1999). *Perspectives on Activity Theory*, Cambridge University Press: Cambridge.

Florida, R. (2002). *The Rise of the Creative Class*, Basic Books: New York.

Fukugawa, N. (2005). "Characteristics of knowledge interactions between universities and small firms in Japan", *International Small Business Journal*, 23**,** 4, pp. 379-401.

Gopalakrishnan, S. & Santoro, M.D. (2004). "Distinguishing between knowledge transfer and technology transfer activities: The role of key organizational factors", *IEEE Transactions on Engineering Management*, 51**,** 1, pp. 57-69.

Grant, R.M. (1996). "Toward a knowledge-based theory of the firm", *Strategic Management Journal*, 17, pp. 109-122.

Gupta, A. & Govindarajan, V. (2000). "Knowledge flows within MNCs", *Strategic Management Journal*, 21, pp. 473-496.

Gustavs, J. & Clegg, S. (2005). "Working the knowledge games? Universities and corporate organizations in partnership", *Management Learning*, 36**,** 1, pp. 9-30.

Hansson, F. (2007). "Science parks as knowledge organizations – the 'ba' in action?", *European Journal of Innovation Management*, 10**,** 3, pp. 348-366.

Hasu, M., Helle, M., & Kerosuo, H. (2005). "Ethnography in expansion – Emergent trends and future challenges", Paper presented at *the First ISCAR Congress*, Seville 20-24 September.

Hedlund, G. (1986). "The hypermodern MNC – a heterarchy?", *International Studies of Management*, 25, pp. 9-35.

Hedlund, G. & Nonaka, I. (1993). "Models of knowledge management in the West and Japan", in Lorange, P.B. Chakravarthy, J. Roos, and A. van Der Ven (eds.), *Implementing Strategic Processes: Change, Learning and Co-operation*, Blackwell Business: Oxford.

Heikkinen, J., Blomqvist, K., & Hong, J.Z. (2007). "Ba for knowledge creation in Sino-Western University-Industry Collaboration", paper presented in the Conference of *EBRF 2007 - Research Forum to Understand Business in Knowledge Society*, September 25 -27, Agora - Jyväskylä, Finland.

Hermans, J. & Castiaux, A. (2007). "Knowledge creation though university/industry collaborative research projects", *The Electronic Journal of Knowledge Management*, 5**,** 1, pp. 43-54, available online at www.ejkm.com.

Hermans, H.J.M. & Kempen, H.J.G. (1998). "Moving cultures: The perilous problems of cultural dichotomies in a globalizing society", *American Psychologist*, 53**,** 10, pp. 1111-1120.

Hofstede, G. (1980). *Culture's Consequences: International Differences in Work-Related Values*, Sage Publications, Newbury Park.

Hofstede, G. (1997). *Cultures and Organizations: Software of the Mind: Intercultural Cooperation and its Importance for Survival***,** McGraw-Hill, New York.

Hofstede, G. & Bond, M. (1988). "The Confucian Connection: from cultural roots to economic growth", *Organizational Dynamics*, 16**,** 4, pp. 4-21.

Hong, J.Z. & Engeström, Y. (2004). "Changing communication principles between Chinese managers and workers: Confucian authority chains and *guanxi* as social networking", *Management Communication Quarterly*, 17, pp. 552-585.

Hong, J., Heikkinen, J., & Niemi, M. (2007). "Collaborative knowledge creation and innovation between MNCs and Chinese universities", *Proceedings of the 8th European Conference on Knowledge Management* (Consorci Escola Industrial de Barcelona Spain September 6-7), pp. 486-491.

Hong, J. Z., Kianto, A. and Kyläheiko, K (2008). "Moving cultures and the creation of new knowledge and dynamic capabilities in emerging markets", *Knowledge and Process Management*, 15, 3, pp. 196-202.

Hong, J.Z. & Ståhle, P. (2005). "The co-evolution of Knowledge and competence management", *International Journal of Management Concepts and Philosophy*, 1,2, pp. 129-145.

House, R.J. et al. (2004). *Culture, Leadership, and Organizations: The GLOBE Study of 62 Societies*, Sage: Beverly Hills, CA.

John-Steiner, V. (2000). *Creative Collaboration*, Oxford University Press, New York.

Johnson, W.H.A. & Johnson, D.A. (2004). "Organisational knowledge creating processes and the performance of university-industry collaborative projects", *International Journal of Technology Management*, 27, 1, pp. 93-114.

Johnston, S. & Paladino, A. (2007). "Knowledge management and involvement in innovations in MNC subsidiaries", *Management International review*, 47, 2, pp. 281-302.

King, W.R. (2007). "A research agenda for the relationships between culture and knowledge management", *Knowledge and Process Management*, 14, 3, pp. 226-236.

Kogut, B. & Zander, U. (1993). "Knowledge of the firm and the evolutionary theory of the multinational corporation", *Journal of International Business Studies*, 24, 4, pp. 625-645.

Kohlbacher, F. & Krähe, M.O.B. (2007). "knowledge creation and transfer in a cross-cultural conctext – empirical evidence from Tyco Flow Control", *Knowledge and Process Management*, 14, 3, pp. 169-181.

Kubota, H. & Nishida, T. (2003). "Channel design for strategic knowledge interaction", in Proceedings KES 2003, pp. 1037-1043.

Lam, A. (1997). "Embedded Firms, Embedded Knowledge: Problems of Collaboration and Knowledge Transfer in Global Cooperative Ventures", *Organization Studies*, 18, 6, pp. 973–996.

Lave, J. (2008). *Apprenticeship in Critical Ethnographic Practice*, University of Chicago Press.

Lave, J. & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*, Cambridge University Press: Cambridge.

Leung, K., Bhagat, R.S., Buchan, N.R., Erez, M., & Gibson, C.B. (2005). "Culture and international business: recent advances and their implications for future research", *Journal of International Business Studies*, 36, pp. 357-378.

Lin, L. (2005). *Study on the University-Enterprise Knowledge Alliance Based on the Theory of Knowledge Activity System*, Doctoral dissertation, Dalian University of Technology (in Chinese).

Lucas, L. 2006). "The role of culture on knowledge transfer: The case of the multinational corporation", *The Learning Organization*, 13, 3, pp. 257-275.

Meyerson, D. & Martin, J. (1987). "Cultural change: an integration of three different views", *Journal of Management studies*, 24, 6, pp. 623-647.

Michailova, S. and Nielsen, B. (2006). "MNCs and knowledge management: a typology and key features", *Journal of Knowledge Management*, 10**,** 1, pp. 44-54.

Nishida, T. (Ed.) (2000). *Dynamic Knowledge Interaction*, RCR Press, Boca Ranton, FL.

Nishida, T. (2002). "A traveling conversation model for dynamic knowledge interaction", *Journal of Knowledge Management*, 6, 2, pp. 124-134.

Ng, S.I., Lee, J.A., & Soutar, G.N. (2006). "Are Hofstede's and Schwartz's value frameworks congruent?", *International Marketing Review*, 24**,** 2, pp. 164-180.

Nonaka, I. (2007). "The knowledge-creating company", *Harvard Business Review*, 85**,** 7/8, pp. 162-171.

Nonaka, I. & Takeuchi, H. (1995). *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press: Oxford.

Nonaka, I., Toyama, R., & Konno, N. (2000). "SECI, Ba and leadership: A unified model of dynamic knowledge creation", *Long Range Planning*, 33, pp. 5-34

Perkmann, M. & Walsh, K. (2006) **"**Relationship-based university-industry links and open innovation: towards a research agenda", *AIM Research Working Paper Series*, 041-July-2006, Loughborough University.

Pettigrew, A. (1979). "On studying organizational cultures", *Administrative Science Quarterly*, 24, pp. 570-581.

Prusak, L. (2001). "Where did knowledge management come from?" *IBM Systems Journal*, 40, 4, pp. 1002-1007.

Popadiuk, S. & Choo, C.W. (2006). "Innovation and knowledge creation: how are these concepts related?", *International Journal of Information Management*, 26**,** 4, pp. 302-312.

Ramasamy, B., Goh, K.W., & Yeung, M.C.H. (2006). "Is guanxi (relationship) a bridge to knowledge transfer?", *Journal of Business Research*, 59, pp. 130-139.

Rose, R.A. (1988). "Organizations as multiple cultures: a rules theory analysis", *Human Relations*, 41**,** 2, pp. 139-170.

Sackmann S.A. (1991). *Cultural Knowledge in Organizations: Exploring the Collective Mind*, Sage: Newbury Park.

Santoro, M.D. & Gopalakrishnan, S. (2000). "The institutionalization of knowledge transfer activities within industry-university collaborative ventures", *J. Eng. Technol. Manage.* 17**,** pp. 299-319.

Schartinger, D. et al. (2002). "Knowledge interactions between universities and industry in Austria: Sectoral patterns and determinants", *Research Policy*, 31, pp. 303-328.

Schein, E.H. (1985). *Organizational Culture and Leadership: A Dynamic View*, Jossey-Bass: san Francisco.

Schein, E.H. (1996). "Three cultures of management: The key to organizational learning", *Sloan Management Review*, 38**,** 1, pp. 9-20.

Schwartz, S.H. (1994). "Beyond individualism/collectivism: new cultural dimensions of values", in U. Kim, H.C. Triandis, C. Kagitcibasi, S.C. Choi and G. Yoon (eds) *Individualism and Collectivism: Theory, Method, and Applications*, Sage: Thousand Oaks, CA, pp.85-119.

Scribner, S. (1985). "Knowledge at work", *Anthropology and Education Quarterly*, 16, 3, pp. 199-206.

Snowden, D. (2002). "Complex acts of knowing: Paradox and descriptive self-awareness", *Journal of Knowledge Management*, 6, 2, pp. 100-111.

Sojka, J.Z. & Tansuhaj, P. (1995). "Cross-cultural research: a twenty-year review", *Advances in Consumer Research*, pp. 461-474.

Ståhle, P. & Grönroos, M. (2000). *Dynamic Intellectual Capital, Knowledge Management in Theory and Practice*, WSOY, Porvoo, Helsinki.

Tong, H. (2008). An invited talk for the workshop on *Future Mobile UI & UE*, Nokia Research Center, July Beijing.

Tuomi, I. (2002). "The future of knowledge management", *Lifelong Learning in Europe*, 2, pp. 69-79.

von Krogh, G. (1999). "Developing a knowledge-based theory of the firm", (http://www.dialogonleadership.org/vonKrogh-1999cp.html).

Wartofsky M. (1979). *Models: Representation and Scientific Understanding*, Reidel: Dordrecht.

Publication 3

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The Role of Knowledge in Inter-cultural Organizational Collaboration

Jianzhong Hong & Aino Kianto
School of Business
Lappeenranta University of Technology

P.O.Box 20 FI-53851
Lappeenranta, FINLAND

Tel: +358 5 621 7253 & +358 5 621 7254
Fax: +358 5 621 7299
E-mail: jianzhong.hong@lut.fi & aino.kianto@lut.fi

Abstract In today's globalized, hypercompetitive business environments, complementary knowledge has increasingly become a key aspect of inter-cultural collaboration, while knowledge itself is simultaneously a variable that moderates cultural influences. This paper examines the interplay of culture and knowledge, clarifying the moderating role of knowledge on inter-cultural organizational collaboration. Based on a critical literature review, it is found that key cultural influences include cultural distance and partner relationships, and a systematic analysis of the role of knowledge could best be approached from the following perspectives: 1) nature, content and structure of knowledge; 2) collaboration-related knowledge concepts such as common knowledge of cross-border knowledge holders, value of knowledge stock of the source organization, and absorptive capacity of the recipient; and 3) modes of and corresponding strategies for knowledge interaction of collaboration partners. Both theoretical and practical implications of the findings are suggested.

Introduction

As work and projects are increasingly conducted in globally distributed contexts, seeking and absorbing complementary knowledge in collaboration across geographic and cultural borders are increasingly becoming part of firms' key strategy and operations when internationalizing and gaining global competitiveness (Awazu, 2007; Buckley & Carter, 1999; Buckley et al., 2006; Lindqvist et al., 2007). Recent research indicates that such inter-cultural collaboration

is increasingly important in science and engineering (John-Steiner, 2008; Olson & Luo, 2007), in rapid innovation via strategic communities (Kodama, 2003; 2005), and in present open and horizontal innovation networks (von Hippel, 2007). This, however, does not mean collaboration and knowledge interaction are without difficulties. Many cross-border knowledge interactions, including knowledge transfer projects, have encountered considerable difficulties or have failed because of significant cultural variations and barriers (Almeida et al., 2002; Bröchner et al., 2004; Holden, 2002; Li & Scullion, 2006; Moitra & Kumar, 2007; Qin et al, 2008; Siegel et al., 2003). The key task of global knowledge management, as pointed out by Holden (2001), is thus to foster and direct collaborative cross-cultural learning and development.

Sophisticated discussion of cultural influences is likely to be associated with the discussion of knowledge. This is understandable because of the intimate relationship between the two (see Nonaka & Tacheuchi, 1995; Sackmann, 1991), and the current stress on the value of context-specific and culturally-bounded tacit knowledge in organizations (Hong et al., 2008; Kok, 2006). Previous studies have touched upon several aspects of knowledge which play a significant role in moderating cultural influences on effective cross-border knowledge interaction. They deal largely with the nature, content, and structure of knowledge (Bhagat et al., 2002; Buckley et al., 2005; Lam, 1997; Simonin, 1999; Szulanski, 2003) and collaboration-oriented knowledge concepts such as common knowledge (Grant, 1996; Li & Scullion, 2006), the value or desirability of knowledge (Gupta & Govindarajan, 1991; 2000; Pak & Park, 2004; Szulanski, 2003), and absorptive capacity (Miesing et al., 2007; Pak & Park, 2004; Szulanski, 2003). In these studies, the role of knowledge has primarily been discussed at the level of national culture and one-way knowledge transfer from the source to recipient organization. This study, however, focuses on different modes of knowledge interaction, in which knowledge transfer is only one type. We argue that in addition to the above-mentioned two aspects of knowledge, different modes and intensity of knowledge interaction along with corresponding strategies should be taken into account and carefully examined. The key research question we address is: How do various aspects of knowledge moderate the influence of culture on knowledge-based collaboration? We explore the role of knowledge in a systematic way, which appears significant but apparently lacking in current studies. The role of knowledge will be demonstrated systematically through propositions about knowledge-related variables in inter-cultural collaboration; a conceptual model of

moderating effects based on the propositions will be presented. The term moderating means here that the cultural influences on the effectiveness of cross-border knowledge interaction can be reduced or intensified depending upon various aspects of knowledge-related variables such as the tacit and sticky nature of knowledge, collaboration-oriented knowledge concepts, and modes of knowledge interaction.

The present research is important also in practical contexts of management. Our initial observations have shown that to gain competitive advantage, particularly in future-oriented and developing markets involving dissimilar cultural contexts, subsidiaries of world-leading multinational corporations (MNCs) have shifted their attention from static types of collaboration (e.g., authorized or contract-based research) to much more interactive collaboration and interaction (e.g., knowledge co-creation). This is mainly because of the increasing complexity of the tasks in hands and also the pressing need to understand collaboration partners in an unfamiliar and uncertain business environment. Intensive interaction is assumed to bridge huge cultural distance and knowledge gaps, facilitating the effectiveness of cross-border knowledge interaction. Such a new organizational context demands research on more interactive types of knowledge interaction, in which the impact of culture is more evident and even intense. We believe systematic research can yield better understanding of the issue pursued here and provide more profound managerial implications.

The paper starts with a review of inter-cultural knowledge-based collaboration, in which the research contexts included in the paper are outlined and major cultural influences derived from the previous literature are identified. Next, we examine the influence of knowledge-related variables in detail to form a conceptual model on the moderating role of knowledge in terms of the cultural influence and effectiveness of cross-border knowledge interaction. Finally, we discuss both theoretical and managerial implications for effective inter-cultural collaboration and knowledge interaction, and suggest some alternatives for future research and practical applications.

Inter-cultural Knowledge-based Collaboration

Inter-cultural collaboration in this paper refers to several research contexts in organization studies, in which knowledge interaction is the focus of our concern. Thus, a knowledge focus works as a criterion for the selection of the literature to be reviewed. In this regard, inter-cultural collaboration is actually inter-cultural knowledge-based collaboration. The first research context of the paper is cross-border transfer of organizational knowledge involving different nations, national cultures or national cultural patterns and expectations, in which organizational type or nature of network are not specified (Bhagat et al., 2002; Evaristo, 2007). The second research context refers to knowledge flow and knowledge transfer within MNCs, in which two major lines of research can further be differentiated: The first line concentrates on the parent company and its subsidiaries (Almeida et al, 2002; Buckley et al., 2005; 2006; Gupta & Govindarajan, 1991; 2000; Kogut & Zander, 1993; Li & Scullion, 2006; Miesing et al., 2007; Pak & Park, 2004; Qin et al, 2008); and the second is interaction between subsidiaries (Kohlbacher & Krähe, 2007; Lucas, 2006). The third research context is collaboration in the form of strategic alliances, specifically international collaboration and joint ventures (Almeida & Phene, 2004; Andersson et al., 2005; Inkpen, 1996; Inkpen & Dinur, 1998; Johnston & Paladino, 2007; Lam, 1997; Simonin, 1999); and university-industry collaboration and interaction with a focus on culture (Barnes et al, 2002; Cyert & Goodman, 1997; Elmuti et al., 2005; Hong et al., 2007; Santoro & Bierly, 2006; Santoro & Gopalakrishnan, 2000; Wang & Lu, 2007). The final research context is related to industrial district or science parks involving multiple and independent organizations from various nations, for example, Suzhou Industrial Park (Inkpen & Pien, 2006).

With the exception of the first research context of our study, the research contexts we have identified seem to match up well with the network typology developed by Inkpen and Tsang (2005). In their study of knowledge transfer between network members, Inkpen and Tsang distinguish three common network types: intracorporate networks, strategic alliances, and industry districts. Intracorporate networks in their differentiation resemble roughly what we here refer to as MNCs, and strategic alliances share the same connotation, that is, voluntary arrangements that involve exchange, sharing, or co-development of products, technologies, or services as defined by Gulati. In our case the strategic alliance members, however, include not only firms but also universities. Moreover, for the industrial districts, we emphasize geographically dispersed and culturally different arenas rather than traditional industrial

districts with a shared geographic locality as in their study. Cross-border knowledge holders, as conceptualized by Li and Scullion (2006), are crucial sources of local knowledge as well as value generators from highly geographically dispersed cross-border knowledge particularly in developing and fast changing markets (see also Jackson & Aycan, 2006; Napier, 2006). The same authors suggest that a wider range of cross-border knowledge holders need to be considered when deploying cross-border knowledge management strategies and resources.

The Role of Culture in Inter-cultural Knowledge-based Collaboration

From the reviewed literature, we found that many of the studies are in one way or another related to *cultural distance*, which may increase the difficulty of cross-border knowledge transfer and interaction. That is, the bigger the distance, the more difficult the knowledge interaction (Qin et al, 2008; Simonin, 1999). Cultural distance is a widely used concept in international business, where it has been applied to foreign investment expansion, entry mode choice, and the performance of the multinational enterprise and its affiliates (Shenkar, 2001). In broader cross-cultural management literature, differences between national cultures have frequently been termed as "cultural distance" (Björkman et al., 2007).

National cultural distance can be defined as the extent to which shared norms and values in one country differ from those in another (Drogendijk & Slangen, 2006). In a similar way but perhaps with greater stress on the role of knowledge, Luostarinen (1980: 131-132) defines cultural distance as "the sum of factors creating, on the one hand, a need for knowledge, and on the other hand, barriers to knowledge flow and hence also for other flows between the home and the target countries". Bhagat et al. (2002) tend to use cultural variation to describe a similar phenomenon. There are other similar concepts such as psychic distance (Johnson & Vahlne, 1977), ethnic ties (Luo, 1999), dissimilar cultural contexts (Kohlbacher & Krähe, 2007; Li & Scullion, 2006), national cultural characteristics in terms of Chinese Guanxi (personal connections) (Buckley et al., 2006; Ramasamy et al. 2006) and and Mianzi (face) (Buckley et al., 2006), and disparity in Hofstede's cultural dimensions including individualism/collectivism, power distance, uncertainty avoidance, masculinity/femininity (Lucas, 2006). This line of studies represents a mainstream of research, showing the significant impact of *national culture* on inter-cultural collaboration and knowledge interaction. The emphasis on the value of and the influence of cultural distance on cross-

border knowledge interactions has received increasing attention (Simonin, 1999; Bhagat et al, 2002; Björkman et al, 2007; Qin et al, 2008).

In the context of inter-cultural organizational collaboration, a further concept relevant to the influence of cultural distance, *partner relationship* is also emphasized when considering effective knowledge transfer across nations (Buckley et al., 2006**;** Inkpen & Pien, 2006**;** Lucas, 2006**;** Miesing et al., 2007**;** Szulanski, 2003) and some key elements have been identified. They include, for instance, trust-based collaboration (Evaristo, 2007; Inkpen, 1996; Inkpen & Pien, 2006; Pak & Park, 2004; Santoro & Bierly, 2006), social connectedness (Santoro & Bierly, 2006), and Chinese Guanxi networking (Buckley et al., 2006, Luo, 1999). Intimate, social and communicative relationships are key to the transfer of tacit knowledge in almost every culture in the world. Particularly in relation-oriented cultures such as the one in China, even for explicit knowledge to be transferred and absorbed, cultural barriers have to be removed and good inter-partner relationships established (Buckley et al., 2006).

Language as a key element of culture and its influence on cross-border knowledge transfer is confirmed as an important cultural factor in some MNC studies (Buckley et al., 2005; Kohlbacher & Krähe, 2007). The transfer of knowledge across national borders depends largely on a common language necessary for communication (Buckley et al., 2005) and the cross-cultural influences manifested themselves through language barriers (Kohlbacher & Krähe, 2007).

Other cultural influences on cross-border knowledge interaction found in the literature, include differing concepts of quality and the priority of cost reduction (Kohlbacher & Krähe, 2007), and the knowledge management culture such as tolerance of redundancy and creative chaos in organizations (Inkpen, 1996).

At the level of organizational collaborative culture, most discussions seem to be related to the university-industry context, in which fundamental differences between two types of organizations are particularly articulated in goal formation, time orientation, language and assumption (Cyert & Goodman, 1997; Elmuti et al., 2005), agreeing priorities and timescales, publishing in the public domain, and academic laissez-faire approach versus industrial lack of flexibility (Barnes et al, 2002), and cultural traits in institutionalization of university-industry knowledge transfer activaties (Santoro & Gopalakrishnan, 2000). In a more general context of

MNC cross-border knowledge building, Almeida et al. (2002) suggest that the challenge of knowledge sharing and use for MNCs extends beyond the creation of international information systems, to the design of organizational structures, systems and cultures capable of supporting the flow of knowledge.

From the review, we can find also that the discussion of cultural influences can sometime be very difficult to differentiate from societal settings and work systems (e.g., Japanese "organizational" versus the British "professional" societal settings referred to by Lam, 1997) as well as institutional factors (e.g., differing intellectual property rights (IPR) regimes and employee systems evident in US and Japan in the study by Appleyard, 1996). Cultural studies with an institutional and political consideration of broader contexts may add new value for the study and related discussions. It is also beneficial, as Aycan (2005: 1113) points out, "to examine the interaction between cultural and institutional/structural contingencies to distil under which institutional/structural conditions culture matters most".

The Influence of Knowledge-related Variables

Previous studies have discussed several aspects of knowledge that moderate the influence of culture on inter-cultural collaboration and knowledge interaction. They include the intrinsic nature of knowledge (Bhagat et al., 2002; Simonin, 1999; Szulanski, 2003); types of knowledge (Bhagat et al., 2002; Buckley et al., 2005; 2006), and the knowledge structure (Lam, 1997). In these discussions knowledge itself is the object of the research concern, and one aspect of knowledge may be closely linked to another and the discussions could focus on one or more aspects simultaneously. The second set of variables can be called collaboration-oriented knowledge concepts. They include the common knowledge of cross-border knowledge holders (Grant, 1996; Li & Scullion, 2006), the value or desirability of knowledge of the source organization (Gupta & Govindarajan, 1991; 2000; Pak & Park, 2004; Szulanski, 2003), and the absorptive capacity of the recipient (Miesing et al., 2007; Pak & Park, 2004; Szulanski, 2003). We argue for a new dimension on that attention should be paid to the role of modes of knowledge interaction and corresponding strategies when discussing the cultural influence on the effectiveness of cross-border knowledge interaction. Details of each knowledge aspect could be expounded as follows.

Nature of Knowledge

The intrinsic nature of knowledge plays a prominent role in inter-cultural knowledge-based collaboration, and this trait is evident in the different attributes of knowledge: articulable versus tacit, simple versus complex, and independent versus systemic (Bhagat et al., 2002; Garud & Nayyar, 1994; Winter, 1987); the simultaneous effect of tacitness, specificity, and complexity of knowledge (Reed & DeFillippi, 1990; Simonin, 1999); codifiability, teachability, and complexity (Kogut & Zander, 1993; Rogers, 1962; Winter, 1987); attributes of knowledge operationalised in terms of codifiability, specificity and desirability (Pak & Park, 2004); and characteristics of knowledge and stickiness (Davison & Ou, 2008; Szulanski, 2003; von Hippel, 1994; 1998). As it can be seen from the list there is much overlapping and sometimes confusing use of terminology. In the following we choose tacitness and stickiness of knowledge as our focus for elaboration, as they are the aspects which are either most discussed in knowledge management literature or can be most expected to have a key impact on cross-border knowledge interaction.

Tacitness of knowledge. Although the tacit nature of much knowledge has been overwhelmingly recognized and discussed in knowledge management literature, it has been argued that the concept is under-specified, and carries too many meanings, such that we only have a nascent understanding of it (Gourlay, 2006). For Polanyi, tacit knowledge is constructed from individuals' own experience in the world and forms the basis for explicit knowledge (Jasimuddin et al., 2005). In present management literature, tacit knowledge refers to both individual and organizational knowledge (Hedlund, 1994; Kogut & Zander, 1992; Spender, 1996).

In inter-cultural knowledge transfer, Bhagat et al. (2002) regard tacitness as one of the most important dimensions to differentiate knowledge and its characteristics. The tacit dimension concerns how well articulated or implicit the knowledge is. Explicit knowledge is well articulated and tacit knowledge is often implicit. Thus, the transfer of tacit knowledge requires richer context and richer media, because tacit knowledge requires more than just codification (i.e., indexing). Explicit knowledge, however, can be transferred with relative ease. For example, explicit knowledge can be transferred when the sending organization informs the receiving organization about its record storing and maintaining rules. Bhagat et al.

(2002) argue that the more tacit the knowledge, the more difficult the cross-border knowledge transfer when dissimilar cultural contexts are involved.

More specifically, tacitness of knowledge in terms of marketing know-how is perceived and conceptualized as one of knowledge-specific variables that affects greatly transfer of marketing know-how in international strategic alliances (Simonin, 1999). Marketing know-how is primarily tacit, and empirical results of Simonin's study indicate that tacitness of knowledge was the most significant determinant of knowledge transferability. As the author claims, "except for the few instances where marketing know-how can be unequivocally codified (e.g., formulas for advertising budgets and media allocation), learning from experience and learning by doing in the presence of knowledgeable partners in cross-cultural settings become an essential condition for circumventing ambiguity and favoring knowledge transfer" (p. 483). Success in the transfer of such knowledge is to reduce its ambiguity.

Cultural distance between the firm and its partner or environment is another important antecedent of knowledge ambiguity. It is important with regard to both explicit and tacit knowledge. The case is much more complex with tacit knowledge. Marketing know-how, like identifying market opportunities and understanding market mechanisms, is closely attached to the cultural context. For instance, the wisdom of a partner's pricing or promotion campaign may be so deeply rooted in prevailing cultural norms (e.g., use of discounts or coupons, ability to bargain) that its full grasp cannot be decoupled from the cultural context. In the lighting-equipment joint venture between General Electric and the Shanghai Jiabao Group, for example, Shanghai Jiabao acrimoniously contended that foreign managers did not understand China's lighting market and raised prices at the wrong time, cutting into prospective sales and resulting in production stoppages (Yatsko, 1997 / Simonin, 1999). Tacitness of knowledge and the effectiveness of knowledge interaction are significantly subject to the cultural and social context in which the knowledge is created and utilized.

> Proposition 1: Understanding and being familiar with the cultural context can facilitate greatly the understanding and communication of more tacit types of knowledge, and thus enhance greatly the process and effectiveness of cross-border knowledge interaction.

Stickiness of knowledge Tacitness of knowledge indicates the nature of knowledge that is difficult to be articulated. Stickiness shows the degree of difficulty in sharing and transferring

the knowledge. Being difficult to articulate is one but not the only reason for stickiness of knowledge. Both stickiness and tacitness are similar and closely linked each other but not exactly the same features. For instance, the claim of Polanyi (1967: 4) "we can know more than we can tell," reflects more tacitness of knowledge, whereas the extension of the claim "we know more than we want to tell" (Davison & Ou, 2008: 282) reveals more personal nature of knowledge rather than knowledge articulation itself and is therefore related more to stickiness of knowledge.

The notion of sticky knowledge is derived from early work carried out by von Hippel who investigated the difficulties and costs associated with sharing information for innovation (Wang & Lu, 2007). For von Hippel (1994), the stickness of a given unit of information in a given instance refers to the incremental expenditure required to transfer that unit of information to a specified locus in a form useable by a given information seeker. Von Hippel (1998) argues that the requirement to transfer information from its point of origin to a specified problem-solving site will not affect the locus of a problem-solving activity when that information can be shifted at no or little cost. However, if it is costly to transfer information from one site to another in a useable form – the knowledge is thus *sticky* and the distribution of problem-solving activities can be significantly affected.

Szulanski (2003) focuses more on the characteristics of knowledge and stickness in the transfer of best practices in MNCs. When discussing the characteristics of knowledge, he regards causal ambiguity and unproven knowledge as the main sources of stickiness. His research shows that causal ambiguity is one of the most daunting knowledge barriers (Szulanski's work discussed by Johnson, 2007). A simple example of causal ambiguity is that people in an organization cannot know with full certainty what is causing exceptional performance and how those forces might interact in another unit. Essentially, more than absence of know-how, causal ambiguity signals the absence of knowledge as to why something is done ('know-why'), including why a given action results in a given outcome. If results cannot be precisely reproduced elsewhere because of different environmental conditions, and if there are causal ambiguities about the inner workings of productive knowledge, then problems that arise in the new environment have to be solved in situ through costly trial and error.

Proposition 2: Causal ambiguity increases stickiness of knowledge, thus making it difficult to have effective knowledge interaction, particularly in early stages of collaboration, and in uncertain circumstances and unfamiliar cultural settings.

Types of Knowledge

The effectiveness of cross-border knowledge interaction depends largely on the types of knowledge to be transferred. Bhagat et al. (2002) discuss three types of knowledge; human, social and structure knowledge. Buckley et al. (2005; 2006) differentiate social knowledge from technical knowledge in MNC contexts. Both studies consider social knowledge as a distinctive type of knowledge.

For Bhagat et al. (2002), social knowledge exists in relationships among individuals or within groups. It can also be called collective knowledge, composing of cultural norms that exist as a result of working together. Its salience is reflected in the ability to collaborate and develop transactional relationships. Social or collective knowledge can be either simple or complex, and is largely tacit and systemic in character. Bhagat et al. claim that cross-border transfer of organizational knowledge is most effective in terms of both velocity and viscosity when the type of knowledge (i.e., human, social, or structured) being transferred is simple, explicit, and independent and when such transfers involve similar cultural contexts. In contrast, transfer is least effective when the type of knowledge being transferred is complex, tacit and systemic and involves dissimilar cultural contexts.

Buckley et al. (2005; 2006) emphasize the role of language and social knowledge in foreign-knowledge transfer to China and they contend that knowledge transfer is more effective when technical and social knowledge are transferred together. Buckley et al. call attention to the significance of understanding the behavior of people from a different culture in cross-border of organizational knowledge transfer. They believe that a common language is not sufficient for successful communication and knowledge transfer within the same MNC. Social knowledge may also be important for the successful interpretation of language. Social knowledge, according to the authors, is a distinct category of knowledge that is essential to the effective functioning of an organization and can be considered on its own merits in combination with other kinds of knowledge. Hence, it can be defined as knowledge held by individuals, or groups of individuals, that enables them to interpret, understand, and predict

the behavior of other individuals and groups. Social knowledge can pertain to individuals or groups either within a single country or between different countries (or locations). Corporate social knowledge is, therefore, a special case of social knowledge in the context of a firm. The authors maintain that once a wholly owned subsidiary has established a sound basis of corporate social knowledge, it is then in a strong position to introduce a common organizational culture. The growth of corporate social knowledge may be an antecedent of the development of a shared organizational culture. Furthermore, rich person-to-person contact in multinational teams provides an effective means of transferring social knowledge.

> Proposition 3: Cross-border organizational knowledge interaction is most effective when the type of knowledge (i.e., human, social, or structured) being transferred is simple, explicit, and independent and when such transfers involve similar cultural contexts.

> Proposition 4: Social knowledge may facilitate both the transfer of technical knowledge and the like and the development of a shared culture for effective cross-border knowledge interaction.

Knowledge Structure

Lam (1997) establishes a comprehensive framework in which knowledge structure and work systems are intertwined. In his opinion, to understand problems of collaboration and knowledge transfer in global cooperative ventures, one needs first to understand the work system in which the knowledge is formed. Knowledge structure, work system and societal culture are intertwined and cannot be examined separately. He states; "…the nature of knowledge and expertise, its distribution and ownership, and patterns of utilization within the firm are closely interconnected with the way work is organized and coordinated, which in turn is shaped by different societal models of skills formation, labour markets and career systems." (p.975). Different knowledge structures are likely to be formed in different societal settings or cultures.

Lam's study develops a conceptual framework for analyzing the main differences and 'points of friction' between the Japanese 'organizational' and the British 'professional' models of the organization of knowledge in high-level technical work. According to Lam, the nature and organization of knowledge can vary along several dimensions, among which knowledge

structure forms the major one. This dimension is concerned with how knowledge and skills are distributed and utilized within the firm. The structure of knowledge can vary from one that is highly diffused and group-based, to one that is task specific and individual-based. The contrasts between the Japanese "organizational" and British "professional" models are striking here. The organizational model emphasizes the flexible and fluid utilization of skills and knowledge. Within this approach, job boundaries tend to be broad and ambiguous. Individuals are likely to undertake a wide range of jobs and duties through job rotation. The professional model emphasizes individual specialization and job differentiation. Within this approach, job boundaries are clearly delineated and each individual follows a narrow and specialized job path throughout their career. The latter approach encourages the development of deep and specialized knowledge at the individual level, but the scope of knowledge and experience tends to be rather limited and specific to the task performed. Moreover, the professional model generates a knowledge structure that is highly individual-based and task-specific, making it more difficult to achieve cross-functional integration.

> Proposition 5: Knowledge structures embedded in work systems have a significant influence on cross-border knowledge interaction and some cultures favour the effective transfer of tacit knowledge and others facilitate more the effective transfer of explicit knowledge.

Collaboration-oriented knowledge concepts

This set of variables or concepts is closely related to knowledge features perceived or able to be utilized by one or both sides of a partnership in collaboration.

Common knowledge is posited to be one of the critical mechanisms for knowledge acquisition, transfer and integration among cross-border knowledge holders (Li & Scullion, 2006). It is essential for effective knowledge interaction involving dissimilar cultural contexts, as huge physical, institutional and cultural differences exist between cross-border knowledge holders. It is commonly assumed that common knowledge can help the knowledge holders bridge the distance and knowledge gap. Different concepts but having similar functions have been proposed, for instance, social knowledge (Buckley et al., 2005; 2006), social capital (Inkpen and Pien, 2006; Inkpen & Tsang, 2005), and coalignment of cultural expectations/expectation-based knowledge (Evaristo, 2007). Unrelated knowledge will be

difficult to acquire and may have limited value because of a lack of common language for understanding the knowledge (Inkpen and Pien, 2006).

> Proposition 6: Common knowledge can greatly facilitate the bridging of cultural and knowledge-related gaps in collaboration, and can thus enable effective cross-border knowledge interaction.

Value of knowledge from the knowledge providers is an antecedent for inter-organizational interaction. Knowledge seeking organizations are only interested in knowledge that is valuable and attractive to them, which can be perceived differently from culture to culture (Evaristo, 2007). The same phenomenon is discussed also with other terms like the desirability of knowledge, in a study of cross-cultural joint ventures (Pak & Park, 2004), and unproven knowledge, which refers to absence of proof of the usefulness acquired from external sources and is particularly related to the unit or firm's knowledge integration efforts (Szulanski, 2003).

> Proposition 7: Value of knowledge can be an antecedent of cross-border knowledge interaction and it can be perceived differently from culture to culture; the more value of knowledge perceived by the recipient organization, the more effective the cross-border knowledge interaction.

Absorptive capacity is related to the level of knowledge acquisition and the firm's learning capabilities, i.e., its potential to integrate the acquired knowledge (Pak & Park, 2004), and it is "largely a function of the firm's level of prior related knowledge" (Cohen & Levinthal, 1990: 128). Absorptive capacity is therefore regarded as a knowledge-specific variable in some studies (Miesing et al., 2007; Pak & Park, 2004). In some other studies it is connected also with the concept of *retentive capacity*, the ability of a recipient to institutionalize the utilization of new knowledge (Szulanski, 2003).

> Proposition 8: Absorptive capacity of the recipient organization is closely related to the firm's prior related knowledge and cultural experience; the greater the absorptive capacity of the recipient, the more effective the cross-border knowledge interaction.

Modes of Knowledge Interaction

In inter-cultural organizational collaboration and management literature, *knowledge interaction* is often a term feely used without any clear definition or discussion. Mostly in such cases, it has just been taken or used to imply somehow a kind of knowledge exchange between two or more teams, organizations or communities that host different bodies of knowledge. The knowledge collaboration partners may often be complementary (e.g., Bukh & Johanson, 2003; John-Steiner, 2000; Santoro & Gopalakrishnan, 2000), meaning two or more organizations have distinct but mutually synergistic resources necessary for advancing new knowledge. Complementarity is one alternative that enables organizations to acquire and exploit new knowledge (Teece, 1987/ Santoro & Gopalakrishnan, 2000).

With a more precise meaning, knowledge interaction as a concept has been used in university-industry collaboration studies (Fukugava, 2005; Hong et al., 2007; Santoro & Gopalakrishnan, 2000; Schartinger, 2002). For instance, knowledge interaction is used to describe all types of direct and indirect, personal and non-personal interactions between organizations and/or individuals from the firm side and the university side, directed at the exchange of knowledge within innovation processes (Schartinger et al, 2002). Focusing on the nature of inter-organizational knowledge interaction, three modes or approaches to knowledge interaction are identified, of which the intensity of knowledge interaction substantially increases from technology and knowledge transfer (TKT), to knowledge integration (KI), to collaborative knowledge creation (CKC) (Hong et al., 2007).

In simple terms, TKT is the communication of technology and knowledge from one agent to another (Hedlund & Nonaka, 1993). The agent that provides the needed knowledge is the knowledge source or supplier, and the agent that gets the knowledge is the knowledge recipient. Not synonymous with technology transfer, knowledge transfer implies a broader, more inclusive construct that is directed more toward understanding the “whys” for change. Technology transfer is a narrower and more targeted construct that usually embodies certain tools for changing the environment (Gopalakrishnan & Santoro, 2004).

KI emphasizes the process of integrating and transforming the acquired knowledge for the firm’s specific use. It seems that the concept of knowledge integration emphasizes the knowledge fit (e.g., the knowledge structure exists prior to the process of knowledge

integration) between the source and the recipient organizations. Comparatively, integrating knowledge takes less time in the learning process than transferring knowledge (Grant, 1996). Thus, knowledge transfer is to make knowledge clear to others and let them be able to learn and use it directly, whereas knowledge integration is to make knowledge available to others and let them be able to choose the part they need and use it in their own ways.

CKC refers to a situation when two or more partners join and work together to create new information and knowledge, which can be used for the benefit of both or all sides, and give potential for future innovation and development. The focus of CKC is on creating and developing new knowledge. In CKC, a common understanding of the shared vision is considered essential throughout discussions. CKC is the key concept underlying collaborative innovation (Hermans & Castiaux, 2007; Hong et al., 2007; Nonaka & Takeuchi, 1995; Nonaka, 2007; Popadiuk & Choo, 2006).

Previous studies of inter-cultural collaboration have almost exclusively focused on knowledge transfer. However, knowledge transfer is only one mode or form of knowledge interaction. Following Hong et al. (2007), this paper argues that the role of culture is moderated by intensity of knowledge interaction, and in inter-cultural collaboration the more interactive the knowledge interaction, the more evident the role of culture. This occurs because more interactive types of knowledge interaction demand more frequent communication and stronger commitment between collaborating partners, thus the role of culture is more manifest particularly when two parties are from dissimilar cultural backgrounds. This happens in a situation similar to that described by Yeganeh and Su (2006); “Dissimilar but complementary cultures do not share many values, but they can offer advantages to each other that may increase their overall capability.” (371) The effectiveness and efficiency of cross-border knowledge interaction depends greatly on the firm’s strategic choice of knowledge interaction approaches and its understanding the features of each approach in accordance with research tasks at hand and specific environments.

> Proposition 9: The more interactive the knowledge interaction, the more significant the role of culture on cross-border knowledge interaction.

Our discussion on the moderating role of knowledge on inter-cultural collaboration and knowledge interaction is summarized in Figure 1.

INSERT FIGURE 1 HERE

Discussion and Conclusions

The above considerations have several theoretical and practical implications for cross-cultural management in general and for inter-cultural organizational collaboration in particular. First and theoretically, it implies that knowledge and knowledge interaction as a prime value for collaboration have received growing attention in inter-cultural collaboration and cross-cultural management. Second, knowledge and knowledge interaction discussed in inter-cultural collaboration contexts deal primarily with knowledge transfer, in which the impact of national culture is most prevalent and examined. It would, however, be useful to consider multi-level cultural influences on knowledge transfer and other types of knowledge interaction. Third, several aspects of knowledge are identified and clarified based on our literature review and theorizing that may have a moderating role in cross-border knowledge interaction. They include 1) nature, content and structure of knowledge, 2) collaboration-oriented knowledge concepts, and 3) modes of and strategies for knowledge interaction. And finally, an important but under-emphasized element from previous research is modes of and strategies for knowledge interaction, in which the intensity of knowledge interaction may have a significant role in moderating cultural influence on the effectiveness of cross-border knowledge interaction. We propose that the relative importance of culture on knowledge interaction is subject to modes of and strategies for knowledge interaction. The significance of culture may *accumulate with the increasing intensity of knowledge interaction* from technology and knowledge transfer, to knowledge integration and collaborative knowledge creation. In future study, it would be interesting to test this proposition empirically.

When discussing the moderating role of knowledge, we have clarified and elaborate nine propositions that constitute basic elements for suggesting further a conceptual model in which the interplay of knowledge and culture is evident. This will help theoretical exploration into the effectiveness of cross-border knowledge interaction in an operational way when involving complex and multinational cultural settings.

For practical implications, we propose that the refined conceptual model on the moderating role of knowledge in terms of cultural influence and the effectiveness of cross-border knowledge interaction can be used as an analytic tool for practitioners who are interested in developing inter-cultural collaboration in organizations and societies. The application of the conceptual model could guide inter-cultural organizational collaboration and knowledge interaction in three significant ways. First, it emphasizes the examination of both cultural and knowledge-related influences at the same time as is often the case when cultural impact is discussed in the context of inter-cultural knowledge interaction. Second, various aspects of knowledge are clarified thus permitting cultural influences to be examined in a more careful and sensitive way. And finally, the propositions under each aspect of knowledge could guide practitioners when dealing with more concrete issues and problems in the context of collaboration at the workplace, otherwise they remain more like abstract categories of knowledge.

Limitations and Future Research

The knowledge-based collaboration at an organizational level reviewed in this paper does not include collaboration between functional units and among individuals within an organization. The situation described in the study and conclusions drawn from our analysis are to a certain extent context-specific and the situation for other types of inter-cultural collaboration cannot therefore be generalized and concluded in the same way.

In future research, the study of university-industry knowledge interaction in the MNC context seems to be promising. Previous studies have paid increasing attention to collaboration between MNC subsidiaries and host-country business partners including suppliers and customers (Almeida & Phene, 2004; Andersson et al., 2005). Among the studies, the important role of local research organizations in MNC innovation networks seems, however, to have been neglected. Further research in this new direction is called for.

In the studies we reviewed above, technology and knowledge transfer has obviously been researched most. Other forms we identified as interactive knowledge integration and collaborative knowledge creation seem to be out of research concern although they differ

substantially from the knowledge transfer type of knowledge interaction in organizational partnership. Particularly in collaborative knowledge creation, knowledge is not something given but constantly modified, integrated and constructed in collaboration between the parties, and thus the strongest involvement and commitment from both or more collaborative parties is required. In this regard, we believe the role of culture is most significant in collaboration projects needing such knowledge creation. We suggest that future research pay much more attention to cross-border knowledge creation and its underlying cultural mechanisms.

References

Appleyard, M. M (1996) How does knowledge flow? Interfirm patterns in the semiconductor industry, Strategic Management Journal, 17, 137-154.

Almeida, P., Song, J. Y. and Grant, R.M. (2002) Are firms superior to alliances and markets? An empirical test of cross-border knowledge building, Organization Science, 13(2), 147-161.

Almeida, P. and Phene, A. (2004) Subsidiaries and knowledge creation: the influence of the MNC and host country on innovation, Strategic Management Journal, 25, 847-864.

Andersson, U., Björkman, I. and Forsgren, M. (2005) Managing subsidiary knowledge creation: the effect of control mechanisms on subsidiary local embeddedness, International Business Review, 14, 521-538.

Aycan, Z. (2005) The interplay between cultural and institutional/structural contingencies in human resource management practices, Int. J. of Human Resource Management, 16(7), 1083-1119.

Awazu, Y. (2007) Managing knowledge within and across geographic borders: the role of culture, Knowledge and Process Management, 14(3), 145-147.

Barnes, T., Pashiby and Gibbons, A. (2002) Effective university-industry interaction: A multi-case evaluation of collaborative R&D projects, European Management Journal, 20(3), 272-285.

Bhagat, R. S., Kedia, B. L., Harveston and Triandis, H. C. (2002) Cultural variation in the cross-border transfer of organizational knowledge: An integrative framework, Academy of Management Review, **27**(2), 204-221.

Björkman, I., Stahl, G. K., & Vaara, E. (2007) Cultural differences and capability transfer in cross-border acquisitions: the mediating roles of capability complementarity, absorptive capacity, and social integration, Journal of International Business Studies, 38, 658-672.

Buckley, P. J. and Carter, M. J. (1999) Managing cross-border complementary knowledge: conceptual development in business process approach to knowledge management in multinational firms, Int. Studies of Mgt. & Org., 29(1), 80-104.

Buckley, P. J., Carter, M. J., Clegg, J. and Tan, H. (2005) Language and social knowledge in foreign-knowledge transfer to China, International Studies of Management & Organization, 35(1), 47-65.

Buckley, P. J., Clegg, J. and Tan, H. (2006) Cultural awareness in knowledge transfer to China – The role of *guanxi* and *mianzi*, Journal of World Business, 41, 275-288.

Bukh, P. N. and Johanson, U. (2003) Research and knowledge interaction: guidelines for intellectual capital reporting, Journal of Intellectual Capital, 4(4), 576-587.

Bröchner, J., Rosander, S. and Waara, F. (2004) Cross-border post-acquisition knowledge transfer among construction consultants, Construction Management and Economics, 22, 421-427.

Cohen, W. and Levinthal, D. (1990) Absorptive capacity: A new perspective on learning and innovation, Administrative Science Quarterly, 35, 128-152.

Cyert, R. M. and Goodman, P. S. (1997) Creating effective university-industry alliances: An organizational learning perspective, Organizational Dynamics, 25(4), 45-57.

Davison, R. M. and Ou, C. X. (2008) Guanxi, knowledge and online intermediaries in China, Chinese Management Studies, 2(4), 281-302.

Drogendijk, R. and Slangen, A. (2006) Hofstede, Schwartz, or managerial perceptions? The effects of different cultural distance measures on establishment mode choices by multinational enterprises, International Business Review, 15, 361-380.

Elmuti, D., Abebe, M. and Nicolosi, M. (2005) An overview of strategic alliances between universities and corporations, The Journal of Workplace Learning, 17(1/2), 115-129.

Evaristo, J. R. (2007) Knowledge transfer across borders: A process model, Knowledge and Process Management, 14, 3, 203-210.

Fukugawa, N. (2005) Characteristics of knowledge interactions between universities and small firms in Japan, International Small Business Journal, 23(4), 379-401.

Garud, R. and Nayyar, P. R. (1994) Transformative capacity: Continual structuring by intertemporal technology transfer, Strategic Management Journal, 15, 365-385.

Gopalakrishnan, S. and Santoro, M. D. (2004) Distinguishing between knowledge transfer and technology transfer activities: The role of key organizational factors, IEEE Transactions on Engineering Management, 51(1), 57-69.

Gourlay, S. (2006) Towards conceptual clarity for 'tacit knowledge': a review of empirical studies, Knowledge Management Research & Practice, 4, 60-69.

Grant, R. M. (1996) Toward a knowledge-based theory of the firm, Strategic Management Journal, 17, 109-122.

Gupta, A. K. and Govindarajan, V. (1991) Knowledge flows and the structure of control within multinational corporations, Academy of Management Review, 16, 4, 768-792.

Gupta, A. and Govindarajan, V. (2000) Knowledge flows within MNCs, Strategic Management Journal, 21, 473-496.

Hedlund, G. (1994). A model of knowledge management and the N-form corporation, Strategic Management Journal, 15, 73-90.

Hedlund, G. and Nonaka, I. (1993) Models of knowledge management in the West and Japan, in Lorange, P. B. Chakravarthy, J. Roos, and A. van Der Ven (Eds.), Implementing strategic processes: change, learning and co-operation, Oxford: Blackwell Business.

Hermans, J. and Castiaux, A. (2007) Knowledge creation though university/industry collaborative research projects, The Electronic Journal of Knowledge Management, 5(1), 43-54, available online at www.ejkm.com.

Holden, N. (2001) Knowledge management: Raising the spectre of the cross-cultural dimension, Knowledge and Process Management, 8, 3, 155-163.

Holden, N. J. (2002) Cross-cultural management: A knowledge management perspective, Harlow: Pearson Education.

Hong, J., Heikkinen, J. and Niemi, M. (2007) Collaborative knowledge creation and innovation between MNCs and Chinese universities, In B. Martins and D. Remenyi (Eds.), Proceedings of the 8th European Conference on Knowledge Management, 1, Barcelona: Consorci Escola Industrial de Barcelona, pp. 486-49.

Hong, J. Z., Kianto, A. and Kyläheiko, K (2008) Moving cultures and the creation of new knowledge and dynamic capabilities in emerging markets, Knowledge and Process Management, 15(3), 196-202.

Inkpen, A. C. (1996) Creating knowledge through collaboration, California Management Review, 39(1), 123-140.

Inkpen, A. C. & Dinur, A. (1998) Knowledge management processes and international joint ventures, Organization Science, 9(4), 454-468.

Inkpen, A. C. & Pien, W. (2006) An examination of collaboration and knowledge transfer: China-Singapore Suzhou Industrial Park, Journal of Management Studies, 43(4), 779-811.

Jackson, T. and Aycan, Z. (2006) Editorial: From cultural values to cross cultural interfaces, International Journal of Cross Cultural Management, 6(1), 5-13.

Jasimuddin, S. M., Klein, J. H. and Connell, C. (2005) The paradox of using tacit and explicit knowledge: Strategies of face dilemmas, Management Decision, 43(1), 102-112.

John-Steiner, V. (2000) Creative Collaboration, New York: Oxford University Press.

Johnson, L. K. (2007) Debriefing Gabriel Szulanski: Improving best-practice transfer, in Managing Knowledge to Fuel Growth, Boston: Harvard Business School Press, pp. 82-89.

Johnson, J. and Vahlne, J.-E. (1977) The internationalization process of the firm: A model of knowledge development and increasing foreign markets commitments, Journal of International Business Studies, 8(1), 23-32.

Johnston, S. and Paladino, A. (2007) Knowledge management and involvement in innovations in MNC subsidiaries, Management International Review, 47(2), 281-302.

Kodama, M. (2003) Knowledge creation through the synthesizing capability of networked strategic communities: Case study on new product development in Japan, Knowledge Management Research & Practice, 1, 77-85.

Kodama, M. (2005) New knowledge creation through dialectical leadership: A case of IT and multimedia business in Japan, European Journal of Innovation Management, 8(1), 31-55.

Kogut, B. & Zander, U. (1992) Knowledge of the firm, combinative capabilities, and the replication of technology, Organization Science, 3(3), 383-397.

Kogut, B. and Zander, U. (1993) Knowledge of the firm and the evolutionary theory of the multinational corporation, Journal of International Business Studies, 24**,** 4, 625-645.

Kohlbacher, F. and Krähe, M. O. B. (2007) knowledge creation and transfer in a cross-cultural context – Empirical evidence from Tyco Flow Control, Knowledge and Process Management, 14(3), 169-181.

Kok, H. C. (2006) Cultivating knowledge sharing: An exploration of tacit organizational knowledge in Singapore, Journal of Asian Business, 22(2/3), 169-187.

Lam, A. (1997) Embedded firms, embedded knowledge: Problems of collaboration and knowledge transfer in global cooperative ventures, Organization Studies, 18(6), 973–996.

Li, S. and Scullion, H. (2006) Bridging the distance: Managing cross-border knowledge holders, Asia Pacific Journal of Management, 23, 71-92.

Lindqvist J., Blomqvist K. and Saarenketo, S. (2007) The role of sales subsidiary in MNC innovativeness - Explorative study and emerging issues on knowledge transfer, in R.R. Sinkovics and M. Yamin (Eds), Anxieties and Management Responses in International Business, Houndmills, Basingstoke, U.K.: Palgrave MacMillan.

Lucas, L. 2006) The role of culture on knowledge transfer: The case of the multinational corporation, The Learning Organization, 13(3), 257-275.

Luo, Y. (1999) Dimensions of knowledge: Comparing Asian and Western MNCs in China, Asia Pacific Journal of Management, 16, 75-93.

Luostarinen, R. (1980) Internationalization of the Firm, Helsinki: The Helsinki School of Economics.

Miesing, P., Kriger, M. P., Slough, N. (2007) Towards a model of effective knowledge transfer within transnationals: The case of Chinese foreign invested enterprises, J Technol Transfer, 32, 109-122.

Moitra, D. and Kumar, K. (2007) Managed socialization: How smart companies leverage global knowledge, Knowledge and Process Management, 14(3), 148-157.

Napier, N. K. (2006) Cross-cultural learning and the role of reverse knowledge flows in Vietnam, International Journal of Cross Cultural Management, 6(1), 57-74.

Nonaka, I. (2007) The knowledge-creating company, Harvard Business Review, 85(7/8), 162-171.

Nonaka, I. and Takeuchi, H. (1995) The knowledge-creating company: How Japanese companies create the dynamics of innovation, Oxford: Oxford University Press.

Olson, G. M. and Luo, A. (2007) Intra- and inter-cultural collaboration in science and engineering, in Intercultural Collaboration, Heidelberg: Springer Berlin, pp. 249-259.

Pak, Y. S. and Park, Y-R. (2004) A framework of knowledge transfer in cross-border joint ventures: An empirical test of the Korean context, Management International Review, 44, 4, 417-434.

Polonyi, M. (1967) The Tacit Dimension. London: Routledge & Kegan Paul Ltd.

Popadiuk, S. and Choo, C.W. (2006) Innovation and knowledge creation: how are these concepts related? International Journal of Information Management, 26(4), 302-312.

Qin, C., Ramburuth, P. and Wang, Y. (2008) Cultural distance and subsidiary roles in knowledge transfer in MNCs in China, Chinese Management Studies, 2(4), 260-280.

Ramasamy, B., Goh, K. W. and Yeung, M. C. H. (2006) Is *guanxi* (relationship) a bridge to knowledge transfer? Journal of Business Research, 59, 130-139.

Sackmann S. A. (1991) Cultural Knowledge in Organizations: Exploring the Collective Mind, Newbury Park: Sage.

Santoro, M. D. and Bierly, P. E. (2006) Facilitators of knowledge transfer in university-industry collaborations: A knowledge-based perspective, IEEE Transactions on Engineering Management, 53 (4), 495-507.

Santoro, M.D., & Gopalakrishnan, S. (2000) The institutionalization of knowledge transfer activities within industry-university collaborative ventures, J. Eng. Technol. Manage. 17, 299-319.

Schartinger, D. et al. (2002) Knowledge interactions between universities and industry in Austria: Sectoral patterns and determinants, Research Policy, 31, 303-328.

Seigel, D. S., Waldman, D. A., Atwater, L. E. and Link, A. N. (2003) Commercial knowledge transfers from universities to firm: improving the effectiveness of university-industry collaboration, Journal of High Technology Research, 14, 111-133.

Simonin, B. (1999) Transfer of marketing know-how in international strategic alliances: An empirical investigation of the role and antecedents of knowledge ambiguity, Journal of International Business Studies, 30(3), 463-490.

Shenkar, O. (2001) Cultural distance revisited: towards a more rigorous conceptualization and measurement of cultural differences, Journal of International Business Studies, 32(3), 519-536.

Szulanski, G. (2003) Sticky knowledge: Barriers to knowing in the firm, London: SAGE.

Spender, J-C. (1996) Making knowledge the basis of a dynamic theory of the firm, Strategic Management Journal, 17, 45-62.

von Hippel, E. (1994) 'Sticky information' and the locus of problem solving: Implications for innovation, Management Science, 40, 429-439.

Von Hippel (1998) Economics of product development by users: The impact of "sticky" local information, Management Science, 44(5), 629-644.

von Hippel, E. (2007) Horizontal innovation networks – by and for users, Industrial and Corporate Change, 16(2), 293-315.

Wang, Y. and Lu, L. (2007) Knowledge transfer through effective university-industry interactions: Empirical experiences from China, Journal of Technology Management in China, 2(2), 119-133.

Winter, S. G. (1987) Knowledge and competence as strategic assets, in D. J. Teece (Ed.), The competitive challenge: Strategies for industrial innovation and renewal, New York: Harper & Row, pp. 159-184.

Yeganeh, H. and Su, Z. (2006) Conceptual foundations of cultural management research, International Journal of Cross Cultural Management, 6(3), 361-376.

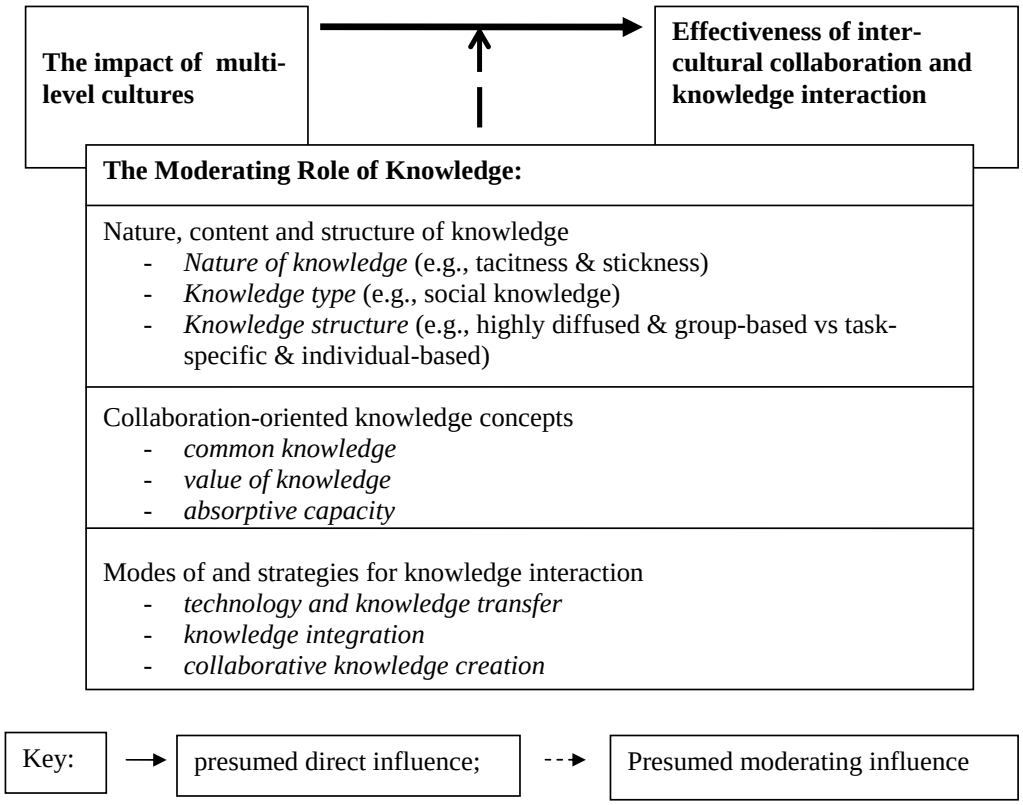

Figure 1: Moderating Role of Knowledge in terms of Cultural Influence on the Effectiveness of Cross-border Knowledge Interaction

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Cultural Implications of Knowledge Sharing, Management and Transfer:
Identifying Competitive Advantage

Deogratias Harorimana
Southampton Solent University, UK

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Chapter 14
The Impact of Culture on University–Industry Knowledge Interaction in the Chinese MNC Context

Jianzhong Hong
Lappeenranta University of Technology, Finland

Johanna Heikkinen
Lappeenranta University of Technology, Finland

Mia Salila
Lappeenranta University of Technology, Finland

ABSTRACT

Recent studies on university–industry collaboration have paid a growing attention to complementary knowledge interaction, which is of crucial importance for networked learning and knowledge co-creation needed in today's rapidly changing markets and for gaining global competitiveness. The existent studies concentrate on the transfer of knowledge from the university to the company, and the impact of culture is examined with a focus on fundamentally different cultures between two types of organizations (i.e., between universities and firms). The studies, however, remain highly fragmented in cultural exploration on one level, and are primarily concerned with one-way technology and knowledge transfer. Research on more interactive knowledge interaction (e.g., collaborative knowledge creation) and especially in the Chinese context is seriously lacking. This chapter explores university–industry knowledge interaction in a broad sense, focusing on the development of a conceptual view on the understanding and analysis of the cultural impact in the Chinese MNC context. The chapter is an early work in process and it is theoretical in nature. It clarifies and elaborates key concepts and perspectives, and suggests implications for future research and practice regarding effective knowledge co-creation involving dissimilar cultures.

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INTRODUCTION

As tasks, work and projects are increasingly conducted in globally distributed contexts, seeking for and integrating complementary knowledge and building networks across geographic and cultural borders are increasingly becoming the firm's key strategy and part of operations for going international and gaining global competitiveness (Awazu, 2007; Buckley & Carter, 1999; Buckley et al., 2006; Kodama, 2003; 2005; Lindqvist et al., 2007). Due to the changing competitive landscape, external links and networking directed at the transfer and creation of knowledge, are of crucial importance for the innovative performance of firms and the advancement of new technologies (Johnston & Paladino, 2007; Santoro & Gopalakrishnan, 2000; Schartinger et al, 2002). Undoubtedly, universities play an important role in such networked innovation systems, and complementary knowledge interaction increasingly becomes a key driver for university–industry (U–I) collaboration (Lin, 2005; Santoro & Gopalakrishnan, 2000; Wang & Lu, 2007). However, many cross-border knowledge interactions including knowledge transfer projects have failed because of cultural barriers (Almeida et al., 2002; Bröchner et al., 2004; Holden, 2002; Lam, 1997; Moitra & Kumar, 2007; Siegel et al., 2003; Simonin, 1999).

Culture may enable or coerce good knowledge interaction depending on how well we know it. Previous studies have identified the following cultural barriers to or influences on effective knowledge interaction: cultural variation across nations in terms of the dimensions of individualism–collectivism and verticalness–horizontalness (Bhagat et al., 2002), cross-cultural differences in language, conception and prioritization (Kohlbacher & Krähe, 2007), differences in Hofestede's cultural dimensions of individualism/ collectivism, power distance, uncertainty avoidance, masculinity/femininity (Lucas, 2006), national or societal settings in terms of knowledge structure and work system (Lam, 1997), language and social knowledge in the form of understanding others' behavior (Buckley et al, 2005), cultural awareness of Chinese *guanxi* (personal connection) and *mianzi* (face) in cross-border knowledge transfer (Buckley et al, 2006), Chinese *guanxi* in terms of trust, relationship commitment, and communication (Ramasamy et al., 2006), cultural distance in the transfer of marketing know-how in international strategic alliances (Simonin, 1999), and the alignment of different professional or functional cultures of executives, engineers and operators (Schein, 1996). In the specific context of U–I knowledge interaction, the impact of culture and related factors are examined and acknowledged with a focus on fundamentally different cultures between two types of organizations particularly in goal formation, time orientation, language and assumptions (Cyert & Goodman, 1997; Elmuti et al., 2005), agreeing on priorities and timescales, publishing in the public domain, and academic laissez-faire approach vs industrial lack of flexibility (Barnes et al, 2002), and cultural traits in the institutionalization of U–I knowledge transfer activates (Santoro & Gopalakrishnan, 2000). Nevertheless, the existent studies remain much fragmented in cultural exploration, and are primarily concerned with technology and knowledge transfer. Knowledge transfer is one form of knowledge interaction. Research on other types of more interactive knowledge integration such as collaborative knowledge creation, and especially in the Chinese context is seriously lacking.

Emerging markets are now seen as a major source of global innovation and knowledge management (Fu et al., 2006; Pillania, 2005). The development of new knowledge and capabilities is particularly relevant and salient in emerging and changing markets like in China (Hong et al., 2008; Khavul et al., 2007; Li & Scullion, 2006). A recent study of Huggins et al. (2007) found that North America has been the source of one half of all R&D foreign direct investments (FDI) between 2002 and 2005. Asia-Pacific, especially China and

India, has been the overwhelming destination for most of the R&D FDI, accounting for more than one half of all investments and almost three quarters of the jobs created. In China, especially R&D collaboration between multinational corporations (MNCs) and local partners has grown strikingly. In 2002, the number of MNC R&D institutes in China was 400 (Li, 2005), whereas by 2005 the number was already 750 (von Zedtwitz, 2007). Since the first establishment of a joint R&D institute by an MNC with a Chinese university in 1994, R&D collaboration between MNC subsidiaries and local universities has been growing rapidly. MNCs have become attractive research partners to Chinese universities and research institutes compared to local enterprises (Heikkinen et al., 2007; Li 2005). Several motivations for MNCs to conduct R&D activities in China have been identified, among which creating and utilizing the local talent pool has been emphasized as a key attraction to MNCs. Thus, the power of best known universities has been increasing and the passive role local universities used to play is changing. More interactive and deeper U–I relationships and collaboration are emerging (Gassmann & Han, 2004; Hong et al., 2007; Li, 2005; Li & Zhong, 2003; von Zedtwitz, 2007; Wang & Lu, 2007). On the other hand, little is known about the MNC subsidiaries' R&D collaboration with Chinese universities and research on these fast emerging U–I knowledge interaction activities is called for. U–I studies are generally conducted in a local context within the same country. U-I collaboration across nations, however, addresses more explicitly cultural issues on both organizational and national levels. The advantage in focusing on MNC subsidiaries is evident in such a research context (Almeida & Phene, 2004).

This chapter aims to develop a conceptual framework on the understanding and analysis of the cultural impact on U–I knowledge interaction in the Chinese MNC context and to suggest theoretical and practical implications for future research. We ask how and when the culture matters in U–I collaboration and knowledge interaction, and how to cope with cultural challenges when an MNC subsidiary starts collaborating with local universities. We take the R&D collaboration of Finnish MNC subsidiaries with Chinese universities as an illustration, discussing the role of the culture, trust and social networking in collaborative knowledge creation and innovation involving dissimilar cultural contexts.

In this chapter, we start a review on the study of culture, emphasizing its multi-layered, multi-level and dynamic nature. The study thus also calls our attention to examine carefully the moderating influences. Next, we deal with the concept of knowledge interaction in several research areas. After bringing in the U–I collaboration context, we specifically define what we mean by U–I knowledge interaction, identifying three modes of knowledge interaction and related U–I knowledge interaction activities. In the section "U–I Knowledge Interaction across Cultural Boundaries" we concentrate on key cultural issues, mainly including literature on U–I studies and cultural relevance in the Chinese MNC context. In the following, implications for future research are suggested and discussed. We conclude the chapter with a conceptual framework on studying the impact of culture on a MNC subsidiary's collaboration with Chinese universities and research institutes. Related managerial implications are suggested.

THE STUDY OF CULTURE

The impact of culture on organizational behaviour and interaction has been well acknowledged, whereas the study of culture is challenging due to its pervasive and complex nature and the increase of *multiculturalism* in today's globalizing businesses, organizations and societies (Craig & Douglas, 2006). The first challenge is to define what culture is, namely, its conceptualization and operationalization in research. There are numerous definitions in cultural studies. Some

have defined culture in terms of *shared values, beliefs,* and *assumptions* (e.g., Sackmann, 1991; Schein 1985), whereas others emphasize more the *material culture and artifacts* and the role of *language and communication* that shape and guide social systems, group relations and collaborative activities and processes (Craig & Douglas, 2006; Sojka & Tansuhaj, 1995; Wartofsky, 1979). This seems to form two major lines in cultural studies. The first line presents the most prevalent way to perceive culture, and thus the ideal aspect of culture is accentuated. Within the second line of research on cultural artifacts and the language, scholars from social sciences and the like focus more on the mediating role in knowing and doing, whereas researchers from business and management studies pay much more attention to their practical aspects and functioning in relation to specific business governance and operations.

The new cross-cultural research considers culture not only as a multi-layered but also a multi-level construct, which consists of various levels nested within each other from the most macro-level of a global culture, through national cultures, organizational cultures, group cultures, and cultural values that are represented in the self at the individual level (Leung et al., 2005). This view places a special emphasis on the intersection of these aggregate levels and the factors, which facilitate cultural change (see Craig & Douglas, 2006). Multi-level cultural influences become more and more evident in organizations and societies. Most of the research addresses culture primarily at the levels of national or societal culture and organizational culture. In order to take an in-depth look at the culture, the study of culture at functional aspects or subunits/groups is necessary.

A national culture, also known as a national character, has been referred to as "the pattern of enduring personality characteristics found among the populations of nations" (Clark, 1990: 66). People are believed to acquire such patterns of thinking, feeling, and acting, starting in early childhood and continuing throughout their life (King, 2007). Geert Hofstede (1980; 1997) has done pioneering work in the 1980s by developing a model to describe the national culture. For Hofstede, the most distinctive dimension between cultures is *individualism* versus *collectivism*. This emphasizes what kind of relation an individual has with the society's collectivity he/she is living in. In addition to this, other cultural dimensions developed by Hofstede include power distance, uncertainty avoidance and masculinity. An emerging cultural dimension of Confucianism reflects a dynamic, future-oriented mentality which the authors believe is more associated with the East Asian economic growth (Hofstede & Bond 1988). Subsequent works after Hofstede include, for instance, new cultural dimensions of values (Schwartz, 1994) and GLOBE's nine cultural dimensions (GLOBE is the acronym for "Global Leadership and Organizational Behavior Effectiveness", House et al., 2004). Schwartz's values may have the potential to explain greater cultural variation than Hofstede's values (Ng et al., 2006) and the GLOBE project adds two novel dimensions to Hofstede: performance orientation and humane orientation which seem to be meaningful (Leung et al., 2005). The dimension of national culture reviewed here is often associated with MNC studies.

Meyerson and Martin (1987) draw a distinction in their discussion between the *integration* and *differentiation* perspectives of the organizational culture. *Integrationist* views of the organizational culture propose that a single unified culture exists in an organization. It is characterized by consistency across individuals and units in terms of the elements of the culture including assumptions, values, and artifacts as reviewed (King, 2007; Schein, 1985). The *integrationist* view directs our attention to see an organization when making a distinction between different types of organizations like a university or a company.

The proponents of the *differentiation* perspective on culture view the organizational culture as a mix of local cultures, each with their own assumptions, values and artifacts. This is a further and more detailed analysis of the organizational culture. These organizational subcultures may reflect the organizational structure, professional occupations, task assignments, ethnic values, rank in the hierarchy, or technologies used (Bloor & Dawson, 1994). Shared assumptions typically form around the functional units of the organization, and could therefore be termed as *functional cultures*. They are often based on members' similar educational backgrounds or similar organizational experiences (Schein, 1996). Rose (1988) notes that the differentiation perspective on the organizational culture may be more realistic particularly in large complex organizations where changes are evident.

The significance of the culture to an organization has increasingly been understood as dynamic processes rather than static imposing structures (Pettigrew, 1979; Sackmann, 1991; Hong & Engeström, 2004; Hasu et al., 2005; Hong et al, 2008). Furthermore, the accelerating process of globalization, radical social and economic transformation and the increasing interconnections between cultures involve an unprecedented challenge to academic mainstream conceptions which continue to work in a tradition of cultural dichotomies (Craig & Douglas, 2006; Hermans & Kempen, 1998). Some illuminating studies shed light on a number of interesting areas of research such as the rise of the creative class in the U.S. resulting from an underlying culture that is open-minded and diverse (Florida, 2002), the construction of a new mode of thought relying on and thriving with collaboration (John-Steiner, 2000), the positive values of cultural diversity for constructing the knowledge base and learning (Boyle, 1999), and mutual adjustment and learning in joint ventures operating in China (Child, 1994). This has put learning and knowledge creation in a situation in which learning is not aimed at adapting a mainstream culture, but it is rather learning from each other or even from the culture with opposing values so that a third and new culture could possibly be generated. The above studies on moving cultures and cultural interaction indicate that cultural diversity is not something negative but rather a powerful source for creating new knowledge and cultures.

Due to multi-layered, multi-level and dynamic nature of culture, the study thus also calls our attention to examine carefully the moderating influences. This is particularly the case when studding the impact of national cultural influences, in which the moderating influences of individual, group and situational characteristics are approached (Leung et al., 2005). For instance, individual or self identity may amplify the impact of culture on beliefs. In every culture, there are people who hold beliefs different from those typical.

When a person views him or herself as a member of the national culture, and the culture is a large component of his or her self-concept, culture will have a strong and pervasive impact on his or her belief … instead, other sources of self identity such as education or professional affiliation may play a much stronger role in defining who they are, and what motivate them personally, and which values they hold (p.369).

Other individual characteristics discussed in Leung et al.'s research include self-esteem (Van Dyne et al., 2000), self-construals (Markus & Kitayama, 1991), levels of cooperativeness and agreeableness (Chatman & Barsade, 1995), sensitivity to the 'other' cultural situation (Adair et al., 2001), etc.. They are worth noting when we make a research design in examining the impact of national culture on both individual and organizational outcomes. Additionally, moderating influence may relate also to group characteristics (e.g., early vs late stages of group development) or situational characteristics (e.g., intra vs intercultural negotiation among managers from different

nations, predictable vs uncertain technological task situations).

KNOWLEDGE INTERACTION

Inter-organizational knowledge interaction is often a term freely used in the literature without any definitions or discussion. Mostly in such cases, it has just been taken or used, implying somehow a kind of knowledge exchange between two or more teams, organizations or communities that host different bodies of knowledge. The knowledge collaboration partners may often be complementary (e.g., Bukh & Johanson, 2003; John-Steiner, 2000; Santoro & Gopalakrishnan, 2000). Complementarity is one alternative that enables organizations to acquire and exploit new knowledge and it refers to the extent to which two organizations have distinct but mutually synergistic resources necessary for advancing new knowledge (Teece, 1987 / Santoro & Gopalakrishnan, 2000).

In a more serious sense, knowledge interaction has been used in several research areas. It can be seen, for instance, in U–I collaboration studies (Fukugava, 2005; Santoro & Gopalakrishnan, 2000; Schartinger, 2002), the design of a new communication medium (Nishida, 2000, 2002) and the study on channel policy (Kubota & Nishida, 2003). In the design of a new communication medium, Nishida (2000, 2002) defines dynamic knowledge interaction as interaction that brings about mutual understanding and evolution in a community. In similar vein, Kubota and Nishida (2003) adopt the term of strategic knowledge interaction for designing the knowledge channel model and discussing channel policy that represents the user intention of interacting with streaming contents.

More studies come from U–I research literature. In the study by Schartinger et al. (2002), the term *knowledge interaction* is used to describe all types of direct and indirect, personal and non-personal interaction between organizations and/or individuals from the firm side and the university side, directed at the exchange of knowledge within innovation processes. This is perhaps the best effort so far in seeing knowledge interaction as a research concept. Drawing from their U–I study in Austria, Schartinger et al. identify sixteen types of knowledge interaction, which can be classified into four major knowledge interaction models. The models can also be seen from an elaboration by Perkmann and Walsh (2006). They are i) joint research (including joint publishing), ii) contract research (including consulting, financing of public research organization research assistants by firms), iii) mobility (staff movement between universities and firms, joint supervision of students) and iv) training (co-operation in education, training of firm staff at universities, lecturing by industry staff). Some types of knowledge interaction are highly active or interactions are more intensified than others. Fukugawa (2005) studies the characteristics of knowledge interaction in terms of the firm size and concludes that university-based scientists with high research potential are linked with large firms in broad areas through highly interactive spillover channels such as joint research, whereas university-based scientists with low research potential are linked with small firms, through less interactive spillover channels such as technical consultation.

U–I COLLABORATION AND KNOWLEDGE INTERACTION

U–I collaboration may take various forms and its driving forces may also vary highly from case to case. In this section, we briefly review why there is U–I collaboration, considering complementary knowledge interaction for innovation as a primary but emerging concern. Then we clarify from the previous literature and our research experience the major forms of the collaboration. We close with an analysis on the nature of knowledge interaction in terms of U–I collaboration by identifying three

distinctive U–I knowledge interaction strategies and approaches.

Why U–I Collaboration?

We argue that the primary reason for U–I collaboration is the need to gain complementary knowledge or expertise for applying it to commercial ends. After all, universities hold the access to intellectual resources and can offer a competent basic research infrastructure and conduct high-quality research, whereas companies possess practical knowledge and up-to-date technology information, contact interface with the international market, financial resources, and employment opportunities for new graduates. When discussing such U–I partnership and collaboration, Gustavs and Clegg (2005) refer to it, for instance, as the interaction between two modes of knowledge production originally proposed by Gibbons and his colleagues: mode one knowledge is defined as being "institutionalized primarily within university structures" and is discipline-based, whereas mode two knowledge is characterized as operating "within a context of application" (e.g., workplace knowledge). The TCL Corporation is one of the biggest consumer electronic groups in China. During the early stage of negotiation and actual acquisition between TCL and the French Thomson (2003–2004), TCL faced a challenge in the lack of knowledge in internationalization and its management. A related training program for TCL top management was started, and soon after a long-term agreement on "strategic knowledge alliance" between the *Guanhua* Management School of the Beijing University and TCL Group was signed. Through this collaboration, the Beijing University offers TCL management knowledge, while the university learns and updates its knowledge base in the latest technologies (see Lin, 2005).

U–I collaboration may be initiated by both economic and non-economic motivators. The economic motivators include the willingness to share R&D costs and risks, to gain new technologies and suitable equipment, to obtain access to human resources and to achieve intangible resources in the form of patents and know-how. Non-economic motivators are related to the desire to gain recognition in the scientific community and to burnish their image through studies aimed for the welfare of the society – the responsibility towards regional economic development and university policy (see also Fukukawa, 2005). In some cases, even if the economic and non-economic motivators are not obvious at the beginning, partners (should) gradually develop a coherent covenant with complementary objectives and ways of behaving (Hermans & Castiaux, 2007). It could also be understood in a more simple way by sticking out the different needs and benefits from each side of the collaboration: the major advantages *for the academic communities* – research funding and practical learning opportunities for students – and *for industry* – lower research and development costs and technology transfer opportunities that affect competitiveness (Elmuti et al., 2005).

Major Forms of Collaboration

The forms of U–I collaboration vary greatly due to various contextual factors. The major forms below we identified are mainly based on our literature study and research experience concerning MNCs' R&D collaboration with Chinese universities (see also Li, 2005; Lin, 2005). They include: 1) *Authorized or contract-based research projects* – normally companies provide research funds and equipment, and the authorized universities return research outcomes back to the companies according to agreed requirements. In this case, the research topic is given. 2) *Joint research projects* – in most cases they are partially "joint" in the early stage of the project establishment. The research topic is jointly discussed and established according to a common interest. The collaboration of MS Corporation with Chinese famous universities is a good example of this. The corporation selects

every year its senior supervisors and experienced experts to form a special committee to identify and choose from the university projects which are meaningful for its own business and further develop them with universities. 3) *Collaborative training enterprises or programs* – commonly planned and developed by both partners. 4) *Joint R&D institutes* or *laboratories* – focusing on specialized areas in collaboration and creating local talent pools more and more become the true motivation of MNCs' collaboration with Chinese universities. 5) *Science and technology parks close to university campuses* – this provides a geographically convenient and common ground for U–I interaction. 6) *Technical and management consultation* is a one-way rather than interactive form since firms exclusively act as the user of knowledge instead of the co-creator of knowledge. 7) *Licensing* refers to the interest and potential of the firm in applying the inventions of university-based scientists. 8) *Donation* is the firm's long-term strategy to connect with universities for hiring competent new graduates, although this is the least interactive form of U–I collaboration. Both company-sponsored post doctoral research centres in universities and thematic joint workshops are emerging as new forms under this category.

U–I Knowledge Interaction

Typical U–I knowledge interaction is revealed, for instance, in knowledge networks (e.g., direct personal networks such as talks at academic conferences/workshops and indirect linkages intermediated by third parties such as liaison offices) (Fukugawa, 2005), strategic knowledge alliances focusing on the knowledge-based value in innovation (Lin, 2005), joint R&D projects and institutes and their evolving activities (Hermans & Castiaux, 2007; Johnson & Johnson, 2004; Li, 2005; Li & Zhong, 2003), co-operation in education and training (Ryan, 2007), science-based industrial innovation (Gu & Lundvall, 2006; Guan et al., 2005), university-run enterprises (Eun et al., 2006) and science parks as knowledge organizations (Hansson, 2007).

In this chapter we define U-I knowledge interaction as interactive knowledge strategies, relationships, processes, activities and outcomes. Focusing on the nature of inter-organizational knowledge interaction, we have identified three approaches to U–I knowledge interaction, among which *the intensity of knowledge interaction* substantially increases from 1) technology and knowledge transfer, to 2) knowledge integration and to 3) collaborative knowledge creation (Hong et al., 2007). In simple terms, *technology and knowledge transfer (TKT)* is the communication of technology and knowledge from one agent to another (Hedlund & Nonaka, 1993). The one that provides the needed knowledge is the knowledge supplier, and the one that gets the knowledge is the knowledge recipient. Not equal to technology transfer, knowledge transfer implies a broader, more inclusive construct that is directed more toward understanding the "whys" for change. Technology transfer is a narrower and more targeted construct that usually embodies certain tools for changing the environment (Gopalakrishnan & Santoro, 2004). Davenport and Prusak (1998) argued that the knowledge transfer process consists of transformation absorption, culminating in a behavioral change by the recipient firm. Typical TKT practices include the transfer of techniques and technologies from one location to another, the commercialization of an innovation (e.g. licensing), or hiring new graduate and young talents from the collaboration universities. In this line of research, it would be interesting, for instance, to study the recruiting of graduate students in addition to the conventional focus on patent and paper studies (Agrawal, 2001).

Previous U–I knowledge interaction research focuses primarily on knowledge transfer. In a comprehensive literature review of university-to-industry knowledge transfer, Agrawal (2001) identifies four research streams. Research in the

firm characteristics category focuses directly on company issues, such as the internal organization, resource allocation, and partnerships. In contrast, research in the *university characteristics* stream pays special attention to issues relating to the university, such as licensing strategies, incentives for professors to patent, and policies such as taking equity in return for intellectual property. The *geography in terms of localized spillovers* stream of research considers the spatial relationship between firms and universities relative to performance in terms of knowledge transfer success. The *channels of knowledge transfer* literature examines the relative importance of various transfer pathways such as publications, patents, and consulting. More specifically, a number of topics on U–I knowledge transfer appear interesting, which deal with the enabling function of trust and networking (Koschatzky, 2002; Lambooy, 2004; Santoro, 2006), the interplay between the characters of U–I relationship and the transfer of sticky knowledge (Wang & Lu, 2007), and the potentially moderating role of technical and organizational uncertainties (Daghfous et al., 2003).

Knowledge integration (KI) emphasizes the process of integrating and transforming the acquired knowledge for the firm's specific use of that knowledge according to situations and needs in a quite tailored way. Comparatively, integrating knowledge takes less time in the learning process than transferring knowledge. Grant (1996) argues that transferring knowledge is not an efficient approach to integrating knowledge. He claims that "if production requires the integration of many people's special knowledge, the key to efficiency is to achieve effective integration while minimizing knowledge transfer through cross-learning by organizational members" (114). Given the assumption about the characteristics of knowledge and the knowledge requirements of production, Grant conceptualizes the firm as an institution for integrating knowledge. One example of KI could be that firms request technical and management consultation from university-based scientists. These consultants provide solutions, but seldom know what afterwards happens in the firm. Knowledge interaction may take very different shapes at early versus later stages. At an early stage, there are much more face-to-face contacts and personal interactions involved, which is not the case at a later stage when everything happens internally only within the recipient organization.

It seems that the concept of knowledge integration emphasizes the knowledge fit between the source and the recipient and the dominant role, and the knowledge structure exists prior to the process of knowledge integration. Comparatively, knowledge transfer emphasizes the knowledge and the wholeness of it from the source organization, and the key process is that this knowledge will be acquired or learned and used in the same way as it should be in the source organization. Thus, knowledge transfer is to make knowledge clear to others and let them be able to learn from you, whereas knowledge integration is to make your knowledge available to others and let them be able to use it directly.

Collaborative knowledge creation (CKC) refers to a situation when two or more partners come and work together to create new information and knowledge, which can be used for the benefit of both sides, and potential for their future innovation and development. The focus of CKC is on creating and developing new knowledge. In CKC, we consider a common understanding for the shared vision essential through discussion. One common practice in U–I collaboration is related to joint research projects or collaborative educational or training programs in which experts from both universities and firms are actively involved in the whole process of projects and programs. Collaborative knowledge creation is the key concept underlying collaborative innovation (Hermans & Castiaux, 2007; Hong et al., 2007; Nonaka & Takeuchi, 1995; Nonaka, 2007; Popadiuk & Choo, 2006).

The studies on knowledge creation in U–I collaborative research projects seem to present an

Figure 1. U–I Knowledge Interaction in Joint Innovation Activities

U-I Knowledge Interaction	Technology and Knowledge Transfer (TKT)	Knowledge Integration (KI)	Collaborative Knowledge Creation (CKC)
Collaboration Activities in Joint Research, Education & Innovation	licensing authorized research projects partially joint research projects Donation	technical & management consultation from research organization(s) university science & technology parks	fully joint research projects collaborative training institutes and/or programs joint R & D institutes or labs Thematic joint workshops

The intensity of knowledge interaction increases from TKT to CKC

emerging line of research (Hermans & Castiaux, 2007; Johnson & Johnson, 2004) which expands the Nonaka and Takeuchi's (1995) theorizing context from within an organization into a wider U–I context. As Nonaka et al. (2000: 30) themselves note: "For the immediate future, it will be important to examine how companies, governments and universities can work together to make knowledge creation possible." Nonaka et al.'s knowledge creation theory and concepts are also applied and discussed in a number of other U–I studies (Gustavs & Clegg, 2005; Hansson, 2007; Heikkinen et al., 2007). In this line of research, the identified knowledge interaction strategies and approaches are often mixed. Some can be clarified into knowledge transfer, and others into collaborative knowledge creation. In practice and in many cases, the boundary of the three knowledge interaction approaches is not clear and the division is made just in a relative sense and more for analytic purposes.

Different forms of U–I collaboration and knowledge interaction are intertwined as shown in Figure 1. The forms of knowledge interaction identified and presented in the figure are relative and analytic and there is much overlapping among them.

Some early findings indicate that political culture has a significant impact on the firm's choice of *exploitation-exploration* internationalization strategy (Armagan & Ferreira, 2005). Other study relates national culture to the firm's developing path on types of research laboratory meant to be capability exploiting versus capability augmenting (Ambos & Schlegelmilch, 2008). In light of this and similar theorizing regarding exploitation-exploration knowledge strategy and paradox (Grant & Baden-Fuller, 2004; Gupta et al., 2006; March, 1991; Spender, 1992), it would be interesting to examine empirically whether the primary advantage of strategic research alliances is in accessing or acquiring knowledge, and how multi-level cultures may influence on the firm's choice and resolution of balancing different knowledge interaction approaches as knowledge transfer, knowledge integration, and collaborative knowledge creation.

U–I KNOWLEDGE INTERACTION ACROSS CULTURAL BOUNDARIES

As shown by the new cross-cultural research, culture is a multi-level construct and the main

stream of cultural research addresses culture primarily at the levels of national and organizational cultures. In the U–I studies with a focus on knowledge interaction, the influence of culture is mainly discussed at an organizational level, in which fundamental cultural differences between universities and companies are identified and examined. Since our research focus is on an MNC subsidiary's collaboration with Chinese universities and research institutes, in this section, we discuss, however, the cultural implications of U–I collaboration and knowledge interaction at both organizational and national levels. We first review cultural studies available in the U–I collaboration context, and then discuss U–I studies and cultural relevance in the Chinese MNC context. At the end of the section, we summarize what we draw from and reflect on our literature studies and pilot research experience in terms of organizational and national cultural influences.

Cultural Gap in U–I Organizational Type

Research on U–I knowledge interaction conducted so far is primarily related to the studies on cultural influences across organizational boundaries. Universities and companies are different in nature. Their objectives and activities are different and so are the ways of thinking and doing things. From the point of view of the organizational culture, one major difference lies in the value they hold for research and its outcomes. Universities appreciate more basic research, and companies focus on applied research; universities emphasize research value itself and companies see most often the practical side of research and profit maximization that might be derived from research. Some researchers regard the impact of such differences negatively as a collaboration barrier (Declercq, 1981), and others consider it the very reason for collaboration (Lee, 1996; Lopez-Martinez et al., 1994).

The U–I studies that deal with the fundamental differences between two types of organizations are particularly about *goal formation, time orientation, language* and *assumption* (Cyert & Goodman, 1997; Elmuti et al., 2005), *agreeing on priorities and timescales, publishing in the public domain*, and *academic laissez-faire approach vs industrial lack of flexibility* (Barnes et al, 2002). In U–I interaction studies, this is where the impact of culture and related factors have been focused and examined. Cyert and Goodman (1997) believe that the differences between university and company partners manifest themselves in divergent goals (to create and disseminate knowledge vs to produce products and services), time orientations (longer time period and less well-defined vs quarterly goals), common language, and assumptions (reputation outside of university vs supervisors within the company). Searching for an overview of strategic alliances between universities and corporations, Elmuti et al. (2005) highlight the partners' different working cultures and values that may have negative effects on effective alliance collaboration and interaction, which must be supported by continuous learning and restructuring processes to overcome the differences. Similar to Cyert and Goodman, essential differences identified in their study include different goals (creating and spreading knowledge vs producing products and services), time approaches (long vs short term), and languages and assumptions (related to communication efficiency). In studying collaborative R&D projects, Barnes et al. (2002) conclude from their U–I collaboration cases that the main cultural issues to emerge are the needs to agree on priorities and timescales; also, prominent is the need to manage perceptions and issues on both sides regarding the academic right to publish, and the student agenda. This latter factor is related to the perceptions of the role of student researchers on such projects. Along with others, Barnes et al. (2002: 282) consider fundamental differences in the relative priorities, perspectives and time horizons of academia and industry "a major obstacle to successful university-industry collaborations." Managing the cultural gap as one

of the key elements for a good practice model of collaboration management, they refer to the bridging of differing priorities/timescales, publishing in the public domain, the academic laissez-faire approach, industry's lack of flexibility, and IPR & confidentiality.

The study of Santoro and Gopalakrishnan (2000) examines the institutionalization of knowledge transfer activities between industrial firms and university research centers. This is one of few direct studies on the impact of culture on U–I knowledge interaction. Their empirical results show that knowledge transfer activities are facilitated when industrial firms have more mechanistic structures, cultures that are more stable and direction-oriented, and when the firm is more trusting on its university research center partner. Thus, they propose that the more stable and direction-oriented an organization's culture, the greater the institutionalization of knowledge transfer activities; in other words, the more flexible and change-oriented an organization's culture, the less the institutionalization of knowledge transfer activities. The key feature of stable and direction-oriented culture is thus risk-avoiding, preferring stability and status-quo rather than the uncertainty of change. In contrast, flexible and change-oriented cultures encourage risk-taking and always search for new knowledge streams. In their research the institutionalization of knowledge transfer activities include high factor loading activities like the firm's involvement in curriculum development to relatively low factor loading activities such as the number of personnel exchanges with the university research center. As we can see from the above review, U–I research and investigation on the culture is apparently within a local context, and research in cross-cultural settings remains an interesting gap. The national or societal culture, for instance, may influence U–I knowledge interaction significantly.

Cultural Relevance in the Chinese MNC Context

China is quite different from the rest of the world, and in this section we take the R&D collaboration of Finnish MNC subsidiaries with Chinese universities as an illustration, discussing the most relevant literature and our research experience regarding the role of trust and *guanxi* (informal social networking) and cultural challenges in U–I knowledge interaction in the Chinese context.

The Role of Trust and *Guanxi* In global markets it is crucial to understand the norms and conditions a company faces on foreign ground. As Doney et al. (1998: 601) wrote: "The importance and benefits of trust, and the emerging global and multicultural workplace, highlight the need for us to understand how trust develops and the ways national culture impacts the trust building process." Trust is especially fragile in cross-cultural trading relationships, because the divergent national cultures affect one's behaviour in the background. The importance of trust and trust-building processes emerge especially when a company has business units in separate countries, which have their own national and various local cultures like the case in China. Building trust is one precondition for starting collaboration, and in order to collaborate effectively in China one needs to have personal connections.

In China personal ties are nurtured and people show high loyalty to their personal networks known as *guanxi*, which are commonly used to get things done in Chinese everyday life. Plugging into the heart of economic and political life, *guanxi* grows from the power asymmetry between markets and officials, because in China (and in other emerging markets as well) the officials tend to interfere in the markets, and therefore the institutional elements cannot be trusted – law is perceived differently from cultures like the one in

Finland. Therefore it is important who you know, and who can help you sell or buy your products, and more importantly who you can trust to do so. It is also relevant if the person you know knows a person who can help you.

In some studies trust is considered as a component of *guanxi*, whereas others see that trust is an outcome of successful *guanxi*. It has been found that in collectivist cultures people tend to trust quite easily, and their motives are benevolent – *but for in-group members only* (Doney et al., 1998; Huff & Kelly, 2003). Getting into the in-group takes time and a lot of effort and nurturing. Building a relationship where there is trust between partners can be difficult and very time-consuming. Park and Luo (2001) put it felicitously in a nutshell – in China transactions often follow successful *guanxi*, while in the Western countries a relationship follows successful transactions.

The significance of trust and *guanxi* has recently been studied in connection with cross-border knowledge transfer (Buckley et al., 2006; Miesing et al., 2007; Ramasamy et al., 2006). Drawing from the case of Chinese foreign invested enterprises, Miesing et al. (2007) propose that trust-based collaboration in geographically dispersed transitional organizations is one of the key factors for successful inter-organizational knowledge transfer within transnationals. Buckley et al. (2006) examine the cultural awareness of *guanxi* and *mianzi* (face) in knowledge transfer to China. Their findings of case studies suggested that foreign investors must be aware of *guanxi* and *mianzi* in the institutions they deal with and establish institutional connections based on personal connections with local partners and government. The research findings imply that cultural awareness can affect cross-border knowledge transfer and firm performance. They argue that "given the diversity and complexity of the Chinese business environment, even for explicit knowledge to be transferred and absorbed, cultural barriers have to be removed and good inter-partner relationships have to be established." (p. 278). Also in the Chinese context, Ramasamy et al. (2006) raise an interesting question whether *guanxi* can serve as a bridge to inter-organizational knowledge transfer. In their research, *guanxi* consists of three components: trust, relationship commitment, and communication. Their results of an interview-based survey with Chinese enterprise general managers show that trust and communication are the two main channels of knowledge transfer. The authors suggest that inter-partner activities tend to be informal in China and so using informal channels (like *guanxi*) to transfer knowledge would be more desirable and practical. In the Chinese society where informality is central, *guanxi* could also improve the quality of knowledge since information passed from a *guanxi* partner to the receiver could be assured of reliability, richness and trust worthiness, thereby reducing the receiver's search cost, and allowing for more informed decisions (Luo, 1997). All these findings suggest that trust and *guanx*i may play an important role in U–I knowledge interaction in the multinational context in China.

Major Cultural Challenges Cultural challenges have much to do with the fact that we are used to thinking in our own way and tend to ignore others' mind. Taking Finland as an example, enormous cultural variations between Finland and China may lead to many difficulties and conflicts in communication and collaboration particularly because 1) it is hard to become an insider or hard to accept and collaborate with "strangers" in the Chinese culture; 2) foreigners are automatically considered "outsiders"; and 3) there are enormous misunderstandings about others' intentions and behaviour due to huge cultural variations.

In Finland personal achievements are appreciated, whereas in China the benefit of an in-group is emphasized, and an individual is motivated by the collective values and attitudes. Many foreign managers have complained that Chinese employees are lacking self-initiative and sense of responsibility in terms of task execution and innovations. This might be due to that in the Chinese

culture group harmony is especially emphasized and sticking out from the group is not encouraged. Finland enjoys a rule-based culture, whereas in China personal relations or *guanxi* often override rules and regulations. Consequently, foreign partners encounter many problems in sticking to the contracts and documented procedures, whereas Chinese tend to emphasize long-term relationships and trust, and expect much flexibility from their collaborators in updating the contracts and procedures whenever necessary. In this sense, it is contracting rather than contracts that are more important in their daily business life. Even laws work differently; in Finland and other Nordic countries, they are obeyed, whereas in China they are avoided if possible. Contracts can be important in binding people to work together in Finland, whereas in China, social networking plays a far more important role in collaboration. Moreover, the importance of informality in the Chinese culture is obvious. An official group is often different from a social group. The former represents hierarchic and vertical communication on the one side, and the latter one the informal and horizontal dimension of collaboration that most likely makes things happen. The latter and informal part is more like a hidden rule which is rarely understood by Westerners. In our view, to be aware of the above cultural variations helps to understand others' views, and therefore greatly furthers cross-cultural communication and collaboration. Common language and the shared social knowledge, as believed by Buckley et al. (2005), are particularly important for the transfer of knowledge across national borders within multinational enterprises.

Our Interviews and Discussion An interview round was conducted when one of the authors attended *the Academia Summit* 2006 *Beijing* organized by a Finnish MNC. Five Chinese professors with experience in collaborating with MNCs were interviewed. They were from three Chinese universities in the field of ICT. In June 2007, two of the authors conducted another round of interviews in five universities of the forest and printing industries in China. Nineteen professors and researchers were interviewed, most of whom quite experienced with collaborating with MNCs. The two rounds of interviewing in China worked as a pilot study for our future project on U–I collaborative knowledge creation and innovation. Each interview took approximately one hour. Based on the interviews of our pilot study, it can be said that *guanxi* and knowing the right people play an influential role at the beginning of U–I collaboration. It seems that the negotiations for joint projects are normally initiated by people who are acquainted from before and share some personal history or background.

There are various challenges in U–I collaboration between MNCs and Chinese universities. According to the interviewees the biggest challenges are related to the differences of the organizations in culture and knowledge. Universities differ from companies as institutions. Where companies aim to gain financial benefit with their operations, universities are non-profit making organizations. Yet, companies aim to carry out applied research, whereas universities are interested in basic and explorative research. Some professors also felt that the differences in management styles were very frustrating. University professors are used to flexible and long-term research with freedom, whereas companies demand reports of the achieved results on a constant basis; the rhythm is different. One example of a favourable company partner was mentioned, namely Intel. This is simply because the company strongly invests in basic research and gives freedom to the university to manage their research in their own style. One very problematic challenge was mentioned and that is the issue of IPRs. This issue is on the lips of both the company and university representatives. Chinese professors felt that the dilemma with IPRs is related to the publication of the results. Companies want to wait for the patents to be approved before publishing any critical information, whereas for researchers such waiting might be harmful, since the PhD

degrees and promotions are dependent on the number of publications.

In the future the main motivation factors for U–I collaboration in Chinese universities may remain the same. However, the forms of collaboration may take a more intensive course. The interviewed professors could see the universities and the MNCs working closer both physically and mentally, and sharing working forces and knowledge to a larger extent than before. Since both partners in U–I collaboration pursue to create new knowledge out of the collaboration, the best result can be achieved when the partners have a shared understanding and a common goal throughout the whole project.

Summary and a Way Forward

As reviewed, Santoro and Goplalakrishnan (2000) examined the relationship between cultural traits and the institutionalization of U–I knowledge transfer activities. On the organizational level of cultural impact, some other studies have introduced different cultural dimensions which we think might have much to do with our study context. They include, for instance, the close relation between organizational innovation and the competing values model of organizational culture (the four orientations of support, rules, innovation and goal) (Quinn, 1988 / Ahteela et al., in press) and the time perspective between long and short term (Kilmann & Saxton, 1983). All these cultural models are largely interrelated. Studies on the impact of culture on U–I knowledge interaction, however, have so far been conducted at the organizational level of culture.

As we discussed, there are some specific characteristics related to the Chinese culture like *guanxi*. We can assume that the national culture may have a significant role in U–I collaboration as well and it would be necessary to take it into account in our study context. In broader literature on inter-cultural organizational collaboration and knowledge interaction, we found that various cultural influences are, actually, mostly discussed at the level of national cultures. Among them, national cultural influences refer to, for instance, the national cultural patterns in terms of the dimensions of individualism–collectivism and verticalness–horizontalness (Bhagat et al., 2002), national cultural characteristics in terms of Chinese *guanxi* (personal connections) and *mianzi* (face) (Buckley et al., 2006; Ramasamy et al., 2006), and national cultural dimensions originally introduced by Hofstede including individualism/collectivism, power distance, uncertainty avoidance, and masculinity/femininity (Lucas, 2006). In other studies, cross-cultural differences and their influences in multinational contexts are differentiated as those in language barriers, conceptions of quality and prioritization of cost reduction (Kohlbacher & Krähe, 2007), common language and shared social knowledge (Buckley et al., 2005), and Japanese *organizational* versus the British *professional* societal settings (Lam, 1997). Recent studies particularly discuss the impact of political culture and national culture on the firm's choice of exploration-exploitation knowledge strategy and the paradox in capability development in international contexts (Ambos & Schlegelmilch, 2008; Armagan & Ferreira, 2005).

Drawing also from inter-cultural collaboration literature, we found that the discussion on cultural influence is often related to some aspects of knowledge that moderate cultural influences. They are, for instance, discussions on the nature of knowledge (Bhagat et al., 2002; Simonin, 1999; Szulanski, 2003), knowledge type (Bhagat et al., 2002; Buckley et al., 2005), knowledge gap (Wang & Lu, 2007) and knowledge structure (Lam, 1997). However, our study focuses on different modes of knowledge interaction as reviewed, in which knowledge transfer is only one type. We argue that in addition to those aspects of knowledge, different modes and intensity of knowledge interaction along with corresponding strategies should be taken into account and thus carefully examined. We propose that in the context of MNCs' collaboration

with Chinese research organizations, the relative importance of multi-level cultural influences on cross-border knowledge interaction may differ due to the intensity of knowledge interaction: *the more interactive knowledge interaction is, the more significant the impact of culture is.* Particularly in the form of collaborative knowledge creation, knowledge is not something given but constantly modified, integrated and constructed in collaboration between the parties, and thus it requires the strongest involvement and commitment from both or more collaborative parties. In this regard, we believe the role of culture is the most significant of all.

IMPLICATIONS FOR FUTURE RESEARCH

Several implications could be drawn from our review and analysis in the chapter. First of all, U–I studies are likely to be conducted in a local context, and research in multinational and cross-cultural settings remain an interesting gap. Particularly in examining multi-level cultural influences, the study on MNC subsidiaries' R&D collaboration with local universities may provide an ideal case. Secondly, in early studies, technology and knowledge transfer is obviously the most examined topic. Other forms we identified as interactive knowledge integration and collaborative knowledge creation seem neglected to a large extent although they differ substantially from the knowledge transfer type in organizational partnership. This is especially in the case of collaborative knowledge creation, where strong involvement and commitment from both or more collaborative parties are required. In this regard, we believe the role of culture to be the most evident. We suggest that much more attention need to be paid to collaborative knowledge creation and its deep underlying cultural mechanisms. And thirdly, the previous studies on inter-cultural collaboration and knowledge interaction also draw our attention to knowledge-specific variables themselves (the nature and type of knowledge, knowledge structure and knowledge gap as discussed in the paper). We propose that the significance of the cultural impact may differ due to the intensity of knowledge interaction, and it may accumulate with the increasing intensity of knowledge interaction from technology and knowledge transfer, to knowledge integration and collaborative knowledge creation. In future studies, it would be interesting to test the proposition empirically.

Moreover, some related methodological issues and empirical cross-cultural research deserve particular attention: 1) when studying the impact of the national culture we need to consider moderating influences. They can be, for instance, individual, group and situational characteristics, dynamic aspects of culture as moving cultures and cultural interactions, and remote and contrast institutional contexts (MNC subsidiaries vs local universities). 2) The study of the national culture should not remain at a level of addressing whether or not the national culture makes a difference, but should focus on *how* and *when* it makes a difference (Leung et al., 2005). The study of U–I knowledge interaction involving dissimilar cultural contexts may provide a work-related situation in which detailed information in terms of the efficiency of knowledge development could be explored and utilized in practice. 3) Cultural factors cannot be seen as an isolated influence. They are often mixed with other contextual factors and conditions such as cohort, gender, race as well as institutional, political, historical, or economic influences which must be cautiously treated.

CONCLUSION

The existing literature in cross-border knowledge interaction is nearly all about knowledge transfer. We argue in this book chapter that knowledge management research should pay ample attention to more interactive types of knowledge interaction,

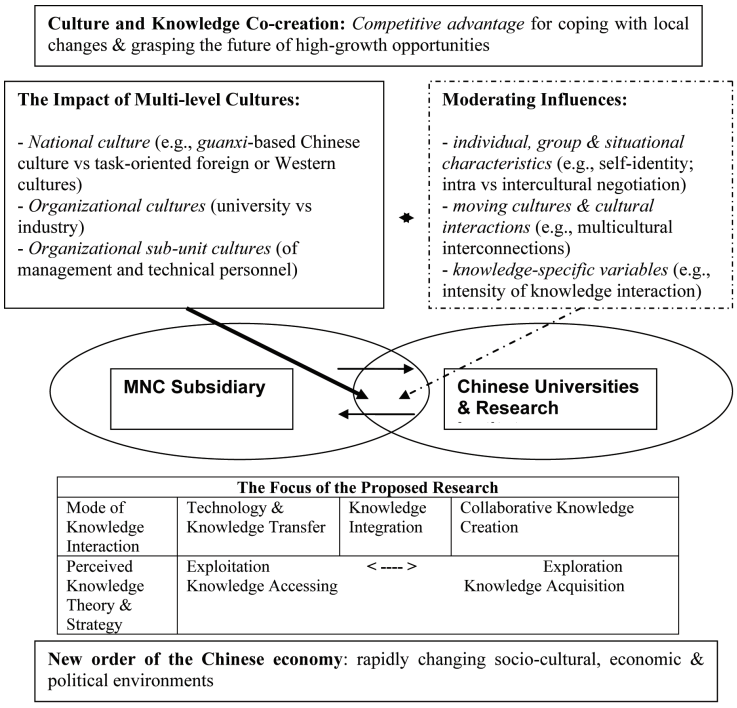
which seem to be the emerging forms of collaboration and networking particularly in today's rapidly changing markets like China. The interactive knowledge-based collaboration is particularly evident in R&D collaboration between MNC subsidiaries and Chinese universities/research institutes. In the rapidly changing business and technology environment in China, things are hard to predict in the long term and there are no ready answers ahead. In this context, a two-way interactive and collaborative knowledge creation mode increasingly becomes a necessity as well as a challenge for MNCs to gain competitive advantage in innovation. The knowledge created in such a context is often tentative and the meaning of it is constantly negotiated based on long-term trust, creative dialogue and open discussions. Under such circumstances, the examination of cultural influences also needs to be given attention and approached in these new international contexts.

Furthermore, we found that the impact of culture on U–I knowledge interaction is examined only at one level of organizational culture. We suggest that particularly in multinational organizational contexts, the impact of the national culture should be taken into account. This is not something new as it has been shown in new cross-cultural research and suggested from a broader research context of inter-cultural organizational collaboration and knowledge interaction, as we reviewed in the paper. What is new is that we note that U–I studies have so far concentrated on the collaboration issues and knowledge interaction only in a local context within the same regional or national systems, and research in multinational and cross-cultural settings remain an interesting gap. Cultural issues have therefore not received enough attention in present U–I knowledge interaction studies.

Based on the above-mentioned argumentation and as a result of our own theorizing, we would propose a tentative conceptual framework in which both multi-level cultural influences and different modes of knowledge interaction are considered for studying the impact of culture on U–I knowledge interaction in the Chinese MNC context (Figure 2). In the framework, the case study strategy of a single MNC subsidiary operating in China is employed due to the exploratory nature of the study, focusing on R&D collaboration with Chinese universities and research institutes. The impact of culture is examined at three levels: local Chinese culture in contrast to foreign or Western cultures (collectivism vs individualism; verticalness vs horizontalness; *guanxi*-based Chinese culture vs task-oriented foreign or Western cultures), organizational cultures between universities and companies (long-term vs short-term planning; flexible & change-oriented vs stable & direction oriented) and organizational sub-unit cultures (management vs technical personnel). Moderating influences are related to three types of variables: 1) individual, group & situational characteristics (e.g., individual or self identity may amplify the impact of culture on beliefs – in every culture, there are people who hold beliefs different from those typical; intra vs intercultural negotiation among managers from different nations), 2) moving cultures & cultural interactions (e.g., the increasing interconnections between cultures), and 3) knowledge-specific variables (nature & type of knowledge, knowledge structure, knowledge gap, intensity of knowledge interaction). The focus of proposed research is on both the perceived knowledge theories and strategies (exploitation-exploration) and the modes of knowledge interaction (technology & knowledge transfer, knowledge integration, and collaborative knowledge creation).

To apply and develop such a conceptual framework should be sensitive to the alignment and tensions between collaboration parties and between organizational level efforts and external socio-cultural, economic & political enabling or coercing forces. We believe the proposed framework and research could help researchers and the like examine and identify cultural differences and barriers in building effective MNC U–I knowledge-based collaboration with local

Figure 2. A Tentative Conceptual Framework for Studying the Impact of Culture on U–I Knowledge Interaction in the Chinese MNC Context.



universities and research institutes for gaining competitive advantage in coping with changes and grasping the future of high-growth opportunities in the emerging markets like China.

Thus, the most important managerial implication we could suggest is related to one of the MNCs' pressing research needs and challenges in coping with changes and throbbing with the pulse of future markets. For MNCs operating in dissimilar cultures and rapidly changing markets like in China, one of the biggest challenges is to understand and model future customer needs in high velocity markets (with rapid and discontinuous changes, see Schreyögg & Kliesch, 2005) and to act accordingly. Here we refer to MNCs whose time perspectives are associated with long-term visioning – time horizons 2-3, for instance, as called by Mehredad Baghai from the Mckensey: Horizon 2 to onboarding the next generation of high-growth opportunities in the pipeline, and Horizon 3 to incubating the germs of new businesses that will sustain the franchise far into the future. Drawing from our theorizing and research experience, we believe that the key to cope with such a challenge is first to build up *knowledge-based collaboration* with local research communities who actively interact with local marketing environments and customers of all types in order to transfer, integrate and co-create knowledge with the company. Clearly, there seems no shortcut or the best method that could be used for direct prediction or modelling purposes in hectic and turbulent business environments, but to build relatively stable and long-term knowledge-based

collaboration and relationship with local research organizations. In this regard, building *guanxi* and trust encourages collaboration; especially in China it initiates, facilitates and intensifies collaboration and knowledge interaction when there are personal connections and various channels of informal social networking. China's huge talent pool increasingly attracts MNCs to look for new forms of long-term and deeper collaboration with Chinese universities and research institutes. This apparently provides a rare opportunity and new landscape for both researchers and practitioners in which knowledge and competence co-creation might be reinforced.

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REFERENCES

Adair, W. L., Okumura, T., & Brett, J. M. (2001). Negotiation behavior when culture collide: The Unites States and Japan. *The Journal of Applied Psychology*, *86*(3), 371–385. doi:10.1037/0021-9010.86.3.371

Agrawal, A. (2001). University-to-industry knowledge transfer: Literature review and unanswered questions. *International Journal of Management Reviews*, *3*(4), 285–302. doi:10.1111/1468-2370.00069

Ahteela, R., Blomqvist, K., & Puumalainen, K. (in press). Linking organizational culture and trust to organizational innovativeness. *Creativity and Innovation Management*.

Almeida, P., & Phene, A. (2004). Subsidiaries and knowledge creation: The influence of the MNC and host country on innovation. *Strategic Management Journal*, *25*, 847–864. doi:10.1002/smj.388

Almeida, P., Song, J. Y., & Grant, R. M. (2002). Are firms superior to alliances and markets? An empirical test of cross-border knowledge building. *Organization Science*, *13*(2), 147–161. doi:10.1287/orsc.13.2.147.534

Ambos, B., & Schlegelmilch, B. B. (2008). Innovation in multinational firms: Does cultural fit enhance performance? *Management International Review*, *48*(2), 189–206. doi:10.1007/s11575-008-0011-2

Armagan, S., & Ferreira, M. P. (2005). The impact of political culture on firms' choice of exploitation-exploration internationalization strategy. *International Journal of Cross Cultural Management*, *5*(3), 275–291. doi:10.1177/1470595805058791

Awazu, Y. (2007). Managing knowledge within and across geographic borders: The role of culture. *Knowledge and Process Management*, *14*(3), 145–147. doi:10.1002/kpm.288

Barnes, T., Pashby, I., & Gibbons, A. (2002). Effective university-industry interaction: A multi-case evaluation of collaborative R&D projects. *European Management Journal*, *20*(3), 272–285. doi:10.1016/S0263-2373(02)00044-0

Bhagat, R. S., Kedia, B. L., Harveston, P. D., & Triandis, H. C. (2002). Cultural variation in the cross-border transfer of organizational knowledge: An integrative framework. *Academy of Management Review*, *27*(2), 204–221. doi:10.2307/4134352

Bloor, G., & Dawson, P. (1994). Understanding professional culture in organizational context. *Organization Studies*, *15*(2), 275–295. doi:10.1177/017084069401500205

Boyle, D. P. (1999). The road less traveled: Cross-cultural, international experiential learning. *International Social Work*, *42*(2), 201–214. doi:10.1177/002087289904200208

Bröchner, J., Rosander, S., & Waara, F. (2004). Cross-border post-acquisition knowledge transfer among construction consultants. *Construction Management and Economics*, *22*, 421–427. doi:10.1080/0144619042000240003

Buckley, P. J., & Carter, M. J. (1999). Managing cross-border complementary knowledge: Conceptual development in business process approach to knowledge management in multinational firms. *Int. Studies of Mgt. & Org.*, *29*(1), 80–104.

Buckley, P. J., Carter, M. J., Clegg, J., & Tan, H. (2005). Language and social knowledge in foreign-knowledge transfer to China. *International Studies of Management & Organization*, *35*(1), 47–65.

Buckley, P. J., Clegg, J., & Tan, H. (2006). Cultural awareness in knowledge transfer to China – The role of *guanxi* and *mianzi. Journal of World Business*, *41*, 275–288. doi:10.1016/j.jwb.2006.01.008

Bukh, P. N., & Johanson, U. (2003). Research and knowledge interaction: Guidelines for intellectual capital reporting. *Journal of Intellectual Capital*, *4*(4), 576–587. doi:10.1108/14691930310504572

Chatman, J. A., & Barsade, S. G. (1995). Personality, organizational culture, and cooperation: Evidence from a business simulation. *Administrative Science Quarterly*, *40*(3), 423–443. doi:10.2307/2393792

Child, J. (994). *Management in China during the age of reform*. Cambridge, UK: Cambridge University Press.

Clark, T. (1990). International marketing and national character: A review and proposal for an integrative theory. *Journal of Marketing*, 66–79. doi:10.2307/1251760

Craig, C. S., & Douglas, S. P. (2006). Beyond national culture: Implications of cultural dynamics for consumer research. *International Marketing Review*, *23*(3), 322–342. doi:10.1108/02651330610670479

Cyert, R. M., & Goodman, P. S. (1997). Creating effective university-industry alliances: An organizational learning perspective. *Organizational Dynamics*, *25*(4), 45–57. doi:10.1016/S0090-2616(97)90036-X

Daghfous, A. (2003). Uncertainty and learning in university-industry knowledge transfer projects. *Journal of American Academy of Business*, *3*(1/2), 145–151.

Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Boston, MA: Harvard Business School Press.

Declercq, G. V. (1981). A third look at the two cultures: The new economic responsibility of the university. *International Journal of institutional Management in Higher Education, 5*(2), 117-122.

Doney, P. M., Cannon, J. P., & Mullen, M. R. (1998). Understanding the influence of national culture on the development of trust. *Academy of Management Review*, *23*(3), 601–620. doi:10.2307/259297

Elmuti, D., Abebe, M., & Nicolosi, M. (2005). An overview of strategic alliances between universities and corporations. *Journal of Workplace Learning*, *17*(1/2), 115–129. doi:10.1108/13665620510574504

Eun, J. H., Lee, K., & Wu, G. (2006). Explaining the *university-run enterprises* in China: A theoretical framework for university-industry relationship in developing countries and its application to China. *Research Policy*, *35*, 1329–1346. doi:10.1016/j.respol.2006.05.008

Florida, R. (2002). *The rise of the creative class.* New York*:* Basic Books.

Fu, P. P., Tsui, A. S., & Dess, G. G. (2006). The dynamics of *guanxi* in Chinese high-tech firms: Implications for knowledge management and decision making. *Management International Review*, *46*(3), 277–305. doi:10.1007/s11575-006-0048-z

Fukugawa, N. (2005). Characteristics of knowledge interactions between universities and small firms in Japan. *International Small Business Journal*, *23*(4), 379–401. doi:10.1177/0266242605054052

Gassmann, O., & Han, Z. (2004). Motivations and barriers of foreign R&D activities in China. *R & D Management*, *34*(4), 423–437. doi:10.1111/j.1467-9310.2004.00350.x

Gopalakrishnan, S., & Santoro, M. D. (2004). Distinguishing between knowledge transfer and technology transfer activities: The role of key organizational factors. *IEEE Transactions on Engineering Management*, *51*(1), 57–69. doi:10.1109/TEM.2003.822461

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, *17*, 109–122. doi:10.1002/(SICI)1097-0266(199602)17:2<109::AID-SMJ796>3.0.CO;2-P

Grant, R. M., & Baden-Fuller, C. (2004). A knowledge accessing theory of strategic alliances. *Journal of Management Studies*, *41*(1), 62–84. doi:10.1111/j.1467-6486.2004.00421.x

Gu, S.-L., & Lundvall, B. -Å. (2006). Policy learning as a key processes in the transformation of the Chinese innovation systems. In B.-Å. Lundvall, et al. (Eds.), *Asia's innovation systems in transition*. Cheltenham, UK: Edward Elgar.

Guan, J. C. (2005). Collaboration between industry and research institutes/universities on industrial innovation in Beijing, China. *Technology Analysis and Strategic Management*, *17*(3), 339–353. doi:10.1080/09537320500211466

Gupta, A. K., Smith, K. G., & Shalley, C. E. (2006). The interplay between exploration and exploitation . *Academy of Management Journal*, *49*(4), 693–706.

Gustavs, J., & Clegg, S. (2005). Working the knowledge games? Universities and corporate organizations in partnership. *Management Learning*, *36*(1), 9–30. doi:10.1177/1350507605049900

Hansson, F. (2007). Science parks as knowledge organizations – the "ba" in action? *European Journal of Innovation Management*, *10*(3), 348–366. doi:10.1108/14601060710776752

Hasu, M., Helle, M., & Kerosuo, H. (2005). *Ethnography in expansion – emergent trends and future challenges*. Paper presented at the First ISCA Congress, Seville.

Hedlund, G., & Nonaka, I. (1993). Models of knowledge management in the West and Japan. In P. Lorange, B. Chakravarthy, J. Roos, & A. van Der Ven (Eds.), *Implementing strategic processes: Change, learning and co-operation*. Oxford, UK: Blackwell Business.

Heikkinen, J., Blomqvist, K., & Hong, J. Z. (2007). *Ba for knowledge creation in Sino-Western university-industry collaboration*. Paper presented in the Conference of EBRF 2007 - Research Forum to Understand Business in Knowledge Society, Agora - Jyväskylä, Finland.

Hermans, H. J. M., & Kempen, H. J. G. (1998). Moving cultures: The perilous problems of cultural dichotomies in a globalizing society. *The American Psychologist*, *53*(10), 1111–1120. doi:10.1037/0003-066X.53.10.1111

Hermans, J., & Castiaux, A. (2007). Knowledge creation though university/industry collaborative research projects. [Retrieved from http://www.ejkm.com]. *Electronic Journal of Knowledge Management*, *5*(1), 43–54.

Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. Newbury Park, CA: Sage Publications.

Hofstede, G. (1997). *Cultures and organizations: Software of the mind: Intercultural cooperation and its importance for survival*. New York: McGraw-Hill.

Hofstede, G., & Bond, M. (1988). The Confucian connection: From cultural roots to economic growth. *Organizational Dynamics*, *16*(4), 4–21. doi:10.1016/0090-2616(88)90009-5

Holden, N. J. (2002). *Cross-cultural management: A knowledge management perspective*. Harlow, UK: Pearson Education.

Hong, J., Heikkinen, J., & Niemi, M. (2007). Collaborative knowledge creation and innovation between MNCs and Chinese universities, In B. Martins & D. Remenyi (Eds.), *Proceedings of the 8th European Conference on Knowledge Management, 1* (pp. 486-449). Barcelona, Spain: Consorci Escola Industrial de Barcelona.

Hong, J. Z., & Engeström, Y. (2004). Changing communication principles between Chinese managers and workers: Confucian authority chains and *guanxi* as social networking. *Management Communication Quarterly*, *17*, 552–585. doi:10.1177/0893318903262266

Hong, J. Z., Kianto, A., & Kyläheiko, K. (2008). Moving culture and the creation of new knowledge and dynamic capabilities in emerging markets. *Knowledge and Process Management*, *15*(3), 196–202. doi:10.1002/kpm.310

House, R. J., et al. (2004). *Culture, leadership, and organizations: The GLOBE study of 62 societies.* Beverly Hills, CA: Sage.

Huff, L., & Kelley, L. (2003). Levels of organizational trust in individualist versus collectivist societies: A seven-nation study. *Organization Science*, *14*(1), 81–90. doi:10.1287/orsc.14.1.81.12807

Huggins, R., Demirag, M., & Ratcheva, V. I. (2007). Global knowledge and R&D foreign direct investment flows: Recent patterns in Asia Pacific, Europe, and North America. *International Review of Applied Economics*, *21*(3), 437–451. doi:10.1080/02692170701390437

John-Steiner, V. (2000). *Creative collaboration*. New York: Oxford University Press.

Johnson, W. H. A., & Johnson, D. A. (2004). Organisational knowledge creating processes and the performance of university-industry collaborative projects. *International Journal of Technology Management*, *27*(1), 93–114. doi:10.1504/IJTM.2004.003883

Johnston, S., & Paladino, A. (2007). Knowledge management and involvement in innovations in MNC subsidiaries. *Management International Review*, *47*(2), 281–302. doi:10.1007/s11575-007-0016-2

Khavul, S., Bruton, G. D., Zheng, C. C., & Wood, E. (2007). Learning during and after internationalization by entrepreneurial firms from emerging economies. *Academy of Management Proceedings*, 1-6.

Kilmann, R. H., & Saxton, M. J. (1983). *Kilmann-Saxton cultural gap survey*. Pittsburgh, PA: Organization Design Consultants.

King, W. R. (2007). A research agenda for the relationships between culture and knowledge management. *Knowledge and Process Management*, *14*(3), 226–236. doi:10.1002/kpm.281

Kodama, M. (2003). Knowledge creation through the synthesizing capability of networked strategic communities: Case study on new product development in Japan. *Knowledge Management Research & Practice*, *1*, 77–85. doi:10.1057/palgrave.kmrp.8500012

Kodama, M. (2005). New knowledge creation through dialectical leadership: A case of IT and multimedia business in Japan. *European Journal of Innovation Management*, *8*(1), 31–55. doi:10.1108/14601060510578565

Kohlbacher, F., & Krähe, M. O. B. (2007). Knowledge creation and transfer in a cross-cultural context – empirical evidence from Tyco Flow Control. *Knowledge and Process Management*, *14*(3), 169–181. doi:10.1002/kpm.282

Koschatzky, K. (2002). Networking and knowledge transfer between research and industry in transition countries: Empirical evidence from Slovenian innovation system. *The Journal of Technology Transfer*, *27*(1), 27–38. doi:10.1023/A:1013192402977

Kubota, H., & Nishida, T. (2003). Channel design for strategic knowledge interaction. In . *Proceedings of the KES*, *2003*, 1037–1043.

Lam, A. (1997). Embedded firms, embedded knowledge: Problems of collaboration and knowledge transfer in global cooperative ventures. *Organization Studies*, *18*(6), 973–996. doi:10.1177/017084069701800604

Lambooy, J. G. (2004). The transmission of knowledge, emerging networks, and the role of university: An evolutionary approach. *European Planning Studies*, *12*(5), 643–657. doi:10.1080/0965431042000219996

Lee, Y. S. (1996). Technology transfer and the research university: A search for the boundaries of university-industry collaboration. *Research Policy*, *25*, 843–863. doi:10.1016/0048-7333(95)00857-8

Leung, K., Bhagat, R. S., Buchan, N. R., Erez, M., & Gibson, C. B. (2005). Culture and international business: Recent advances and their implications for future research. *Journal of International Business Studies*, *36*, 357–378. doi:10.1057/palgrave.jibs.8400150

Li, J., & Zhong, J. (2003). Explaining the growth of international R&D alliances in China. *Managerial and Decision Economics*, *24*, 101–115. doi:10.1002/mde.1079

Li, J. D. (2005). *A study on R&D collaboration between MNCs and Chinese universities* (in Chinese). Unpublished master's thesis, Tsinghua University, China.

Li, S., & Scullion, H. (2006). Bridging the distance: Managing cross-border knowledge holders. *Asia Pacific Journal of Management*, *23*, 71–92. doi:10.1007/s10490-006-6116-x

Lin, L. (2005). *Study on the university-enterprise knowledge alliance based on the theory of knowledge activity system* (in Chinese). Unpublished doctoral dissertation, Dalian University of Technology: Dalian.

Lindqvist, J., Blomqvist, K., & Saarenketo, S. (2007). The role of sales subsidiary in MNC innovativeness - Explorative study and emerging issues on knowledge transfer. In R.R. Sinkovics and M. Yamin (Eds), *Anxieties and Management Responses in International Business*. Houndmills, Basingstoke, UK: Palgrave MacMillan.

Lopez -Martinez, E. et al. (1994). Motivations and obstacles to university-industry coop eration (UIC): A Mexican case. *R & D Management*, *24*(2), 17.

Lucas, L. (2006). The role of culture on knowledge transfer: The case of the multinational corporation. *The Learning Organization*, *13*(3), 257–275. doi:10.1108/09696470610661117

Luo, Y. D. (1997). *Guanxi*: Principles, philosophies, and implications. *Human Systems Management*, *16*(1), 43–51.

March, J. G. (1991). Exploration and exploitation in organizational learning . *Organization Science*, *2*(1), 71–86. doi:10.1287/orsc.2.1.71

Markus, H., & Kitayama, S. (1991). Culture and self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*, 224–253. doi:10.1037/0033-295X.98.2.224

Meyerson, D., & Martin, J. (1987). Cultural change: An integration of three different views. *Journal of Management Studies*, *24*(6), 623–647. doi:10.1111/j.1467-6486.1987.tb00466.x

Miesing, P., Kriger, M. P., & Slough, N. (2007). Towards a model of effective knowledge transfer within transnational: The case of Chinese foreign invested enterprises. *The Journal of Technology Transfer*, *32*, 109–122. doi:10.1007/s10961-006-9006-y

Moitra, D., & Kumar, K. (2007). Managed socialization: How smart companies leverage global knowledge. *Knowledge and Process Management*, *14*(3), 148–157. doi:10.1002/kpm.278

Ng, S. I., Lee, J. A., & Soutar, G. N. (2006). Are Hofstede's and Schwartz's value frameworks congruent? *International Marketing Review*, *24*(2), 164–180. doi:10.1108/02651330710741802

Nishida, T. (Ed.). (2000). *Dynamic knowledge interaction.* Boca Ranton, FL: CRC Press.

Nishida, T. (2002). A traveling conversation model for dynamic knowledge interaction. *Journal of Knowledge Management*, *6*(2), 124–134. doi:10.1108/13673270210424657

Nonaka, I. (2007). The knowledge-creating company. *Harvard Business Review*, *85*(7/8), 162–171.

Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford, UK: Oxford University Press.

Nonaka, I., Toyama, R., & Konno, N. (2000). SECI, ba and leadership: A unified model of dynamic knowledge creation. *Long Range Planning*, *33*, 5–34. doi:10.1016/S0024-6301(99)00115-6

Park, S. H., & Luo, Y. (2001). *Guanxi* and organizational dynamics: Organizational networking in Chinese firms. *Strategic Management Journal*, *22*, 455–477. doi:10.1002/smj.167

Perkmann, M., & Walsh, K. (2006). *Relationship-based university-industry links and open innovation: Towards a research agenda* (AIM Research Working Paper Series, 041-July-2006). Loughborough University.

Pettigrew, A. (1979). On studying organizational cultures. *Administrative Science Quarterly*, *24*, 570–581. doi:10.2307/2392363

Pillania, R. K. (2005). New knowledge creation scenario in India industry. *Global Journal of Flexible Systems Management*, *6*(3&4), 49–57.

Popadiuk, S., & Choo, C. W. (2006). Innovation and knowledge creation: How are these concepts related? *International Journal of Information Management*, *26*(4), 302–312. doi:10.1016/j.ijinfomgt.2006.03.011

Ramasamy, B., Goh, K. W., & Yeung, M. C. H. (2006). Is *guanxi* (relationship) a bridge to knowledge transfer? *Journal of Business Research*, *59*, 130–139. doi:10.1016/j.jbusres.2005.04.001

Rose, R. A. (1988). Organizations as multiple cultures: A rules theory analysis. *Human Relations*, *41*(2), 139–170. doi:10.1177/001872678804100204

Ryan, L. (2007). Developing a qualitative understanding of university-corporate education partnerships. *Management Decision*, *45*(2), 153–160. doi:10.1108/00251740710727214

Sackmann, S. A. (1991). *Cultural knowledge in organizations: Exploring the collective mind*. Newbury Park, CA: Sage.

Santoro, M. (2006). Self-interest assumption and relational trust in university-industry knowledge transfer. *IEEE Transactions on Engineering Management*, *53*(3), 335–347. doi:10.1109/TEM.2006.878103

Santoro, M. D., & Gopalakrishnan, S. (2000). The institutionalization of knowledge transfer activities within industry-university collaborative ventures. *Journal of Engineering and Technology Management*, *17*, 299–319. doi:10.1016/S0923-4748(00)00027-8

Schartinger, D. (2002). Knowledge interactions between universities and industry in Austria: Sectoral patterns and determinants. *Research Policy*, *31*, 303–328. doi:10.1016/S0048-7333(01)00111-1

Schein, E. H. (1985). *Organizational culture and leadership: A dynamic view*. San Francisco, CA: Jossey-Bass.

Schein, E. H. (1996). Three cultures of management: The key to organizational learning. *Sloan Management Review*, *38*(1), 9–20.

Schreyögg, G., & Kliesch, M. (2005). *Dynamic capabilities and the development of organizational competencies* (Discussion Papers No. 25/05). Berlin: Freie Universität Berlin.

Schwartz, S. H. (1994). Beyond individualism/collectivism: New cultural dimensions of values. In U. Kim, H. C. Triandis, C. Kagitcibasi, S. C. Choi, & G. Yoon (Eds.), *Individualism and collectivism: Theory, method, and applications* (pp. 85-119). Thousand Oaks, CA: Sage.

Seigel, D. S., Waldman, D. A., Atwater, L. E., & Link, A. N. (2003). Commercial knowledge transfers from universities to firm: Improving the effectiveness of university-industry collaboration. *Journal of High Technology Research*, *14*, 111–133. doi:10.1016/S1047-8310(03)00007-5

Simonin, B. (1999). Transfer of marketing know-how in international strategic alliances: An empirical investigation of the role and antecedents of knowledge ambiguity. *Journal of International Business Studies*, *30*(3), 463–490. doi:10.1057/palgrave.jibs.8490079

Sojka, J. Z., & Tansuhaj, P. (1995). Cross-cultural research: A twenty-year review. *Advances in Consumer Research. Association for Consumer Research (U. S.)*, 461–474.

Spender, J.-C. (1992). Limits to learning from the West . *The International Executive*, *34*, 389–410.

Szulanski, G. (2003). *Sticky knowledge: Barriers to knowing in the firm*. London: SAGE.

Van Dyne, L., Vandewalle, D., Kostova, T., Latham, M. E., & Cummings, L. L. (2000). Collectivism, propensity to trust and self-esteem as predictors of organizational citicenship in a non-work setting. *Journal of Organizational Behavior*, *21*, 3–23. doi:10.1002/(SICI)1099-1379(200002)21:1<3::AID-JOB47>3.0.CO;2-6

von Zedtwitz, M. (2007). *Innovation in China – from an R&D perspective*. Presentation in Lotus Flower Day, VTT Espoo.

Wang, Y., & Lu, L. (2007). Knowledge transfer through effective university-industry interactions: Empirical experiences from China. *Journal of Technology Management in China*, *2*(2), 119–133. doi:10.1108/17468770710756068

Wartofsky, M. (1979). *Models: Representation and scientific understanding*. Dordrecht, The Netherlands: Reidel.

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University-industry knowledge interaction: case studies from Finland and China

Jianzhong Hong* and Heidi Olander

School of Business,
Lappeenranta University of Technology,
P.O. Box 20, 53851 Lappeenranta, Finland
E-mail: jhong@lut.fi
E-mail: olander@lut.fi
*Corresponding author

Abstract: The paper examines the roles of formal governance and informal social networking in University–Industry (U-I) knowledge interaction in the context of high-tech Multinational Corporations (MNCs). The issue is approached by conducting a critical literature review with empirical cases from Finland and China. Previous studies on U-I collaboration focus primarily on one-way technology and knowledge transfer. This study argues that especially in the cross-cultural context of high-tech MNCs, more interactive types of knowledge interaction should be of key concern where there are various challenges of informal governance that include, for example, interpersonal trust, mutual commitment, frequency of communication and interaction, and awareness of cultural and knowledge-related gaps between collaboration partners.

Keywords: university–industry collaboration; knowledge interaction; formal governance; informal social networking; high-tech; multinational corporations.

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Biographical notes: Jianzhong Hong PhD (Psych.) is a Senior Lecturer of Knowledge Management in the School of Business at Lappeenranta University of Technology. His articles have appeared in several international journals, including those in the areas of *Psychology*, *Education* and *Management*. His prime teaching is related to organisational learning and competence development, and his current research focuses on cultural aspects of university-industry R&D collaboration and knowledge interaction.

Heidi Olander MSc (Econ. & Bus. Adm.) is a Doctoral Candidate in Strategy Research in the School of Business at Lappeenranta University of Technology. Her research interests include strategic management, knowledge sharing and knowledge protection in collaboration, collaboration for innovation creation and the use of different governance mechanisms for organising collaborative R&D.

1 Introduction

In the current management context of rapid globalisation, strategic partnership rather than ownership has become increasingly important in knowledge development (Inkpen, 1996; Sherwood and Covin, 2008). With the changing competitive landscape, external links and horizontal networks directed at the transfer and creation of knowledge are of crucial importance for the innovative performance of firms and the advance of new technologies (Almeida and Phene, 2004; Inkpen, 1996; Li and Scullion, 2006; Santoro and Gopalakrishnan, 2000; Schartinger et al., 2002; von Hippel, 2007). Almeida et al. (2002) have shown the relative superiority of MNCs over both alliances and market mechanism in cross-border knowledge building, whereas Johnston and Paladino (2007) have noted that subsidiaries' involvement in MNCs' innovation networks tends to be associated with external factors such as the innovativeness of the industry and the degree of involvement with local organisations. Universities and research institutes undoubtedly play a key role in such networked innovation, and the importance of both the local involvement of MNC subsidiaries and the knowledge outflows has increasingly been recognised (Almeida and Phene, 2004; Johnston and Paladino, 2007; Li and Scullion, 2006; Qin et al., 2008).

This paper aims to provide a relational view on U-I knowledge interaction in the context of high-tech MNCs, including those in the health sector, exploring the role of formal governance and informal social networking in collaborative innovation. Knowledge interaction here refers to inter-organisational knowledge-based collaboration, implying knowledge exchange between two or more teams, organisations or communities that host different bodies of knowledge (Santoro and Gopalakrishnan, 2000; Schartinger et al., 2002). It is argued that a safe ground and common knowledge pool (Olander and Hurmelinna-Laukkanen, 2008) can be built into collaborative innovation by using both formal governance (e.g., contracts and Intellectual Property Rights (IPRs)) and informal social networking (e.g., personal trust and Chinese *guanxi*). The former provides scaffolding for the collaboration, and the latter creates a positive atmosphere for knowledge sharing and co-creation. The key research question asked is *how do both formal governance and informal social networking enable the organisational processes of U-I knowledge interaction?* This question is addressed with a literature review and illustrations from qualitative pilot case studies conducted in Finland and China.

More than a decade ago, Inkpen (1996) argued that the primary obstacle to success in collaboration is a failure to execute the specific organisational processes necessary to access, assimilate and disseminate alliance knowledge. Yet, little is known about cross-border knowledge interaction and its deeper underlying mechanisms (Bhagat et al., 2002; Evaristo, 2007; Li and Scullion, 2006). Previous U-I studies focus primarily on one-way technology and knowledge transfer and are limited to a local context within the same national boundary. This research contributes to the study of more interactive types of knowledge interaction, such as knowledge co-creation, in multinational and cross-cultural settings.

The paper starts by reviewing the literature on inter-organisational knowledge interaction including knowledge interaction strategies, U-I knowledge interaction approaches, and knowledge sharing and protection, which are clarified and refined in the MNC context. A relational view of cross-border knowledge interaction is then presented including the concept of the common knowledge pool and the role of both formal governance and informal social networking. After the literature

review, three pilot case studies giving three different points of view of U-I collaboration and knowledge interaction are included. On the basis of the literature review and findings from the cases, a conceptual framework is then developed and propositions for future research presented. Implications for healthcare technology firms are suggested.

2 Knowledge interaction in partnerships

There has been considerable debate in knowledge and learning literature on whether *knowledge exploitation* or *knowledge exploration* should be the focus of the firm for achieving effective knowledge interaction and value creation (March, 1991; Grant and Baden-Fuller, 2004; Gupta et al., 2006; Spender, 1992). In understanding strategic alliances, Grant and Baden-Fuller (2004), for instance, promote a knowledge-accessing theory in which they argue that the primary advantage of alliances is in *accessing* rather than *acquiring* knowledge. In the MNC context, Gupta et al. (2006) emphasise the consistency between conceptual and empirical definitions of exploitation and exploration and raise a key question: How should organisations find a balance between exploration and exploitation?

In any collaboration, managers and researchers may understand knowledge strategies differently. Some may intensively use a *knowledge exploitation* or *codification strategy*, emphasising the application of the existing knowledge; others may employ a *knowledge exploration* or *personalisation strategy*, stressing knowledge creation through collaboration. The two strategies have been differentiated and conceptualised further by Jasimuddin et al. (2005). The exploitation strategy focuses chiefly on explicit knowledge and allows knowledge to be carefully codified and stored in databases, where it is made available for use. The exploration strategy tends to focus on tacit knowledge and addresses the storage of knowledge in human minds and its transfer from person-to-person.

2.1 Knowledge interaction approaches

Depending on the knowledge theories and strategies adopted in the inter-organisational knowledge interaction, the following knowledge interaction approaches are often used in U-I collaboration and interaction: *technology and knowledge transfer, knowledge integration* and *collaborative knowledge creation* (Hong et al., 2007). In simple terms, technology and knowledge transfer is the communication of technology and knowledge from one agent to another (Hedlund and Nonaka, 1993). Knowledge integration emphasises the process of integrating and transforming *the acquired knowledge* for the firm's specific use. For Grant (1996), integrating knowledge uses comparatively less time in the learning process than transferring knowledge. Collaborative knowledge creation refers to a situation when two or more partners join and work together to create new information and knowledge, which can be used for the benefit of both or all sides, and which has potential for future innovation and development (Engeström et al., 2003; Inkpen, 1996). The focus of the approach is on creating and developing new knowledge.

In previous studies, researchers have related different knowledge interaction strategies and approaches to different organisational consequences in the development of accumulated knowledge, competence and capabilities. In many firms, knowledge interaction strategies are further differentiated, unconsciously or intentionally, in connection with the knowledge type (explicit vs. tacit), research task (basic vs. applied), capability development (exploiting vs. augmenting) and preferable knowledge strategy in the firm (codification vs. personalisation). These concepts and their inter-connections will next be described in more detail.

Explict vs. tacit knowledge: Highly tacit knowledge is more likely to be in connection with a knowledge-creation strategy (i.e., knowledge exploration) rather than a knowledge-reuse strategy (i.e., knowledge exploitation) (Hansen et al., 1999). Emphasising either explicit or tacit knowledge has both advantages and disadvantages (Jasimuddin et al., 2005).

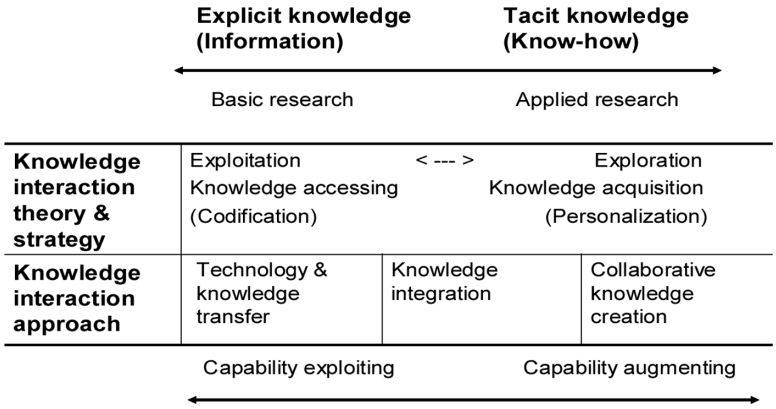
Applied vs. basic research: Applied research contains greater not-codified or tacit knowledge than basic research. Mansfield (1995), for instance, concludes from his study that in many kinds of applied R&D, it is very important for academic and firm personnel to interact and work together on a face-to-face basis, whereas in basic research such ties can be weaker and more sporadic. The finding is much in a relative sense and, nowadays, the distinction between applied and basic research is no longer so clear.

Capability exploiting vs. capability augmenting: Knowledge interaction strategies and approaches are closely linked to the firm's types of research laboratory meant to be capability exploiting vs. capability augmenting (technology transfer unit vs. global technology unit; support laboratory vs. research laboratory; exploitation laboratories vs. exploration laboratories). The former focuses on the exploitation of the firms' existing capabilities and the latter on the creation (augmentation, exploration) of new capabilities (Ambos and Schlegelmilch, 2008).

Codification vs. personalisation strategy: In a study of healthcare and high-tech industries by Hansen et al. (1999), it was found that firms pursuing an assemble-to-order product or service strategy emphasised the codification and reuse of knowledge. Those that pursued highly customised service offerings or a product innovation strategy invested mainly in person-to-person knowledge sharing.

In the light of the studies reviewed, it is proposed that knowledge interaction strategies (i.e., exploitation vs. exploration/codification vs. personalisation) and their corresponding U-I knowledge interaction approaches (i.e., technology and knowledge transfer, knowledge integration and collaborative knowledge creation) should match the knowledge type in interaction (explicit vs. tacit), research tasks at hand (applied vs. basic research), and capability development practices (capability exploiting vs. augmenting). It is the authors' belief that efficient and appropriate matching strategy can greatly enhance the effectiveness of U-I knowledge interaction in high-tech MNCs. Such alignment of knowledge interaction strategies, approaches, the knowledge type, research tasks and capability development practices can be depicted figuratively as in Figure 1.

Figure 1 Co-alignment of knowledge interaction strategies and approaches with their corresponding and dominant knowledge type, research task and capability development



2.2 Knowledge sharing and protection

From the knowledge management perspective, the idea of collaborative innovation lies in knowledge interaction: acquiring, transferring, integrating and creating new knowledge with the partner. Thus, knowledge needs to be shared with the partner throughout the whole collaboration process. However, not only knowledge sharing is needed, but also protection measures need to be considered to avoid loss of the organisations' core knowledge.

Depending on the knowledge interaction approaches of the collaborative partners, a choice must be made regarding different knowledge sharing and knowledge protection strategies. In basic research, the knowledge is often explicit (Kogut and Zander, 1992; Mansfield, 1995), and it can be more easily transferred to the partner. Applied research involves more the transfer and sharing of tacit knowledge, which calls for closer interaction between the partners.

The need for knowledge protection is high in the knowledge-accessing-based *technology and knowledge transfer* approach when trade secrets are involved and when the knowledge is tacit (Polanyi, 1966) in nature and strategically important. Need for knowledge protection becomes medium when the knowledge is codified and explicit. In the internally oriented *knowledge integration* approach, the need for knowledge protection is lower because no fear exists of the partner expropriating the knowledge. In the *collaborative knowledge creation* approach where partners co-create knowledge, the risk of losing core knowledge is higher than in the knowledge integration approach since this approach requires extensive knowledge sharing of tacit knowledge. On the other hand, transferring highly tacit knowledge to the partner is difficult and the tacit nature of knowledge can even act as a protection mechanism for unwanted knowledge expropriation (Norman, 2002).

If the partner does not share enough knowledge, the collaboration will likely fail. Yet, if knowledge sharing is careless, core knowledge could be lost, which could jeopardise future business. Thus, the partners need to find a balance governing their knowledge sharing. Knowledge interaction and its major approaches in terms of knowledge sharing and protection features are summarised in Table 1.

Table 1 Knowledge interaction approaches in terms of knowledge sharing and protection

	Knowledge interaction approach		
	Technology and knowledge transfer	*Knowledge integration*	*Collaborative knowledge creation*
Knowledge sharing	Internal and external	Internal	Internal and external
Knowledge protection	Medium (codified knowledge) High (trade secret; tacit)	Low	High

3 Relational view of cross-border knowledge interaction

The relational view of cooperative strategy states that the relationship between the collaborating firms may be a source for inter-organisational competitive advantage (Dyer and Singh, 1998). From the relational view, U-I collaboration and knowledge interaction increasingly become key assets for the collaboration and for gaining competitiveness in the global market.

3.1 Common knowledge pool

The use of different governance mechanisms enables collaborating organisations to create a common space, which can be called a common knowledge pool, where they transfer their knowledge to each other and thus enable the creation of new knowledge based on the increased access to the partner's background knowledge, i.e., the intellectual property (e.g., patents, trademarks, copyright, trade secrets, knowledge and ideas) that each organisation possesses before engaging in collaboration.

3.2 Role of formal governance

Formal governance mechanisms, which can be used to protect intellectual assets, include for example contracts and IPRs. Formal governance is used in U-I knowledge interaction to prevent unwanted knowledge leaks (Reuer and Ariño, 2005), which could occur because of a partner's opportunistic behaviour and which can be safeguarded against by using contracts (Woolthuis et al., 2005). The fear of knowledge leaks results from the need to share background knowledge quite openly. The use of IPRs may allow partners to share their knowledge more openly without fear of losing proprietary assets.

When developing the scaffolding of the collaboration, the collaborating entities need to set ground rules by agreeing on important issues related to their collaborative effort: the obligations, responsibilities and rights of the partners (Ferguson et al., 2005). Contracts are used in collaboration to prepare for future ventures and to reduce risk and uncertainty in the business relationship (Lusch and Brown, 1996). Formal governance, in particular contracting, can also be seen as creating trust by defining a safe ground for partners to operate in. On the other hand, too tight formal governance and the inappropriate use of contracts can damage trust between partners (Macaulay, 1963). The unpredictability of the future makes contracts incomplete, which is why it is essential that formal governance is supplemented by informal social networking.

3.3 Role of informal social networking

Formal structures and governance will not work without the support of informal social relationships and networking in organisational communication and knowledge management (Adler, 1993, 2001; Hong and Engeström, 2004; Nonaka and Takeuchi, 1995; Ring and van de Ven, 1994). Adler (2001), for example, notes that informal governance, including relational capital and trust, plays a significant role in managing knowledge flows between collaborative partners. Informal social governance and trust are generally considered key mechanisms in enhancing collaborative communication, knowledge sharing and commitment (Adler, 2001; Grant, 1996; Kogut and Zander, 1992; Luo, 1997; Sheu et al., 2006). Furthermore, informal social networking is particularly important in relation-oriented cultures and societies like China. Weir and Hutchings (2005), for instance, claim that key to understanding knowledge management in the Arab world and China is recognising the networked nature of these societies.

The significance of trust and Chinese *guanxi* (informal social networking) has recently been studied in connection with cross-border knowledge transfer (Buckley et al., 2006; Miesing et al., 2007; Ramasamy et al., 2006). In the Chinese culture, managers and organisational members will only share knowledge with those with whom they already have a trustful relationship (Weir and Hutchings, 2005). Knowledge sharing in joint ventures, for example, is problematic because of the potential of divisions between local employee insiders and foreign management outsiders (Hutchings and Michailova, 2004; Weir and Hutchings, 2005). In other research, however, it has been found that *guanxi* orientation plays an important role in knowledge-sharing intention. Huang et al. (2008) observed that the *guanxi* orientation of the Chinese is quite high: They are inclined to maintain a good relationship with people around them. Quite often, they will treat their colleagues in a friendly way and hope to create a harmonious atmosphere. This characteristic makes them willing to share their knowledge and skills to help others since this could help facilitate a smooth working relationship.

In relation-oriented cultures, the priority is given to a personalisation strategy and tacit knowledge (Hansen et al., 1999; Bhagat et al., 2002). As Hasen et al. (1999, p.108) note, "To make the personalization strategies work, firms like Bain invest heavily in building networks of people". In explaining China's path towards modernisation, which is very different from that of the West, Boisot and Child (1996, p.622) contend that China's economic reforms and decentralisation have led "not to markets but to clans and permits the more local and personalised institutional order". It is, moreover, argued that people in individualistic cultures (e.g., Scandinavian nations) emphasise explicit knowledge, whereas those in collectivist cultures (e.g., China) emphasise tacit information and knowledge (Bhagat et al., 2002).

4 Methodology and preliminary findings

To examine how knowledge interaction in U-I collaboration can be governed in an effective manner, the above-reviewed concepts will now be discussed with illustrations from our qualitative pilot case studies. According to Yin (2003) and Auerbach and Silverstein (2003), cases should be chosen on a theoretical basis and not for statistical reasons; the researcher chooses cases that involve information related to the research

concerns in question. Thus, theory rather than randomness determines which cases constitute the sample. The logic used to choose a single case or multiple cases is to find information-rich cases using purposeful sampling (Patton, 2002) combined with convenience sampling (Auerbach and Silverstein, 2003), meaning cases to which the researchers have access. The cases in this study illustrate the same phenomenon from various perspectives. The aim is not to make statistical generalisations or to find explicit answers but to study the kinds of knowledge interaction processes found in U-I collaboration.

A Finnish private research centre (Case 1), a Finnish MNC (Case 2), and a Chinese research institute (Case 3) were chosen for study. These organisations are not a network but separate institutes working in different business areas, although the organisations in Cases 2 and 3 have had a collaboration relationship. The authors interviewed one person in Case 1 (in Finnish) and Case 3 (in Chinese), and two persons in Case 2. The first interview and discussion in Case 2 were conducted in Finnish and the second one in Chinese. The interviews took place in Finland and in China between July 2008 and January 2009.

4.1 Pilot case studies on university–industry collaboration

The person interviewed in Case 1 was the CEO of the Finnish, internationally operating private research centre. The interviewee worked in the research centre for decades in several highly responsible positions before his appointment as CEO. In Case 2, one of the interviewed persons has worked in the company in Finland for several years and has had several job descriptions inside the same organisation. Thus, the senior manager interviewed has good knowledge of the way the company operates in U-I collaboration. The other person interviewed in Case 2 works as a senior user experience manager in the headquarters of the company and is responsible for China-related innovation issues in connection with a specialised innovation group. The interviewee has had hands-on experience of collaboration with several Finnish and Chinese universities while running several of the firm's innovation projects. Case 3 is an interview of a senior researcher who works in one of China's top scientific research institutes in Beijing. The interviewee has more than six years research collaboration experience with Chinese and multinational companies. General descriptions of the cases were drafted using thematic order (Eriksson and Kovalainen, 2008) and the cases are presented in more detail here.

Case 1

The research centre is owned by a few Finnish industrial firms that operate in the same process industry field, but it operates independently and serves the needs of both external firms in related industries and those of the owners. The institute produces research services supporting the businesses of its customers and owners. In this expert organisation, the employees are considered the most important intellectual asset. The centre is famous for its competitive level of knowledge in its industry. The knowledge of the firm resides in its employees. The knowledge needed in the institute's research services is considered to be tacit, because the knowledge needed in the research collaboration is difficult to transfer. The institute's collaboration with the owner firms is long term. Collaboration projects between the external industry partners and the research centre are both short term and long term.

The research centre also collaborates with foreign and Finnish universities and research institutes. In these relationships, the research centre has noted that collaboration is easiest with geographically proximate institutes and the further away the partner is located, the more difficult the collaboration becomes. The centre has noticed that there seem to be some conflicts of interests when collaborating with universities that operate in the same industry. The interviewee, therefore, thinks that collaboration with universities is easiest when the university partner is in a clearly different competence area, and benefiting from a different set of skills and know-how is possible. The most important non-Finnish university partners of the case firm are located in Sweden, Germany, France, the Netherlands and Canada.

> "A few decades ago it used to be very uncommon for firms to collaborate with universities, but today, it is in the definition of a good university that it collaborates with the industry,"

says the interviewee. The problem, according to the interviewee, is that universities tend to be forced to seek external finance and thus feel obliged to collaborate with industry. Indeed, the interviewee believes that universities in the same field now compete for the same customers. The interviewee also calls for more commitment from the universities: "Quite often, we feel like what we get from the university collaboration is less than what we had agreed and what we expected". For the firm, the most important gain from university collaboration is getting to know and being able to hire students with whom they have established relationships.

Governance of the collaboration is usually done formally by contracting at least the sale of service, which enables a smooth collaboration project without surprises about prices, for example. "The need for more extensive collaboration agreements is dependent on the partner, I mean, how familiar or unknown the partner is". The choice of governance mode seems to be somewhat culturally bound; with foreign firms, contracting is more complicated. "The other end is collaborating with Finnish companies, who have other means at their disposal for making sure that we will not offend their rights", says the interviewee, referring to the small size of the country and the importance of reputation.

When the collaboration with universities is financed by public funding sources, e.g., EU-projects or TEKES (Finnish Funding Agency for Technology and Innovation) funding, the contracts are coordinated by the financing institution's rules. The gain from these endeavours for the case organisation is that it gets to know different parties. Later, it can start a collaboration of its own with a partner it has got to know and with whom it has established trust and informal contacts.

Trust and informal social networking are essential for the research centre. "As a CEO my role is to communicate our values, and show our desire to commit and build long-term partnerships". Informal social networking between organisations is considered to be really important.

> "For the customer, two things are important: first, you need to know you can count on your partner to do what you have agreed on, and second, you need to have competence and expertise to do it. For us, it is more convenient to work with people that we trust, who we share a common language with, and with whom we have a shared world of ideas."

The interviewee believes that a change of people in the collaboration interface could change and even break the collaboration relationship.

Case 2

The Finnish MNC has multiple ways of collaborating with different entities. The company collaborates with its suppliers and with R&D partners and also with different research institutes and universities at home and abroad. The case-firm prefers to collaborate with familiar partners with whom they share a common language. Previous contacts with representatives from university projects also play a significant role in choosing the partner, and thus, both informal social networks and organisational contacts are utilised in choosing partners. Having a common history, trust and a common language increase the chances of choosing the partner. Transparency, openness and trust with mutual appreciation and respect enable success in the collaboration. Plans, and keeping to them, and taking firm-specific processes such as time-tables into account are expected from the university partner. If the university-partner proves to be trustworthy, the relationship is maintained. The case firm feels that it needs to have a win-win situation with the university partner in the collaboration. Unless the firm gains something from the collaboration, there is no point. The firm feels that the gain for the university is getting access to data, getting relevant research themes and being able to test hypotheses in an industry setting.

The MNC Interviewee 1 thinks that Finnish and Japanese firms have totally different strategies when it comes to hiring PhDs, for example.

> "In Japan, it is considered that academic research is of no use to the industry because these two worlds (industry world and university world) are so far apart."

In Finnish firms, PhDs are appreciated and considered as providing value to the firm.

According to the second interviewee of Case 2, the U-I gap in China is huge, and

> "if we do not do it together, the gap remains rather big … we were lacking human resources before, we would have paid a couple of hundred thousand yuan (one euro is about ten Chinese RMB yuan) if you could do the research for us. But the results were not what we wanted."

In U-I collaboration, Interviewee 2 emphasises the role of personal relationships in collaborating with universities. "We prefer to have contacts with universities we have already known to a good extent … this is the case particularly with the important things." He gives examples that his colleague in Beijing has found a collaborator in a university from which she graduated, and he himself graduated from another university in another Chinese city and he also initiated a collaboration relationship with his former university. He believes that it is easier to collaborate in this way for several reasons. First, you know your collaborators better, second, you know better what they can deliver, and finally, you do not need to make great efforts to guess what they mean and what they intend to do through collaboration.

One way of reducing risk, as mentioned before, is to turn to collaboration with familiar universities. The other way is that the firm simply looks for another firm to collaborate with. The main reasons for trusting firms more than universities are: first, in a firm there is a clear employer-employee relationship, whereas in a university it is most often a teacher–student relationship; second, firms quite often have strict regulations and discipline, which must be followed, whereas universities work as an open system, and sharing information and knowledge is very much encouraged. Confidentiality is one

of the key issues considered. This topic is related to organisational type and its unique culture (universities vs. firms).

Case 3

Nowadays, Chinese universities and research institutes tend to collaborate a lot with companies. The interviewee entered the institute in 2002 as a doctoral student when collaborating with a company's research project. More recently, the interviewee's connection with the MNC (the Case 2 company) is also via previous contact with the institute. It seems that good internal collaboration between research units may lead to external collaboration with companies, and the interviewee believes that a differentiated and visible core competence of the research unit is important for both internal and external collaboration.

The interviewee believes that the main reasons for firms to collaborate with universities and research institutes are: first for reputation, second for specialised knowledge or expertise, and third for knowledge co-creation in which the research target cannot be easily articulated clearly or defined beforehand. Regarding U-I knowledge co-creation, in the interviewee's view, the topic under discussion with the MNC is rather new, and the interviewee said that it might be that they need to undergo a process of getting acquainted and getting to understand the topic better. There is thus a strong need for communication and interaction using different channels: e-mails, regular exchange-type small scale meetings, introducing what they have discovered in their laboratory, inviting company people to visit them, or taking part in a discussion forum organised by a third party in which university and company people can talk face-to face. By doing so, they hope to get to know the company's market situation and needs better, making unclear or unspecified needs clear and specified, and gradually finding a common target to work on further.

The interviewee considers that using an appropriate way to make research is a big challenge. This simply means that there is a need to demonstrate to the collaborative partner firm something convincing and valuable. For the interviewee's area of research, this may include, for instance, an in-depth interview outlining a big picture of the research, laboratory experiments for more detailed and objective evidence, and living labs, which might be ideal in combining real-life situation with experimental methods. In collaboration with companies and when solving practical problems, it would be important to adopt multi-methods to produce meaningful results.

The three cases are summarised in Table 2, which focuses on the types of collaboration, the preferred governance mode, and the greatest challenges in U-I collaboration.

Table 2 Summary of the cases

	Case 1	*Case 2*	*Case 3*
Institution	Finnish private research centre	Finnish MNC	Top Chinese research institute
Business/operation	Process industry, custom-made research services	High-tech	Consumer psychology research

Table 2 Summary of the cases (continued)

	Case 1	*Case 2*	*Case 3*
Interviewee(s)	CEO	• Senior manager • Senior user experience manager	Senior researcher
Types of collaboration	With owner firms, external firms, universities, and other research institutes	With suppliers, universities	With Chinese and multinational companies
Preferred governance mode	Formal governance plays a role. Depending on the familiarity and culture of the partner, social governance is important as well	Formal governance plays a role, social networks and inter-person relationships play a significant role	Frequent communication and interaction with long-term relationship are essential
Greatest challenges	Confidentiality, rights to inventions, gaining win-win	Achieving a win-win situation	The comprehensive and meaningful application of multi-methods including in-depth interviews, experimental methods and living labs

4.2 Analysis of the cases

Analysis of the three cases began with analysis of each individual case separately, i.e., within-case analysis (Eriksson and Kovalainen 2008; Patton, 2002). The cases were analysed thematically using theoretical aspects as the basis for the analysis. The themes used in the analysis were: the ways knowledge interaction is evident in the case, the role of formal governance, and the role of informal social networking. In multiple case studies, this phase is followed by cross-case analysis, which includes comparison of the cases in a search for similarities or differences across the cases in terms of theoretical framework used (Eriksson and Kovalainen, 2008; Patton, 2002).

In Case 1, the case-firm thinks that it is more difficult to collaborate with universities and research institutes that are in the same field of research as the case firm. The reason for this is fear of losing core knowledge to institutes with a similar knowledge base. On the other hand, proximity of locations makes collaboration easier and cultural similarities make contracting and informal social networking easier. Collaboration seems easiest with culturally similar and geographically closely located countries, i.e., with European universities.

To a large extent, clear contracts help smoothen communication and interaction between partners. As is shown in Case 1, contracts are more important if the partners are unfamiliar or foreign, but a basic level of contracts is necessary (e.g., sale of service) even for familiar partners to avoid unnecessary surprises or embarrassment, which could be harmful to long-term collaboration relationships.

From Case 1, we can see that both formal and informal governance play a significant role in U-I collaboration. Formal or institutional connections (e.g., through public funding sources like EU-projects) may provide a rare opportunity for different

organisations to collaborate together, but in the long run, continuation of the collaboration depends very much on whom they have established trust and informal contacts with.

Case 2 implies that the reason for the firm to actively interact with universities in research is the huge gap between the collaborators in terms of culture and knowledge. The interaction facilitates mutual understanding and bridges the gap so that the expected results can be produced through collaboration. It seems that more interactive types of knowledge interaction (e.g., knowledge co-creation) become necessary because of the huge gap between university and industry. This trend becomes more evident in the way that the firm collaborates with universities in most cases for untargeted or unspecified research. For more deliverable and specified projects, they turn rather to firms than to universities.

Confidentiality is an important issue mentioned in Case 2. The case firm, for instance, tries to reduce the risk of knowledge leakage by collaborating with familiar universities in important projects, or by finding a firm instead. It seems that confidentiality issues in collaboration are related to previous collaboration experience, long-term relationships and trust. They are also related to the type of organisation partner: whether it is a firm or a university.

In Case 3, frequent and interactive communication between partners is emphasised. This is especially the case when research collaboration is future-oriented and the research topic is not easily specified. This also indicates that in such a situation, U-I collaboration is untargeted at its early stage, and one needs to understand the situation and be patient in discussing and finding a potential collaboration project.

In knowledge sharing and protection, as revealed in Cases 1 and 2, creating a safe ground and being careful with confidential issues can enable U-I collaboration and trust building. The use of both formal and informal mechanisms is important in U-I collaboration, as is shown in all three cases. Formal governance mechanisms, like contracts, seem, however, more important in some contexts (being unfamiliar and foreign, a rule- and procedure-based culture like Finland) than in others (being familiar and with strong trust relationships, a relation-oriented culture that emphasises informality, like China).

Regarding knowledge interaction approaches, as Cases 2 and 3 indicate, in the case of a large cultural and knowledge-related gap between the partners and when developing unspecified research topics, it is necessary for collaboration partners to interact actively to achieve the desired outcomes, a finding that was somewhat present in Case 1 as well.

5 Concluding remarks

Our study deals with U-I knowledge interaction in high-tech MNCs and emphasises the role of both formal governance and informal social networking. Drawing from our theorising of knowledge interaction strategies and approaches and the preliminary findings of our pilot study, it becomes evident that although previous studies focus on knowledge transfer type of knowledge interaction, in the cross-cultural context of high-tech MNCs, it seems that more interactive types of knowledge interaction such as knowledge co-creation are of greater concern. Theoretically, more interactive types of knowledge interaction are more likely to be associated with tacit knowledge and a personalisation knowledge strategy. In reality, from all of our cases, we can see that the

biggest challenge of U-I collaboration lies not in technology or codified knowledge, or the mode of one-way knowledge transfer, but rather in time consuming and more interactive types of knowledge interaction in which the dominant type of knowledge is most often tacit, complex and context-specific.

To cope with the above-mentioned challenge and improve the effectiveness of cross-border knowledge interaction in high-tech MNCs, we propose several interactive organisational processes of knowledge development, including interpersonal trust, formal governance, informal social networking and knowledge interaction strategies. From our literature review and the findings presented, the following propositions can be drawn:

Proposition 1: *Informal governance, which is related to personal relationships and trust, is key for further developing the relationships and for long-term collaboration.*

Proposition 2: *Clear contracts support communication and interaction between partners by creating trust and transparency, which lead to an increase in informal social networking.*

Proposition 3: *Confidentiality is closely related to interpersonal trust and also to the type of organisation. Formal contracts do not work properly without personal trust. And to preserve trust, the universities should be more sensitive to confidential issues.*

Some theoretical and practical implications of the findings for high-tech MNCs can be drawn in terms of U-I collaboration. In Finland, collaboration between industry and universities has a relatively long history and firms have found university research valuable. This is not the case in every country, for example, in Japan and China the relationship between industry and universities is not nearly as close although things are slowly changing as shown in Case 3: there is an emerging tendency for U-I boundary crossing in China. One reason for the difference could be that the Finnish economy has been technologically innovation-led in both process and high-tech industries for a long time. The Finnish pattern of U-I collaboration and knowledge interaction may have much to offer high-tech MNCs elsewhere, particularly in Asian nations.

Current U-I collaboration striving for a win-win situation increases the possibility of successful knowledge interaction including knowledge transfer between organisations. It seems that both formal and informal governance play a significant role in these relationships: more formal governance is used with partners that are unfamiliar, and more informal governance with familiar partners. How significant a role is played in U-I knowledge interaction by formal or informal governance depends on the national cultures of the collaborating parties.

The challenge of conducting more interactive types of knowledge interaction and the co-construction of collectively forming tacit knowledge with external organisations encountered in high-tech MNCs has profound implications for healthcare technology firms. Like many global high-tech MNCs, the products and services of healthcare technology firms are increasingly customised and internationally oriented. It is thus ultimately important to understand and model changing customer needs, expectations and preferences. We believe that the key to coping with such a challenge is to build up mutually dependent *knowledge-based collaboration* and interaction with local research communities who actively interact with local marketing environments and customers of all types to transfer, integrate and co-create knowledge.

Research on U-I knowledge interaction in the high-tech MNC context seems promising. U-I collaboration and knowledge interaction across nations are more likely to confront cultural issues more explicitly at both organisational and national levels. We believe such research could help researchers examine and identify cultural differences and barriers in building effective U-I knowledge-based collaboration with local universities and research institutes with the aim of gaining global competitiveness. This study has contributed to the literature by providing a cross-cultural view of U-I knowledge interaction and has presented three pilot case studies offering different perspectives on the phenomenon. As previous studies concentrating on U-I knowledge interaction have not paid great attention to cross-cultural data, this study acts as starting point for further studies in the field and offers propositions that can be empirically examined more thoroughly.

References

Adler, P.S. (1993) 'The 'learning bureaucracy': New United Motor Manufacturing Inc.', *Research in Organizational Behavior*, Vol. 15, pp.111–194.

Adler, P.S. (2001) 'Market, hierarchy, and trust: the knowledge economy and the future of capitalism', *Organization Science*, Vol. 12, No. 2, pp.215–234.

Almeida, P. and Phene, A. (2004) 'Subsidiaries and knowledge creation: the influence of the MNC and host country on innovation', *Strategic Management Journal*, Vol. 25, pp.847–864.

Almeida, P., Song, J.Y. and Grant, R.M. (2002) 'Are firms superior to alliances and markets? An empirical test of cross-border knowledge building', *Organization Science*, Vol. 13, No. 2, pp.147–161.

Ambos, B. and Schlegelmilch, B.B. (2008) 'Innovation in multinational firms: Does cultural fit enhance performance?', *Management International Review*, Vol. 48, No. 2, pp.189–206.

Auerbach, C.F. and Silverstein, L.B. (2003) *Qualitative Data: An Introduction to Coding and Analysis*, New York University Press, New York.

Bhagat, R.S., Kedia, B.L., Harveston, P.D. and Triandis, H.C. (2002) 'Cultural variation in the cross-border transfer of organizational knowledge: an integrative framework', *Academy of Management Review*, Vol. 27, No. 2, pp.204–221.

Boisot, M. and Child, J. (1996) 'From fiefs to clans and network capitalism: Explaining China's emerging economic order', *Administrative Science Quarterly*, Vol. 41, pp.600–628.

Buckley, P.J., Clegg, J. and Tan, H. (2006) 'Cultural awareness in knowledge transfer to China – the role of *guanxi* and *mianzi*', *Journal of World Business*, Vol. 41, pp.275–288.

Dyer, J.H. and Singh, H. (1998) 'The relational view: cooperative strategy and sources of interorganizational competitive advantage', *The Academy of Management Review*, Vol. 23, No. 4, pp.660–679.

Engeström, Y., Engeström, R. and Kerosuo, H. (2003) 'The discursive construction of collaborative care', *Applied Linguistics*, Vol. 24, pp.286–315.

Eriksson, P. and Kovalainen, A. (2008) *Qualitative Methods in Business Research*, Sage Publications, Los Angeles.

Evaristo, J.R. (2007) 'Knowledge transfer across borders: a process model', *Knowledge and Process Management*, Vol. 14, No. 3, pp.203–210.

Ferguson, R., Paulin, M. and Bergeron, J. (2005) 'Contractual governance, relational governance, and the performance of interfirm service exchanges: the influence of boundary spanner closeness', *Journal of the Academy of Marketing Science*, Vol. 33, No. 2, pp.217–235.

Grant, R.M. (1996) 'Toward a knowledge-based theory of the firm', *Strategic Management Journal*, Vol. 17, pp.109–122.

Grant, R.M. and Baden-Fuller, C. (2004) 'A knowledge accessing theory of strategic alliances', *Journal of Management Studies*, Vol. 41, No. 1, pp.62–84.

Gupta, A.K., Smith, K.G. and Shalley, C.E. (2006) 'The interplay between exploration and exploitation', *Academy of Management Journal*, Vol. 49, No. 4, pp.693–706.

Hansen, M.T., Nohria, N. and Tierney, T. (1999) 'What's your strategy for managing knowledge?', *Harvard Business Review*, Vol. 77, March-April, pp.106–116.

Hedlund, G. and Nonaka, I. (1993) 'Models of knowledge management in the West and Japan', in Lorange, P.B., Chakravarthy, J.R. and van Der Ven, A. (Eds.): *Implementing Strategic Processes: Change, Learning and Co-Operation*, Blackwell Business, Oxford, pp.117–144.

Hong, J. and Engeström, Y. (2004) 'Changing principles of communication between Chinese managers and workers: Confucian authority chains and *guanxi* as social networking', *Management Communication Quarterly*, Vol. 17, No. 4, pp.552–585.

Hong, J., Heikkinen, J. and Niemi, M. (2007) 'Collaborative knowledge creation and innovation between MNCs and Chinese universities', in Martins, B. and Remenyi, D. (Eds.): *Proceedings of the 8th European Conference on Knowledge Management*, Consorci Escola Industrial de Barcelona, 1, Barcelona, pp.486–491.

Huang, Q., Davison, R.M. and Gu, J. (2008) 'Impact of personal and cultural factors on knowledge sharing in China', *Asia Pacific J. Manage*, Vol. 25, pp.451–471.

Hutchings, K. and Michailova, S. (2004) 'Facilitating knowledge sharing in Russian and Chinese subsidiaries: the role of personal networks and group membership', *Journal of Knowledge Management*, Vol. 8, No. 2, pp.84–94.

Inkpen, A.C. (1996) 'Creating knowledge through collaboration', *California Management Review*, Vol. 39, No. 1, pp.123–140.

Jasimuddin, S.M., Klein, J.H. and Connell, C. (2005) 'The paradox of using tacit and explicit knowledge: strategies to face dilemmas', *Management Decision*, Vol. 43, No. 1, pp.102–112.

Johnston, S. and Paladino, A. (2007) 'Knowledge management and involvement in innovations in MNC subsidiaries', *Management International Review*, Vol. 47, No. 2, pp.281–302.

Kogut, B. and Zander, U. (1992) 'Knowledge of the firm, combinative capabilities, and the replication of technology', *Organization science*, Vol. 3, No. 3, pp.383–397.

Li, S. and Scullion, H. (2006) 'Bridging the distance: managing cross-border knowledge holders', *Asia Pacific Journal of Management*, Vol. 23, pp.71–92.

Luo, Y.D. (1997) '*Guanxi*: principles, philosophies, and implications', *Human Systems Management*, Vol. 16, No. 1, pp.43–51.

Lusch, R.F. and Brown, J.R. (1996) 'Interdependency, contracting, and relational behaviour in marketing channels', *Journal of Marketing,* Vol. 60, No. 4, pp.19–38.

Macaulay, S. (1963) 'Non-contractual relations in business: a preliminary study', *US Sociological Review*, Vol. 28, No. 1, pp.55–70.

Mansfield, E. (1995) 'Academic research underlying industrial innovations: sources, characteristics, and financing', *The Review of Economics and Statistics*, Vol. 77, No. 1, pp.55–65.

March, J.G. (1991) 'Exploration and exploitation in organizational learning', *Organization Science*, Vol. 2, No. 1, pp.71–86.

Miesing, P., Kriger, M.P. and Slough, N. (2007) 'Towards a model of effective knowledge transfer within transnational: the case of Chinese foreign invested enterprises', *J. Technol Transfer*, Vol. 32, pp.109–122.

Nonaka, I. and Takeuchi, H. (1995) *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, Oxford.

Norman, P.M. (2002) 'Protecting knowledge in strategic alliances, resource and relational characteristics', *Journal of High Technology Management Research*, Vol. 13, No. 2, pp.177–202.

Olander, H. and Hurmelinna-Laukanen, P. (2008) 'Value creation and value capturing in innovative networks', *Proceedings of the 4th EIASM Workshop on Visualizing, Measuring and Managing Intangibles and Intellectual Assets*, Hasselt, Belgium, pp.1–14.

Patton, M.Q. (2002) *Qualitative Research & Evaluation Methods*, 3rd ed., Sage Publications, Thousand Oaks, CA.

Polanyi, M. (1966) *The Tacit Dimension*, Routledge & Kegan Paul, London.

Qin, C., Ramburuth, P. and Wang, Y. (2008) 'Cultural distance and subsidiary roles in knowledge transfer in MNCs in China', *Chinese Management Studies*, Vol. 2, No. 4, pp.260–280.

Ramasamy, B., Goh, K.W. and Yeung, M.C.H. (2006) 'Is *guanxi* (relationship) a bridge to knowledge transfer?', *Journal of Business Research*, Vol. 59, pp.130–139.

Reuer, J.J. and Ariño, A. (2005) *Contractual Complexity in Strategic Alliances*, Working paper, Published in May 2005, 39 pages.

Ring, P.S. and van de Ven, A.H. (1994) 'Developmental processes of cooperative interorganizational relationships', *Academy of Management Review*, Vol. 19, No. 1, pp.90–118.

Santoro, M.D. and Gopalakrishnan, S. (2000) 'The institutionalization of knowledge transfer activities within industry-university collaborative ventures', *J. Eng. Technol. Manage.*, Vol. 17, pp.299–319.

Schartinger, D., Rammer, C., Fischer, M.M. and Fröhlich, J. (2002) 'Knowledge interactions between universities and industry in Austria: sectoral patterns and determinants', *Research Policy*, Vol. 31, pp.303–328.

Sherwood, A.L. and Covin, J.G. (2008) 'Knowledge acquisition in university – industry alliances: an empirical investigation from a learning theory perspective', *The Journal of Product Innovation Management*, Vol. 25, pp.162–179.

Sheu, C., Yen, H.R. and Chae, B. (2006) 'Determinants of supplier-retailer collaboration: evidence from an international study', *International Journal of Operations & Production Management*, Vol. 26, No. 1, pp.24–49.

Spender, J-C. (1992) 'Limits to learning from the West', *The International Executive*, Vol. 34, pp.389–410.

von Hippel, E. (2007) 'Horizontal innovation networks – by and for users', *Industrial and Corporate Change*, Vol. 16, No. 2, pp.293–315.

Weir, D. and Hutchings, K. (2005) 'Cultural embeddedness and contextual constraints: knowledge sharing in Chinese and Arab cultures', *Knowledge and Process Management*, Vol. 12, No. 2, pp.88–98.

Woolthuis, R.K., Hillebrand, B. and Nooteboom, B. (2005) 'Trust, contract and relationship development', *Organization Studies*, Vol. 26, No. 6, pp.813–840.

Yin, R.K. (2003) *Case Study Research, Design and Methods*, 3rd ed., Sage Publications, Newbury Park.

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■ *Research Article*

Culture and Knowledge Co-Creation in R&D Collaboration between MNCs and Chinese Universities

Jianzhong Hong[1]*, Johanna Heikkinen[2] and Kirsimarja Blomqvist[3]

[1]*Lappeenranta University of Technology—School of Business, Lappeenranta, Finland*
[2]*Fortune Falls Consulting Company, Helsinki, Finland*
[3]*Lappeenranta University of Technology—School of Business, Lappeenranta, Finland*

This paper examines the role of culture in university–industry R&D collaboration and knowledge interaction in the context of multinational corporations in China. Earlier university–industry studies focus primarily on one-way technology and knowledge transfer; however, the present study argues that in the studied context more interactive types of knowledge interaction like knowledge co-creation should be of key concern. The main challenge of the R&D collaboration lies in the understanding of culture in general and Chinese guanxi (interpersonal relationship) in particular in collaborative knowledge creation, in which the dominant type of knowledge involved is most often tacit, future oriented, complex and context-specific. This is particularly important when dealing simultaneously with multidisciplinary applied research where cultural challenges appear prominent.

INTRODUCTION

Emerging markets are now seen as a major source of global innovation and knowledge management (Hutchings and Mohannak, 2007; Pillania, 2008). The development of new knowledge and capabilities is particularly relevant and salient in markets like China (Burrows *et al*., 2005; Hong *et al*., 2008; Li and Scullion, 2006). For China to step further into the world economy and global innovation, recent research assumes an increasingly important role for universities (Hong, 2008) and a more dynamic triple helix model of university–industry–government relationships, and collaboration is strongly proposed (Lu and Etzkowitz, 2008; Zhou, 2008). In this changing landscape, R&D collaboration between multinational corporations (MNCs) and Chinese universities presents a rapidly growing trend (Heikkinen *et al*., 2007; Li, 2005; Lin, 2005). In 2002, the number of MNC R&D institutes in China was 400 (Li, 2005), whereas by 2008 the number had already risen to around 1100 (representing 920 MNCs) (Zinnov, 2009). The power of the most reputable universities has, therefore, been increasing and a trend towards more interactive and deeper university–industry (U–I) relationships and collaboration is emerging (Chen, 2007; Wang and Lu, 2007; Zhao and de Pablos, 2010). However, there is little research about the nature of such collaboration and knowledge interaction (Fu, 2008; Hemmert *et al*., 2008; Liu and Jiang, 2001).

Mainstream literature focuses primarily on technology and knowledge transfer, whereas Holden (2001, 2008) contends that the key task of global knowledge management is to foster and direct collaborative cross-cultural learning and development. So far numerous cross-border knowledge interaction, including technology transfer projects, have encountered considerable difficulties or have failed because of significant cultural variations and barriers (Almeida *et al*., 2002; Holden, 2002; Kohlbacher and Krähe, 2007; Li and Scullion, 2006; Lindqvist *et al*., 2007; Moitra and Kumar, 2007; Qin *et al*., 2008; Seigel *et al*., 2003). Therefore in this paper especially the role of culture in more interactive type of U–I R&D collaboration is examined. We argue that in the Chinese MNC context, collaborative knowledge creation, in which the influence of culture tends to be more evident and intensive, should be of key concern. With this aim, we conduct

*Correspondence to: Jianzhong Hong, Lappeenranta University of Technology—School of Business, P.O. Box 20, Lappeenranta 53851, Finland. E-mail: jhong@lut.fi

a critical literature review and case studies with in-depth interviews and participant observation from Finland and China during 2006–2009. The key research questions include: What is the nature of knowledge interaction in U–I R&D collaboration in China? How does the Chinese culture influence effective U–I R&D collaboration and knowledge interaction? The second question is particularly concerned with what we can actually learn from cultural aspects for more effective U–I R&D collaboration.

The paper starts with a critical literature review of knowledge interaction and culture in U–I R&D collaboration. First, knowledge interaction strategies and approaches are clarified. The interconnection of Chinese guanxi (interpersonal relationship) and knowledge interaction is underlined. The first section ends with a conceptual framework that guides the study. The paper then describes data collection and analysis of two sets of empirical data collected during 2006–2009. The first set of data consists of 25 in-depth interviews and the second set includes data from three inter-cultural U–I workshops and three follow-up in-depth interviews. The preliminary findings are discussed in relation to the key research questions. Finally, both theoretical and practical implications for U–I studies in the Chinese MNC context are discussed and suggestions made for some avenues for future research.

KNOWLEDGE INTERACTION AND CULTURE

University–industry knowledge interaction

Knowledge interaction as a concept has commonly been used in U–I collaboration and related studies (Fukugawa, 2005; Perkmann and Walsh, 2006; Santoro and Gopalakrishnan, 2000; Schartinger *et al.*, 2002; Tödtling *et al.*, 2009; Viljamaa, 2007). For instance, knowledge interaction is used to describe all types of direct and indirect, personal and non-personal interactions between organizations and/or individuals from the firm side and the university side, directed at the exchange of knowledge within innovation processes (Schartinger *et al.*, 2002). In this study, knowledge interaction includes all types of U–I interactive knowledge strategies, relationships, processes, activities and outcomes, in which the value of knowledge is particularly emphasized. Thus, the emphasis is on mutual and two-way knowledge exchange and interaction.

Knowledge interaction strategies and approaches

Some of the practitioners and researchers in R&D collaboration refer to a knowledge exploitation or codification strategy, emphasizing the application of existing knowledge, whereas others employ a knowledge exploration or personalization strategy, laying stress on knowledge creation through collaboration (Grant and Baden-Fuller, 2004; Gupta *et al.*, 2006; Jasimuddin *et al.*, 2005; March, 1991; Spender, 1992). Depending on the knowledge strategies chosen, the following knowledge interaction approaches used in U–I R&D collaboration have been identified: technology and knowledge transfer (TKT), knowledge integration (KI) and collaborative knowledge creation (CKC) (Hong *et al.*, 2007). In simple terms, TKT is the communication of technology and knowledge from one agent to another (Hedlund and Nonaka, 1993). The agent that provides the needed knowledge is the knowledge source or supplier, and the agent that gets the knowledge is the knowledge recipient[1]. KI emphasizes the process of integrating and transforming the acquired knowledge for the firm's specific use. Comparatively, integrating knowledge takes less time in the learning process than transferring knowledge (Grant, 1996). CKC refers to a situation when two or more partners join and work together to create new information and knowledge, which can be used for the benefit of both or all sides, and presents potential for future innovation and development (Drejer and Jørgensen, 2005; Engeström, 1999; Engeström *et al.*, 2003; Holland and Lave, 2009; Inkpen, 1996; Vuola and Hameri, 2006). In the U–I context, the focus of CKC is on creating and developing new knowledge through R&D collaboration.

The role of the Chinese culture

In explaining China's path towards modernization which differs from that of the West, Boisot and Child (1996: 622) contend that China's economic reforms and decentralization have developed to 'network capitalism', where the priority is given to personalization strategies, personal solutions and tacit knowledge (see also Bhagat *et al.*, 2002; Boisot and Child, 1996; Hansen *et al.*, 1999; Li, 2008). Weir and Hutchings (2005) further claim that in the Chinese culture managers and organizational members will share knowledge only with those with whom they already have a trusting relationship. Knowledge sharing in joint ventures, for instance, is problematic because of the potential of divisions between local employee insiders and foreign management outsiders (Hutchings and Michailova, 2004; Weir and Hutchings, 2005).

[1]TKT in this paper refers to one-way technology and knowledge transfer. For some and a growing number of authors, the concept or approach is also understood as an interactive process of knowledge interaction, in which technology transfer is not mechanical, but interactive and embedded in existing capabilities on both collaboration sides and in the social relationships between both partners of the transaction (e.g. Grandori and Kogut, 2002).

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Personal ties are thus nurtured in China and people show high loyalty to their personal networks, known as guanxi[2], which are commonly used to get things done (Huang *et al*., 2008). The combination and complexity of cultural norms and the socioeconomic and political situation in China means that guanxi ties are seen as a core element of Chinese culture (Buckley *et al*., 2006; Ramasamy *et al*., 2006), a key determinant of a firm's performance (Luo, 2007), and even a source for competitive advantage of Chinese capitalism (Yang, 2002).

The significance of Chinese guanxi and trust has recently been studied in connection with cross-border knowledge interaction (Buckley *et al*., 2006; Miesing *et al*., 2007; Ramasamy *et al*., 2006). Buckley *et al*. (2006: 278), for instance, argue that 'given the diversity and complexity of the Chinese business environment, even for explicit knowledge to be transferred and absorbed, cultural barriers have to be removed and good inter-partner relationships have to be established.' Jiang's study (2005) explores the powerful effects of Chinese entrepreneurs' social capital, social interaction ties and trustworthiness, which are mediated by guanxi development, on the success of knowledge transfer in Chinese high-tech firms.

To sum up, in this study it is presumed that in relation-oriented cultures, the adoption of a personalization strategy, a focus on personal solutions and the priority of tacit knowledge over explicit knowledge are preferable in U–I R&D knowledge interaction. Previous studies show that guanxi has a significant role in knowledge interaction, including knowledge sharing and knowledge transfer. It has an inter-dependent relationship with trust, which is particularly important when transferring and sharing tacit types of organizational knowledge.

A conceptual framework

Based on the review above and related studies discussed here, the important dimensions of U–I R&D collaboration and knowledge interaction can be summarized in a conceptual framework depicted in Figure 1. From top to bottom of the figure, there are six dimensions: culture, knowledge type, knowledge interaction strategy, knowledge interaction approach, capability development and research task. The first dimension is related to the relation-oriented and guanxi-based culture in contrast to a task-oriented and rule-based culture

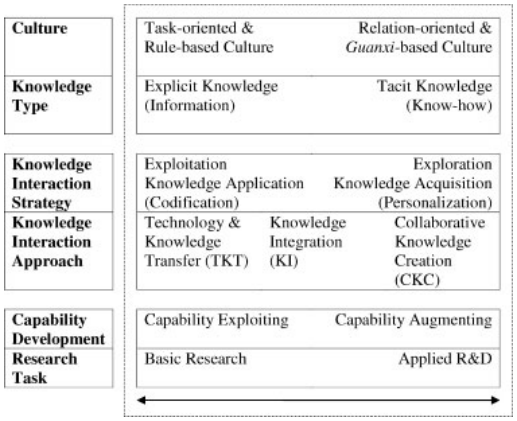

Figure 1 Conceptual framework of culture and knowledge interaction in university–industry R&D collaboration (based on Hong and Olander, 2010). Note: The line with double-headed arrow indicates the elements at two ends of each dimension above in the figure are part of a continuum

(Boisot and Child, 1996; Hong and Engeström, 2004; Li, 2008; Martinsons and Westwood, 1997; Nonaka and Takeuchi, 1995; Weir and Hutchings, 2005). The contrasting cultures are correspondingly related to the second dimension of knowledge type involved in R&D collaboration and interaction: explicit versus tacit knowledge[3]. In relation-oriented and guanxi-based cultures like in China, as mentioned earlier, priority is given to tacit knowledge and informality, both of which are extremely important for any meaningful collaboration and knowledge interaction.

The third and fourth dimensions are associated with knowledge interaction strategies and approaches. Previous studies indicate that knowledge interaction strategies and approaches are closely related to the type of knowledge, i.e. whether it is mainly explicit or tacit knowledge (Andreu and Sieber, 2005; Hansen *et al*., 1999). Highly tacit knowledge, for instance, is likely to be found with a knowledge-creation (i.e. knowledge exploration) strategy rather than a knowledge-reuse (i.e. knowledge exploitation) strategy (Hansen *et al*., 1999); this is further related to different characteristics of political or/and national cultures (Ambos and Schlegelmilch, 2008; Armagan and Ferreira, 2005; Hemmert *et al*., 2008).

[2]*Guanxi* is difficult to translate into English, and it can roughly mean interpersonal relationship, personal connection, personal network or informal social networking. The traditional concept of *guanxi* emphasizes role relationships and a set of background factors (e.g. being a relative, having the same place of origin, being former classmates/colleagues, etc.) operative in interpersonal relationships. In the context of modern business, *guanxi* can occur at both personal and institutional levels.

[3]Explicit knowledge is formal, objective and codifiable (e.g. a meaningful set of information articulated in clear language including numbers or diagrams), whereas tacit knowledge is personal, context-specific and not as easily communicated (e.g. institutions, unarticulated mental models and embodied technical skills) (Nonaka and Takeuchi, 1995; Nonaka et al., 1998). The distinction of the two types of knowledge is in a relative sense, and it is worth noting that there are both advantages and disadvantages in emphasizing either explicit or tacit knowledge in organizations (Jasimuddin et al., 2005).

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The fifth dimension is related to the development of the type of capability: capability exploiting versus capability augmenting. The former focuses on the exploitation of the firms' existing capabilities and the latter on the creation (augmentation, exploration) of new capabilities. Ambos and Schlegelmilch (2008) connect knowledge interaction strategies and approaches with the different types of R&D laboratory of firms, which are seen as indicating the difference between capability exploiting and capability augmenting (i.e. technology transfer unit versus global technology unit; support laboratory versus research laboratory; exploitation laboratories versus exploration laboratories). The sixth dimension is related to the research task in hand, i.e. if it is primarily basic research or very much applied R&D. Applied research contains greater not-codified or tacit knowledge than basic research (Mansfield, 1995). The author concludes from his study that in many kinds of applied R&D, it is relatively more useful for academic and firm personnel to interact and work together on a face-to-face basis, whereas in basic research such ties may be weaker and more sporadic.

Drawing from the figure above we propose that the U–I R&D knowledge interaction strategies (i.e. exploitation versus exploration/codification versus personalization) and the corresponding approaches (i.e. TKT, KI and CKC) should be aligned with the knowledge type (explicit versus tacit), intended capability development practices (capability exploiting versus augmenting) and research tasks (basic versus applied research). Ensuring correct matching enhance greatly the effectiveness of inter-cultural U–I R&D collaboration and knowledge interaction.

DATA COLLECTION AND ANALYSIS

A qualitative research approach was chosen since the studied phenomenon is rather new and exploratory in nature. R&D collaboration between two Finnish MNCs and Chinese universities provides an illustrative example of the role of culture in collaborative innovation and knowledge interaction involving dissimilar cultural contexts. The first case company is a MNC that focuses on ICT (hereafter ICT Company) and the second is a MNC in the forest industry (hereafter Forestry Company). ICT Company was at a more advanced stage in collaborating with local universities and research institutes whereas Forestry Company was in the early stages of searching for appropriate collaboration partners and was carrying out initial collaboration projects. Two sets of data were collected for the empirical investigation: the first set consists of 25 in-depth interviews conducted during 2006–2009, and the second set includes our participant observation from three inter-cultural U–I workshops and three follow-up in-depth interviews in connection with one of the workshops, which were conducted during 2006–2008. All interviewees were asked how and when culture is important in U–I R&D collaboration and knowledge interaction, and how they cope with cultural challenges (for interview guideline, see Appendix A).

Data Set 1: interviews 2006–2009

The first round of interviews was conducted in December 2006, when the second and third authors of the paper attended an Academic Summit in China, which was organized by ICT Company, and had the opportunity to interview two managers of the company and four researchers from its university partners. In June 2007, the first and second authors conducted a second round of interviews related to Forestry Company in five Chinese universities and 17 persons were interviewed. In the fall of 2009, the first author interviewed further one leading R&D manager of Forestry Company research centre and the General Manager (GM) of the R&D Centre in China. Data Set 1 for the interviews 2006–2009 can be seen from Table 1.

Data Set 2: workshop participations and follow-up interviews 2006–2008

Data Set 2 is from three U–I workshops and three follow-up in-depth interviews from 2006–2008. The workshops were held in China and were organized by the two case MNCs. The first workshop was a one-day workshop organized by ICT Company. The workshop participants were from the case company and included representatives from both Finnish and Chinese universities and public sector authorities. The second workshop was held in April 2007 and was organized by Forestry Company. The workshop was conducted in connection with the opening ceremony of the Asian R&D Centre of the company. The workshop included both keynote speeches and panel discussions involving experienced university researchers and industry managers from Finland and China. The event and workshop participants were representatives from the case company, researchers from universities in Finland and China and representatives of Chinese regional and government authorities. The third workshop was organized by ICT Company in China in July 2008.

Table 1 Interviews conducted during 2006–2009

	Company	University	Total
ICT focus	2	4	6
Forest industry focus	2	17	19
All	4	21	25

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It was a two-day workshop, in which the first author was invited to participate and give a keynote speech. All the keynote speeches and small group discussions at this workshop were video-taped. Following the workshop, the first author interviewed three key participants, including two of the keynote speakers. These interviewees are hereafter named Interviewee A, B and C.

The two sets of data were collected over a relatively long period 2006–2009. Although the same in-depth interview technique was used, the issues focused on and questions asked were not exactly the same. A general framework, including the issues studied and open-ended interview questions, is given in Appendix A.

Data analysis

All interview data and a part of the workshop discussions were transcribed. The themes and sub-themes arising from the data were categorized and analysed. The data analysis is inspired by and based on the technique and concept of puzzle identification developed by Mason (2002). The key idea is that identifying a puzzle can be a way to kick-start analysis of a transcript. Once the intellectual puzzle has been found, the best method is often to work back and forth through the transcript to see how the puzzle arises and is resolved. This implies a strongly inductive bent to this kind of research. In this study, the conceptualization of puzzle identification is expanded to also relate to the process of data collection. With this approach, valid questions could be asked already at an early stage of the study. The technique of data analysis applied is not strictly data-driven nor fully inductive as Mason's approach would imply. A further data analysis technique adopted in this study is within-case and cross-case analysis (Eriksson and Kovalainen 2008, Patton 2002). Analysis of each individual case separately, within-case analysis, permitted thematic analysis using theoretical aspects as a basis. The themes used in the analysis were, for example, the ways of knowledge interaction evident in the case, and the role that interpersonal relationships play. This phase was followed by cross-case analysis, comparison of the cases in the search for similarities or differences, with reference to theory.

MAJOR FINDINGS AND DISCUSSIONS

Towards a collaborative mode of knowledge co-creation

The first research question addressed the issue: What is the nature of knowledge interaction in U–I R&D collaboration in China? From our participant observation of the U–I Workshops, Workshop 3 in particular, it is noticeable that the people from the case company seemed to show greater interest in more interactive collaboration and interaction (e.g. knowledge co-creation) rather than conventional types of collaboration that are relatively static and passive (e.g. authorized or contract-based research). This can be seen from the speech by Organizer A of Workshop 3:

> Nowadays for our collaborating with universities, it is not hoped that I have a topic and ask your help to accomplish it. Such a mode of collaboration becomes less favorable, therefore I would very much expect to see more what both partners are commonly interested, which is likely future-oriented, and it does not mater how crazy the idea is (Researcher Manager, Organizer A of Workshop 3).

According to an interviewee from ICT Company, who was an invited participant at Workshop 3, the U–I gap in China is huge regarding working culture and knowledge, which explains to certain degree why the partners had decided to start the collaboration.

> If we do not do it together, the gap remains rather big . . . we were lacking human resources before, we would have paid a couple of hundred thousand yuan (one euro is about ten Chinese RMB yuan) if only you could do the research for us. But the results were not what we wanted. (Senior Manager, Interviewee A).

The emerging trend of knowledge co-creation, based on our informal conversation with a member of research staff Organizer B of Workshop 3 (08.07.2009), might well be explained by some specific concerns of the company. The first issue is related to an organizational change within the corporation; the research centre/Beijing belonged formerly to the business unit of the corporation but then became an independent unit also from a financial point of view. This strongly suggests that the U–I collaboration projects were not pre-determined and well defined by the business unit beforehand. Moreover, the specific subject under study was a new research area, which was also a multi-disciplinary topic, and there was no ready model to follow. To succeed meant continuous experimentation and collaboration.

However, the trend towards collaborative mode of knowledge co-creation was also visible in Forestry Company R&D, where the mode of knowledge co-creation might also be related to the nature of applied R&D. A top manager from Forestry Company R&D Centre we interviewed emphasized the great difference between basic research and applied R&D. Consequently, being involved in applied research, the interviewee said that nowadays the company spends much more time carefully selecting a few collaboration partners and projects, discussing actively the project propo-

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sal in terms of their internal strategy and targets, and defining together with their research partners the scope and content of the project.

Another interviewed R&D manager from Forestry Company confirmed the significance of U–I knowledge co-creation in the Chinese MNC context. The interviewee told that the main purpose for them to collaborate with Chinese universities was not to use university researchers as cheap labour, but in the hope of developing some new innovative ideas and creating new knowledge together. Thus, the same interviewee thought they had more projects related to creating new knowledge and innovative ideas rather than directly using the existing knowledge of their university partners in China.

The newly emerging trend we observed here seems understandable for the following reasons: the increasing complexity of the tasks in hand; the pressing need to understand collaboration partners from different organizations (university versus industry) and nations (MNCs); the challenge to understand and follow up changing customer behaviour, which is often unspecified and future-oriented, in an unfamiliar business environment; a decentralizing trend in knowledge flows from university to industry in which flexible ways of collaboration are enacted (Hong, 2008); and the change in the role of universities from a passive role to more interactive and deeper U–I relationships and collaboration.

In the immediate future, the main motivation factors for U–I R&D collaboration in China are unlikely to change. However, the forms of collaboration may become more intensive. The interviewed professors and researchers could imagine universities and MNCs working more closely, both geographically and mentally, and sharing working forces and knowledge to a greater extent than before (Interviews 2006–2009). Since partners from both sides in U–I R&D collaboration aim to create new knowledge out of the collaboration, the best results can be achieved when the partners have a shared understanding and a common goal throughout the whole project.

Influences of the Chinese culture

The second research question asked: How does the Chinese culture influence U–I R&D collaboration and knowledge interaction? Based on our interviews in 2006–2009, it is evident that guanxi seems to be the key influence of the Chinese culture, and knowing the right people plays an influential role particularly at the beginning of U–I R&D collaboration. University professors and researchers found it difficult to approach MNCs without previous guanxi networking.

> If you approach them (MNCs) directly, they may not accept you. You have to have some guanxi to approach them, like a schoolmate, former colleague or friend.

It seemed that the discussions and negotiations for a joint project were normally initiated by people who were acquainted before and/or had some shared history or background related to personal guanxi (e.g. former students or colleagues). From the perspective of the company, interviewee A of ICT Company emphasized the role of guanxi in collaborating with universities.

> We prefer to have contacts with universities we have already known to a good deal . . . this is the case particularly when things are important.

The interviewee told that a colleague in the research centre in Beijing had established collaboration with the top technology university from which the colleague had graduated, and he himself initiated collaboration with his Alma Mater in a different Chinese city. He believed that in this way it was easier to collaborate. The main reasons, as explained by the interviewee: first, collaborators are better known; second, it is better known what collaborators can deliver and finally, less effort is needed to guess what the collaborator means and intends to do throughout the long collaboration process.

Interviewee C of a MNC considered the organizing research centre of Workshop 3 to be a business competitor of theirs. However, participation of the interviewee in the workshop was based on guanxi in that the interviewee knew some of the key persons who organized the workshop. Moreover, although they did not have any formal collaboration relationship, the occasion of the workshop fitted such communication well because of the open exchange of academic ideas.

From the interviews in 2006–2009 it was also found that university professors emphasized that without true interest in the research topic and cooperation, guanxi might not develop further from the first contact. True interest in collaboration can be explained as a matched motivation and mutual learning process in terms of producing new ideas and innovation. As seen in our interview of the GM of the Asian R&D Centre of Forestry Company:

> . . . (We) must have a very true interest in them (universities), actually we have our interest, and they have theirs . . . their motivation and ours should be matched.

This can be further demonstrated with a dialogue between the researcher and the GM of the Asian R&D Centre of Forestry Company:

> GM: Why do we need to collaborate (with universities)? That is, we can learn from them from their side and perspective, and they can also learn from us from our side and perspective.

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> Researcher: That might be called mutual learning, a interactive learning process.
>
> GM: It is not only a learning process, they can produce new ideas, so do we!

The results of our study confirm the finding of a recent U–I study of 30 interviews with technology university researchers, in which a company's real perception of project usefulness, its interest and involvement were found to be one of the decisive factors for attaining effective technology transfer from universities to firms (Barbolla and Corredera, 2009).

True interest in collaboration has much to do with the relatedness of the research. For effective collaboration, it is important that collaboration partners should have related research experience in the specific field of R&D collaboration. This issue can be seen in Interviewee C's statement that while they would like to collaborate with Chinese universities in the future, the current situation was that:

> As a result of our searching, there has not been one university that is relatively good at researching on the specific research area of our interest, or perhaps there exist no such a university yet in the country.

Regarding guanxi, on the one hand, many interviewees considered familiar interpersonal contacts and good relationships an important reason for finding a collaboration partner and working together. On the other hand, they emphasized very much the relatedness of the research and the fact that the partner should have a true interest in the success of a collaborative project. This illustrates, in a way, the changing relationship of guanxi: it seems guanxi is not the sole factor it was before, although it still plays a key role in the Chinese workplace, and task-related issues like the true interest in a collaboration project and research relatedness have a stronger effect in the new co-configuration of guanxi and task-related considerations (see also Hong and Engeström, 2004).

U–I R&D collaboration is often related to unspecified projects. We found that R&D collaboration between Forestry Company and Chinese universities placed more stress on projects that were future-oriented, stronger IPR or innovation-related, strategic and mostly exploratory. Quite often in this case, the topic under discussion was rather new and the ultimate goal for such collaboration was to co-create new knowledge.

The same situation seems to prevail in ICT Company. A Chinese researcher, Interviewee B said that it might be that in their collaboration with ICT Company, a process was needed for knowing each other and getting to understand the topic better. There was thus a strong need for communication and interaction by different channels. Through such a process they hoped to know better the company's market situation and needs, and make unclear or unspecified needs clear and specified, gradually finding a common focus or target to work on further. This indicates in a way that, in such a situation, U–I collaboration is untargeted in its early stage, and one needs to understand the situation and be patient when discussing and finding a potential common project. Clearly, such a process is time consuming.

Regarding the knowledge interaction approaches, as Interviewees A and B indicate, in the case of large cultural and knowledge-related gaps between collaboration partners and unspecified research topics, it is necessary for the partners to interact actively to achieve desired outcomes; an opinion which was somewhat shared by Interviewee C as well. Both interviews of the R&D managers from Forestry Company emphasized the need for mutual motivation and frequent communications in their U–I collaboration.

In brief, both our in-depth interviews and participant observation indicate that the key challenge of U–I R&D collaboration and knowledge interaction in the Chinese MNC context is related to the Chinese culture in terms of guanxi and its deeper and complex social and cultural mechanisms. This includes, for instance, interpersonal relationship and trust, true interest and the relatedness of research, mutual commitment and learning, intensive communication and interaction, and being well aware of cultural and knowledge-related differences between collaboration partners.

From our study, we observed also some similarities and differences between the ICT and forestry industry sectors in collaborating with host-country universities. One commonality is that both focus on future-oriented objectives in U–I collaboration and therefore the object of collaboration is not pre-defined clearly but nevertheless there is still some motive for and direction in searching for possible solutions and applications. In this sense, 'a runaway object' proposed by Engeström (2008) seems to be illuminating. The differences seem to be related to the developmental status and the focusing content in U–I collaboration. Comparatively, for instance, ICT Company was concerned more with marketing segments, potential consumer groups and their changing needs, whereas Forestry Company was more interested in local technology, natural resources and production-specific possibilities.

Reflections in relation to the conceptual framework

The empirical data from this study supports the following ideas proposed in the conceptual frame-

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Table 2 Conceptual framework and its empirical relevance

The dimensions of knowledge interaction proposed in the conceptual framework	Empirical relevance from our in-depth interviews and participant observation
Culture: task-oriented and rule-based versus relation-oriented and guanxi-based	(1) The significance of guanxi in China (2) Changing configuration of guanxi and task-oriented consideration
Knowledge: explicit versus tacit	U–I projects are likely to involve more tacit knowledge as they are un-specific and future-oriented; also Chinese priority on guanxi networking and the informality is tacit in nature
Knowledge interaction strategy: exploitation versus exploration	Explorative type of collaboration projects are of a key concern for U–I R&D collaboration
Knowledge interaction approach: TKT, KI and CKC	Towards a mode of collaborative knowledge creation (CKC) rather than technology and knowledge transfer (TKT) in U–I R&D collaboration and knowledge interaction
Research task: basic research versus applied R&D	(1) Applied R&D requires more intensive communication and interaction between collaboration partners (2) Universities valued more basic research whereas companies found applied research more valuable.

work. Table 2 above highlights the relationship between the two.

Based on the conceptual framework (Figure 1) and the interview data, it can be seen from Table 2 that all dimensions except the one of capability development in the framework are recognized and confirmed by the empirical data of the study. However, the idea of capability augmentation can be seen to be implicitly embedded in the explorative projects, even though we did not explicitly ask about the nature of capabilities in the interviews.

DISCUSSION AND CONCLUSIONS

Our study deals with U–I R&D collaboration and knowledge interaction in the Chinese MNC context, in which the role of culture in knowledge co-creation is particularly emphasized. The key findings of the study, with some of their theoretical and managerial implications, can be seen as follows. Firstly, the results of the study confirm a close relationship between the effectiveness of U–I knowledge interaction and good alignment of knowledge interaction strategies and approaches. This finding has a profound implication, for increasing the effectiveness of knowledge interaction is strategically important for both nations and companies (see also Liu and Jiang, 2001). Based on our study, an efficient matching strategy in U–I R&D collaboration would be that the firm or university's adoption of a knowledge interaction strategy and its corresponding approach matches up well with the knowledge type involved in the collaboration and interaction (explicit versus tacit knowledge), intended capability development practices (capability exploiting versus augmenting) and research tasks (basic versus applied research). A knowledge exploitation or reuse strategy, for instance, cannot work efficiently if the type of knowledge involved is largely tacit. The knowledge as such is not ready for the purpose of exploitation or reuse. A personalization strategy works better in the Chinese relation-oriented and guanxi-based culture. It is very difficult to make tacit knowledge explicit or codified in such a society; moreover, even if the knowledge has been well codified and documented, it is still very hard to put it into use. In such societies, things tend to be managed by people, not in any sense by information, paper or document.

Secondly, we proposed that the significance of cultural influences is not always the same due to different intensification of knowledge interaction approaches intentionally or unconsciously used in organizations. The significance of culture may accumulate with the increasing intensity of knowledge interaction from technology and knowledge transfer to knowledge integration and collaborative knowledge creation. Theoretically, more interactive types of knowledge interaction are likely to be associated with tacit knowledge and a personalization knowledge strategy. Compared to explicit knowledge, tacit knowledge or organizational know-how is more likely to result in advantages that are sustainable. As Dyer and Singh (1998) noted already a decade ago, to gain inter-organizational competitive advantage, 'alliance partners that are particularly effective at transferring know-how are likely to outperform competitors who are not.' (665).

Thirdly, some further and more specific implications can be drawn from the study for future research and practice: (1) We argue in the paper that in our studied context of multinational corporations in China, more interactive types of knowledge interaction like knowledge co-creation should be of key concern, illustrating a need for future research

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to re-consider the nature of knowledge interaction in similar organizational and socio-cultural contexts. In practice, much more managerial attention and efforts need to be addressed to more interactive types of knowledge interaction in which the cultural influence is more evident. (2) China becomes an increasingly important knowledge pool and marketplace for many MNCs yet the cultural challenges are still a major issue. In our paper the role of host-country culture, i.e. Chinese culture for knowledge interaction is especially highlighted. As previous studies concentrating on U–I knowledge interaction have not paid great attention to cross-cultural contexts, this study acts as a starting point for further studies in the field and offers a new way of looking into the dynamic and complex interplay of culture and knowledge that can be empirically examined more thoroughly in cross-cultural settings. (3) Innovation and product development should be based on the needs expected to exist even years ahead, and thorough understanding and proactive assessment of such hidden and future customer needs are particularly challenging for companies to fulfil (Kärkkäinen *et al*., 2001). It seems that searching for a good model or formula to predict what future customers in China may need in the long run (e.g. in 5 or 10 years) is likely to be unfruitful. There are too many simultaneously changing variables to be able to make reliable predictions. To cope with this challenge, knowledge-based collaboration with local research organizations should be developed that actively interacts with local stakeholders and customers of all types in order to transfer, integrate and co-create knowledge with the company. Knowledge-based collaboration can provide stability to track the fast changes and pulse of future markets. In this regard, Chinese guanxi building and trust relationships are extremely important, and we found from our study that guanxi initiates, facilitates and intensifies collaboration and knowledge interaction when there are personal connections and varied channels of informal social networking.

China's huge talent pool increasingly attracts MNCs to look for new forms of long-term and deeper collaboration with Chinese research organizations. As commented by Asakawa and Som (2008), MNCs should not forget the conventional wisdom of managing their innovative R&D, but they should also learn from the unique challenges and capabilities in China. This demand provides a rare opportunity and new scenario, for both researchers and practitioners, in which knowledge and competence co-creation might be reinforced. In a broader sense, the concept of guanxi constantly gains new meanings in business and R&D collaboration, and a broader view of guanxi may be applicable to many other types of alliances and business collaboration in today's networked economy.

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REFERENCES

Almeida P, Song JY, Grant RM. 2002. Are firms superior to alliances and markets? An empirical test of cross-border knowledge building. *Organization Science* **13**: 147–161.

Ambos B, Schlegelmilch BB. 2008. Innovation in multinational firms: does cultural fit enhance performance? *Management International Review* **48**: 189–206.

Andreu R, Sieber S. 2005. Knowledge integration across organizations: how different types of knowledge suggest different 'integration trajectories'. *Knowledge and Process Management* **12**: 153–160.

Armagan S, Ferreira MP. 2005. The impact of political culture on firms' choice of exploitation-exploration internationalization strategy. *International Journal of Cross Cultural Management* **5**: 275–291.

Asakawa K, Som A. 2008. Internationalization of R&D in China and India: conventional wisdom versus reality. *Asia Pacific J Manage* **25**: 375–394.

Barbolla AMB, Corredera JRC. 2009. Critical factors for success in university-industry research projects. *Technology Analysis and Strategic Management* **21**: 599–616.

Bhagat RS, Kedia BL, Harveston PD, Triandis HC. 2002. Cultural variation in the cross-border transfer of organizational knowledge: an integrative framework. *Academy of Management Review* **27**: 204–221.

Boisot M, Child J. 1996. From fiefs to clans and network capitalism: explaining China's emerging economic order. *Administrative Science Quarterly* **41**: 600–628.

Buckley PJ, Clegg J, Tan H. 2006. Cultural awareness in knowledge transfer to China: the role of guanxi and mianzi. *Journal of World Business* **41**: 275–288.

Burrows GR, Drummond DL, Martinsons MG. 2005. Knowledge management in China. *Communications of the ACM* **48**: 73–76.

Chen YC. 2007. The upgrading of multinational regional innovation networks in China. *Asia Pacific Business Review* **13**: 373–403.

Drejer I, Jørgensen BH. 2005. The dynamic creation of knowledge: analysing public–private collaborations. *Technovation* **25**: 83–94.

Dyer JH, Singh H. 1998. The relational view: cooperative strategy and sources of interorganizational competitive advantage. *The Academy of Management Review* **23**: 660–679.

Engeström Y. 1999. Innovative learning in work teams: analyzing cycles of knowledge creation in practice. In *Perspectives on Activity Theory*, Y, Engeström R, Miettinen RL Punamäki (eds). Cambridge University Press: Cambridge; 377–406.

Engeström Y. 2008. *From Teams to Knots: Activity-Theoretical Studies of Collaboration and Learning at Work*. Cambridge University Press: Cambridge.

Engeström Y, Engeström R, Kerosuo H. 2003. The discursive construction of collaborative care. *Applied Linguistics* **24**: 286–315.

Eriksson P, Kovalainen A. 2008. *Qualitative Methods in Business Research*. Sage Publications: London.

Fu XL. 2008. Foreign direct investment, absorptive capacity and regional innovation capabilities: evidence from China. *Oxford Development Studies* **36**: 89–110.

DOI: 10.1002/kpm

Fukugawa N. 2005. Characteristics of knowledge interactions between universities and small firms in Japan. *International Small Business Journal* **23**: 379–401.

Grandori A, Kogut B. 2002. Dialogue on organization and knowledge. *Organization Science* **13**: 224–231.

Grant RM. 1996. Toward a knowledge-based theory of the firm. *Strategic Management Journal* **17**: 109–122.

Grant RM, Baden-Fuller C. 2004. A knowledge accessing theory of strategic alliances. *Journal of Management Studies* **41**: 62–84.

Gupta AK, Smith KG, Shalley CE. 2006. The interplay between exploration and exploitation. *Academy of Management Journal* **49**: 693–706.

Hansen MT, Nohria N, Tierney T. 1999. What's your strategy for managing knowledge? *Harvard Business Review* **March-April**: 106–116.

Hedlund G, Nonaka I. 1993. Models of knowledge management in the West and Japan. In *Implementing Strategic Processes: Change, Learning and Co-operation*, Lorange P, Chakravarthy B, Roos J, van Der Ven A (eds). Blackwell Business: Oxford.

Heikkinen J, Blomqvist K, Hong JZ. 2007. Ba for knowledge creation in Sino-Western university–industry collaboration. *Paper presented in the Conference of EBRF 2007—Research Forum to Understand Business in Knowledge Society*, September 25–27, Agora—Jyvaskyla, Finland.

Hemmert M, Okamuro H, Bstieler L, Ruth K. 2008. An inquiry into the status and nature of university–industry research collaborations in Japan and Korea. *Hitotsubashi Journal of Economics* **49**: 163–180.

Holden N. 2001. Knowledge management: raising the spectre of the cross-cultural dimension. *Knowledge and Process Management* **8**: 155–163.

Holden N. 2002. *Cross-cultural Management: A Knowledge Management Perspective*. Pearson Education: Harlow.

Holden N. 2008. Reflections of a cross-cultural scholar: context and language in management thought. *International Journal of Cross Cultural Management* **8**: 239–251.

Holland D, Lave J. 2009. Social practice theory and the historical production of persons. *ACTIO: An International Journal of Human Activity Theory* **2**: 1–15.

Hong W. 2008. Decline of the center: the decentralizing process of knowledge transfer of Chinese universities from 1985 to 2004. *Research Policy* **37**: 580–595.

Hong JZ, Engeström Y. 2004. Changing principles of communication between Chinese managers and workers: Confucian authority chains and guanxi as social networking. *Management Communication Quarterly* **17**: 552–585.

Hong JZ, Olander H. 2010. University-industry knowledge interaction: case studies from Finland and China. *International Journal of Healthcare Technology and Management*. Transforming Basic Research in Biomedical Sciences into Commercial Applications: The Role of Universities in Industrialised Countries.

Hong JZ, Heikkinen J, Niemi M. 2007. Collaborative knowledge creation and innovation between MNCs and Chinese universities. In *Proceedings of the 8th European Conference on Knowledge Management, Vol 1*, Martins B, Remenyi D (eds). Consorci Escola Industrial de Barcelona: Barcelona; 486–449.

Hong JZ, Kianto A, Kyläheiko K. 2008. Moving culture and the creation of new knowledge and dynamic capabilities in emerging markets. *Knowledge and Process Management* **15**: 196–202.

Huang Q, Davison RM, Gu J. 2008. Impact of personal and cultural factors on knowledge sharing in China. *Asia Pacific Journal of Management* **25**: 451–471.

Hutchings K, Michailova S. 2004. Facilitating knowledge sharing in Russian and Chinese subsidiaries: the role of personal networks and group membership. *Journal of Knowledge Management* **8**: 84–94.

Hutchings K, Mohannak K. 2007. *Knowledge Management in Developing Economies: A Cross-Cultural and Institutional Approach*. Edward Elgar: Cheltenham.

Inkpen AC. 1996. Creating knowledge through collaboration. *California Management Review* **39**: 123–140.

Jasimuddin SM, Klein JH, Connell C. 2005. The paradox of using tacit and explicit knowledge: strategies of face dilemmas. *Management Decision* **43**: 102–112.

Jiang C. 2005. The impact of entrepreneur's social capital on knowledge transfer in Chinese high-tech firms: The mediating effects of absorptive capacity and guanxi development. *International Journal of Entrepreneurship and Innovation Management* **5**: 269–283.

Kärkkäinen H, Piippo P, Puumalainen K, Tuominen M. 2001. Assessment of hidden and future customer needs in Finnish business-to-business companies. *R&D Management* **31**: 391–407.

Kohlbacher F, Krähe MOB. 2007. Knowledge creation and transfer in a cross-cultural context: empirical evidence from Tyco Flow Control. *Knowledge and Process Management* **14**: 169–181.

Li JD. 2005. A study on R&D collaboration between MNCs and Chinese universities. *Master's Thesis*, Tsinghua University: Beijing (in Chinese).

Li PP. 2008. Toward a geocentric framework of trust: an application to organizational trust. *Management and Organization Review* **4**: 413–439.

Li S, Scullion H. 2006. Bridging the distance: managing cross-border knowledge holders. *Asia Pacific Journal of Management* **23**: 71–92.

Lin L. 2005. Study on the university–enterprise knowledge alliance based on the theory of knowledge activity system. *Doctoral Dissertation*, Dalian University of Technology: Dalian (in Chinese).

Lindqvist J, Blomqvist K, Saarenketo S. 2007. The role of sales subsidiary in MNC innovativeness: explorative study and emerging issues on knowledge transfer. In *Anxieties and Management Responses in International Business*, Sinkovics RR, Yamin M (eds). Palgrave MacMillan: Houndmills, Basingstoke, U.K.

Liu H, Jiang YZ. 2001. Technology transfer from higher education institutions to industry in China: nature and implications. *Technovation* **21**: 175–188.

Lu L, Etzkowitz H. 2008. Strategic challenges for creating knowledge-based innovation in China: transforming triple helix university-government-industry relations. *Journal of Technology Management in China* **3**: 5–11.

Luo YD. 2007. *Guanxi and Business*. World Scientific: New Jersey.

Mansfield E. 1995. Academic research underlying industrial innovations: sources, characteristics, and financing. *The Review of Economics and Statistics* **77**: 55–65.

March JG. 1991. Exploration and exploitation in organizational learning. *Organization Science* **2**: 71–86.

Martinsons MG, Westwood RI. 1997. Management information systems in the Chinese business culture: an explanatory theory. *Information and Management* **32**: 215–228.

Mason J. 2002. *Qualitative Researching* (2nd edn). Sage Publications: London.

Miesing P, Kriger MP, Slough N. 2007. Towards a model of effective knowledge transfer within transnationals: the case of Chinese foreign invested enterprises. *The Journal of Technology Transfer* **32**: 109–122.

Moitra D, Kumar K. 2007. Managed socialization: how smart companies leverage global knowledge. *Knowledge and Process Management* **14**: 148–157.

DOI: 10.1002/kpm

Nonaka I, Takeuchi H. 1995. *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*? Oxford University Press: Oxford.

Nonaka I, Umemoto K, Sasaki K. 1998. Three tales of knowledge-creating companies. In *Knowing in Firms. Understanding, Managing and Measuring Knowledge*, von Krogh G, Roos J, Kleine D (eds). Sage Publications: London.

Patton MQ. 2002. *Qualitative Research and Evaluation Methods* (3rd edn). Sage Publications: Thousand Oaks, CA.

Perkmann M, Walsh K. 2006. Relationship-based university-industry links and open innovation: towards a research agenda. *AIM Research Working Paper Series, 041*, July, Loughborough University.

Pillania RK. 2008. Innovations and knowledge management in emerging markets (Editorial). *Knowledge and Process Management* **15**: 184–185.

Qin C, Ramburuth P, Wang Y. 2008. Cultural distance and subsidiary roles in knowledge transfer in MNCs in China. *Chinese Management Studies* **2**: 260–280.

Ramasamy B, Goh KW, Yeung MCH. 2006. Is guanxi (relationship) a bridge to knowledge transfer? *Journal of Business Research* **59**: 130–139.

Santoro MD, Gopalakrishnan S. 2000. The institutionalization of knowledge transfer activities within indust ry–university collaborative ventures. *The Journal of Engineering and Technology Management* **17**: 299–319.

Schartinger D, Rammer C, Fischer MM, Fröhlich J. 2002. Knowledge interactions between universities and industry in Austria: sectoral patterns and determinants. *Research Policy* **31**: 303–328.

Seigel DS, Waldman DA, Atwater LE, Link AN. 2003. Commercial knowledge transfers from universities to firm: improving the effectiveness of university-industry collaboration. *Journal of High Technology Research* **14**: 111–133.

Spender J-C. 1992. Limits to learning from the West. *The International Executive* **34**: 389–410.

Tödtling F, Lehner P, Kaufmann A. 2009. Do different types of innovation rely on specific kinds of knowledge interactions? *Technovation* **29**: 59–71.

Viljamaa K. 2007. Technological and cultural challenges in local innovation support activities: emerging knowledge interactions in Charlotte's motor sport cluster. *European Planning Studies* **15**: 1215–1232.

Vuola O, Hameri A-P. 2006. Mutually benefitting joint innovation process between industry and big-science. *Technovation* **26**: 3–12.

Wang Y, Lu L. 2007. Knowledge transfer through effective university-industry interactions. *Journal of Technology Management in China* **2**: 119–133.

Weir D, Hutchings K. 2005. Cultural embeddedness and contextual constraints: knowledge sharing in Chinese and Arab cultures. *Knowledge and Process Management* **12**: 88–98.

Yang M. 2002. The resilience of guanxi and its new deployments: a critique of some new guanxi scholarship. *The China Quarterly* **170**: 459–476.

Zhao JY, de Pablos PO. 2010. Analysis of cooperative mechanism of industry–academiy R&D allianc lab and case study. *Human Factors and Ergonomics in Manufacturing and Service Industries* **20**: 123–134.

Zhou CY. 2008. Emergence of the entrepreneurial university in evolution of the triple helix: the case of Northeastern University in China. *Journal of Technology Management in China* **3**: 109–126.

Zinnov . 2009. *R&D Globalization: The China Chapter*, Zinnov, Bangalore.

DOI: 10.1002/kpm

APPENDIX A: The issues studied and open-ended interview questions

The topics of the study

The major topic of the study include (1) Motivation factors for the collaboration with multinational companies (MNCs); (2) Creation of relationship between MNC and Chinese universities; (3) Process of typical collaboration project(s); (4) Knowledge interactions for collaborative innovation and (5) Cultural issues and challenges in U–I collaboration.

The open-ended interview questions

Industry–university collaboration (basic)

(1) Why do you like to collaborate with universities?
(2) Do you find easy to collaborate with? Why?
(3) So far, have you been satisfied with your collaboration? What are satisfied and what are not?

Knowledge interaction (in-depth)

(1) Perspective and ways of interacting with universities—How important do you see knowledge exchange and interaction in industry–university collaboration?
(2) Process of the knowledge interaction (e.g. one successful and one unsuccessful events or stories)—What do you think are critical factors that facilitate or impede industry–university knowledge interaction?
(3) Current challenges in industry–university knowledge interaction—what are they? What are available coping mechanisms? What would you like to do in the future?

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352. JAATINEN, AHTI. Performance improvement of centrifugal compressor stage with pinched geometry or vaned diffuser. 2009. Diss.

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393. KÄHKÖNEN, ANNI-KAISA. The role of power relations in strategic supply management - A value net approach. 2010. Diss.

394. VIROLAINEN, ILKKA. Johdon coaching: Rajanvetoja, taustateorioita ja prosesseja. 2010. Diss