The Way Chinese Companies Collaborate with Chinese Universities

Authors: Guilan An

Tutor: Sigvald Harryson
Program: Business Administration
Subject: Growth Through Innovation and International Marketing
Level and semester: Masterlevel September 2007
Baltic Business School
# Table of Contents

Acknowledgements.............................................................................................................1
Abstract.................................................................................................................................2

**Chapter One: Introduction**.................................................................................................3

1.1 Background .......................................................................................................................3
1.2 Objectives of the studies ...............................................................................................3

**Chapter Two: Literature Review**..........................................................................................4

2.1 Innovation in Organizations.............................................................................................4
2.2 The Two Dilemmas of Innovation.....................................................................................5
2.3 Applying Network Theory to Analyze Dilemmas of Innovation.....................................6
2.4 Open and Closed Networks............................................................................................7
2.5 University characteristics and the role of university towards academic capitalism......11
2.6 Company is looking for External Network....................................................................12
2.7 Industry-University Collaboration to Support Learning both in Exploration and Exploitation.........................................................................................................12
2.8 Research on Industry-University Innovation in Europe................................................13
2.9 Research on Industry-University Collaboration in China.............................................14
   2.9.1 University National Science Park.........................................................................15
   2.9.2 University Invested Companies..........................................................................15
   2.9.3 Establishment of High Technology Companies in Partnership with Enterprises....16
   2.9.4 Joint Project Development..................................................................................17
   2.9.5 Technology Transfer through Collaboration with Local Governments...............18
   2.9.6 Building-up a Science and Technology Co-operation Network of Chinese Universities................................................................................................................18
   2.9.7 Joint-lab Model.....................................................................................................19
   2.9.8 Post Doctor Work Station......................................................................................19
   2.9.9 In-sourced Model.................................................................................................19

**Chapter Three:**

**Methodology**.......................................................................................................................21
3.1 Research Design..............................................................................................................21
3.1.1 Research Approach.................................................................................................21
Chapter Four: The cases of Fudan university, ZheJiang University, West Baltic Components and HuaWei Technologies

Chapter Five: Analysis of Findings

Chapter Six: Conclusion

Chapter Seven: Implications For Both University and Company

Appendix One: Interview Guild

Appendix Two: Table of Chinese Companies Created As Spin-Outs From Universities
Appendix Three: List of Chinese Companies Actively Pursue I-U Collaboration……56
Abbreviation...............................................................................................57
Appendix Four: Company and University Fact Sheets.......................................58
4.1 ZheJiang University..................................................................................58
4.2 FuDan University......................................................................................59
4.3 Huawei Technologies Co., Ltd.................................................................60
4.4 Westbaltic Components AB......................................................................61
Reference.......................................................................................................62
ACKNOWLEDGEMENTS

This research denotes the end of my Master of Science degree in Growth through Innovation and International marketing at Baltic Business School, Kalmar University. During this study, I have the privilege of working with a number of persons to whom I would like to express my gratitude.

First and foremost I want to thank my supervisor, Professor Sigvald Harryson at Baltic Business School for his insightful comments helping me to structure my work, and his student, Han Yang helping me to contact the interviewees, together with critical advice contributing to the final outcome of my work.

In addition, I will show my warmest gratitude to all those who gave their valuable time for interview: Ma Hui from West Baltic company, Zhang Kai from HuaWei Technologies, Zhang Zheng from FuDan University and Han Yang from ZheJiang University. Without them and the valuable information and insights which they provide this research could not have been completed.
ABSTRACT

The objective of this study is to investigate how Chinese companies collaborate with Chinese universities. These companies in academic often referred as technology-based firms and follow a trend of Industry-University collaboration. Prior research within this field has found that these technology-based firms generally apply a model when collaborate with universities to reach both exploration and exploitation. Literature has given much attention to firms originating from European countries, and for that matter, more research needs to focus on the collaboration between Chinese firms and Chinese Universities. This exploratory research has incorporated a holistic approach in order to obtain an overall picture of the underlying pattern behind the collaboration. In order to aid and facilitate this investigation, I have followed a conceptual research model that has functioned as a guiding tool for my exploration and analysis. This conceptual research model is comprised of four main Industry-University models: Spin-off Model, joint project development model, joint-lab model and PHD work station. In order to investigate the objectives of the study, four cases from companies and universities were selected representing highly innovative company and university: Westbaltic Components AB, HuaWei Technologies, FuDan University and ZheJiang University.
CHAPTER ONE                      INTRODUCTION

1.1 Background
I have been inspired for this research by Clayton Christensen’s book, the innovator’s dilemma. One of the most consistent patterns in business is the failure of leading companies to stay at the top of their industries when technologies or markets change. The failure of these companies could be due to lack of good management, bureaucracy, inadequate skills and resources or just plain bad luck. But even well management and respected companies are challenged by innovative and aggressive small firms and challenged in markets on technological basis. Whereas, Clayton Christensen talks about solving innovator’s dilemma for non-network products, in this thesis an attempt has been made to leverage findings and theoretical linkages in a network setting.

1.2 Objectives of the Study
This thesis seeks to answer the following questions:

- Why do Chinese companies collaborate with Chinese universities?
- How do Chinese companies collaborate with Chinese universities, are there any patterns appeared in collaboration?
- What are the effects of approach applied in collaboration?

I have in this thesis investigated motivation of collaborations between Chinese companies and universities. The goal was to find out the way how Chinese companies are collaborating with universities with the particular interest in finding if there are any patterns appeared in collaboration. By investigating the patterns the further goal is to detect the effects of approach applied in collaboration. I will specifically focus on finding the patterns appeared in collaboration.
2.1 Innovation in Organizations

A convenient definition of innovation from an organizational perspective is given by Luecke and Katz (2003), who wrote: "Innovation . . . is generally understood as the successful introduction of a new thing or method . . . Innovation is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services."

Innovation typically involves creativity, but is not identical to it: innovation involves acting on the creative ideas to make some specific and tangible difference in the domain in which the innovation occurs. For example, Amabile et al (1996) propose: “All innovation begins with creative ideas . . . We define innovation as the successful implementation of creative ideas within an organization. In this view, creativity by individuals and teams is a starting point for innovation; the first is necessary but not sufficient condition for the second”. (p. 1154-1155).

For innovation to occur, something more than the generation of a creative idea or insight is required: the insight must be put into action to make a genuine difference, resulting for example in new or altered business processes within the organization, or changes in the products and services provided.

A further characterization of innovation is as an organizational or management process. For example, Davila et al (2006), write: "Innovation, like many business functions, is a management process that requires specific tools, rules, and discipline." (p. xvii) From this point of view the emphasis is moved from the introduction of specific novel and useful ideas to the general organizational processes and procedures for generating, considering, and acting on such insights leading to significant organizational improvements in terms of improved or new business products, services, or internal processes.

Through these varieties of viewpoints, creativity is typically seen as the basis for innovation, and innovation as the successful implementation of creative ideas within an organization (c.f. Amabile et al 1996 p.1155). From this point of view, creativity may be displayed by individuals, but innovation occurs in the organizational context only.
Therefore, it can be seen that in order for companies to reach innovation, two essential things are needed: creative ideas and the rules and appropriate organizational structure to exploit the creative ideas. However, most of the companies are stuck into two innovation dilemmas: dilemmas of technological leadership which hinders organizations from having creative ideas. Also, even there are creative ideas, organization might stick in the organizational dilemmas to exploit the creative ideas to finally reach innovation.

2.2 The Two Dilemmas of Innovation

According to Sigvald Harryson (1995; 1998; 2002) that many MNCs seem to have reached an inner limit in terms of innovation ability due to two theoretical dilemmas of innovation, which seem to limit the efficacy of pure internal technological development (Harryson, 1995; 1998; 2002).

The first dilemma refers to the dilemma of technological leadership where companies normally concentrated on their own pool of knowledge and technology and also more and more specialized in that area. This has decreased company’s sensitivity and responsiveness to external technological and market factors that ought to guide product development and innovation. Moreover, the people from different department are lack of cross-department collaboration which is required for radical innovation. In this case, the tacit knowledge-base might increase at the level of specific individuals, but without systematically transforming into organizational knowledge, innovation will not occur as we discussed above: innovation will only occur at the organizational context instead of individual levels.

The second dilemma refers to the organizational dilemma of innovation: it is that the creation and exploration of inventive technologies and knowledge appear to require small and organic organizational structures, whereas rapid innovation through effective exploitation of that knowledge, in contrast, calls for large and rigid organizations. Companies trying to achieve entrepreneurship by pursuing both creative invention and rapid innovation are most likely to be caught in this dilemma of ‘excessive ambidexterity’ (He and Wong, 2004).

The above organizational dilemma of innovation can be described along the two critical dimensions: size of the organization and the degree of managerial hierarchy as suggested by figure 1 described by Sigvald Harryson (1995; 1998; 2002). As we can see from the figure, the lower left-hand square seems to be most adequate for organic knowledge flows that
stimulate creative invention; the upper right-hand square depicts the ideal conditions for well-structured and efficient processes. Accordingly, for innovation to happen both small organic organizations and a large hierarchic unit are typically required.

Figure 1: The Organizational Dilemma of Innovation

Up to the discussion so far, innovation requires two things: creative ideas and organisational structure to exploit the creative ideas, however, there are two dilemmas of innovation that work against them like two white fields in figure 1: one is massive chaos which are organic enough for creative invention but too unstructured to handle large-scale exploitation, another one is decentralized bureaucracy which is under hierarchic control, but the hierarchic control is lack of inspiration for creative ideas. Only the two shaded fields are able to offer both creative ideas and organisational structure for exploitation. Then the main challenge is how to combine these two shaded fields to acquire both creative ideas and exploit the ideas while avoiding the dilemmas of innovation. The following section will discuss how the multi-network approach can be used to overcome the challenge.

2.3 Applying Network Theory to analyze Dilemmas of Innovation

The main challenge for most companies is to be innovative and exploitive and avoid the two dilemmas of innovation at the same time as discussed above. Harryson (1995, 1997 and 1998) have taken a multi-networked approach that had greatly overcome the challenge and make
company reach innovation. This multi-network is made three levels which are illustrated by figure 2: creativity network, process network and project network.

1. Extra corporate creativity networks as primary sources of knowledge and technology, it is mainly for knowledge creation and radical invention.
2. Intracorporate process networks for transfer and transformation of invention into innovation
3. Project networks: will help us better understand how project networks can be established and managed to circumvent the dilemmas of innovation by combining the aforementioned creativity networks and process networks.

![Figure 2: The Multi-networked Approach to Growth through Innovation](image)

**Figure 2**  *The Multi-networked Approach to Growth through Innovation*

This three-layered network model serves as a theoretical framework in this paper to guide both the empirical and the theoretical analyses. And this multi-network approach leads to argument of network innovation and relationships management discussed below.

### 2.4 Open and Closed Networks

A network can be defined as a set of direct and indirect social relationships centred around a given person, object or event (Meyerson 2000). Ties between nodes in a network can be described as strong or weak and network structure can be described as open and close. Having
no social capital on which to rely, open network is mainly about resource exchange of information, while closed network focuses on social exchange, trust and shared norms (Walker et al, 1997). An example of an open network is one in which firms have direct social contacts with all their partners, but these partners do not have any direct contacts with each other. A high number of such non-connected parties or structural holes, means that the network consists of few redundant contacts and is information rich since people on either side of the hole have access to different flows of information (Burt, 1992; 1993). This implies that the structure of an open network is suitable when the purpose of the network is knowledge creation by maximising the number of contacts gathering, processing and screening new sources of information.

The opposite is the tightly coupled closed network where all partners have direct and strong ties with each other. This network is centred on social capital, which is built through trust and shared norms and behaviour (Coleman, 1988). Embeddedness in dense networks supports effective knowledge transfer and inter-firm cooperation (Granovetter, 1985; Walker et al, 1997). It is believe that this type of network is required for exploitation, but not suited for exploration.

The complementary networking theory has been summarised in a model by Harryson (1996; 1998). It seem that the network structure required for exploration is absolute opposite of the one required to support exploitation. So it had been suggested that a project team should have its nucleus in the North-Eastern corner of Figure 3, but also have a multitude of current weak ties into the open networks – as represented by the opposing South-Western corner.
Furthermore, both open and closed network corresponds with the theory of strength of ties. Some authors do also claim that benefits of different ties (strong ties and weak ties) for sharing of knowledge also depend upon the different types of knowledge dissemination activities used (Hansen 1999). Hansen discerns between search and transfer activities and his argument is that benefits of tie strength are relative to the kind of learning activity carried out. Weak ties with novelty benefits are superior for search activities: that is when an individual or group is scanning for and identifying knowledge from external sources. Strong ties with comprehensibility benefits are more important for transfer activities: when the knowledge identified is to be is transferred and accommodated in a new context. Therefore, it is clear that weak ties are required in open network for generating new ideas, while the strong ties are requested for exploiting the results.

Furthermore, both weak and strong ties in a network provide organizations with information about potential partners and opportunities to form new linkages. The conceptual pair strong and weak ties (Granovetter 1973) are central in both relationship formation studies (e.g. Uzzi 1996) as well as knowledge transfer research (e.g. Hansen 1999). According to Granovetter (1973, p. 1361), “the strength of a tie is a combination of the amount of time, emotional intensity, intimacy (mutual confidence), and reciprocal services that characterize the tie”. Strong ties are relationships characterized by close and frequent interaction, where a lot of
time and emotion are invested in the relationships. Typical examples include friendships and familial relationships. Weak ties on the other hand are relationships where contact is less frequent and with less investments of time and emotion, for instance social acquaintances. Lazzarini & Zenger (2002, p. 4) have modified the definition of tie strength to inter-organizational relationships and define it as “the degree of commitment that supports an exchange relationship for the transfer of goods, services, or information”. But instead of treating tie strength as a static characteristic of relationships, Lazzarini & Zenger (2002) argue that tie strength is dynamic: over time weak ties might grow strong and strong ties might weaken.

Ahuja (2000) highlights contradiction between open and closed networks and proposes that the larger the number of structural holes spanned by a firm, the greater its innovation output. There seems to be a trade-off between a large loosely coupled network that maximises information benefits and a smaller tightly coupled network promoting trust building and more reliable information. Since the contradiction between open and close networks, accordingly, there is a balance question between weak ties and strong ties: innovation requires some degree of novel knowledge or ideas acquired from weak ties and at the same time this knowledge is hard to communicate and absorb due to “perceptual gaps”. So it is assumed that collaboration in innovation processes requires a balance between weak ties and strong ties.

Then how to keep balance between open and close networks and balance between weak ties and strong ties, this contradiction is studied in the context of project teams by Soda et al. (2004), who argue that the best performing teams are those with strong ties among the project members based on past joint-experience, but with a multitude of current weak ties to complementary, non-redundant resources. This means that members in the project team need to be sufficiently different to carry some novel knowledge, but also sufficiently similar to be able to communicate efficiently. Since this is a question of balance, the relationship between project members will be in terms of proximity, as a concept for closeness but not overlap between different members.

Based on all the discussion so far, critical in this context is to secure good exploration and exploitation of knowledge in the interchange between two opposing network structures and the relationship between agents. Therefore, in the next section, Industry-University collaboration will depict how industry and university collaboration can reach both exploration
and exploitation by applying two opposing networks and the relationship between agents. Before the discussion of industry and university collaboration, the changing role of university towards academic capitalism will be illustrated.

2.5 University characteristics and the role of university towards academic capitalism

Slaughter & Leslie (1997) have investigated entrepreneurial behaviour of university in their book on “academic capitalism”, defined as “market and market like behaviour on parts of universities and faculty” (p. 11). Slaughter & Leslie offer detailed empirical investigations on how institutions and faculty have changed their behaviour in response to changes in the environment. They put emphasis on one variable for explaining the emergence of entrepreneurial universities – resource dependency, brought about by declining public funding and new patterns of financing.

However, the resource dependency argument alone does not explain propensity for linkage. Knowledge proximity and market potential further explain the phenomenon in responses to decline of public funding. Academic capitalism differentiate at different academic field: According to Slaughter & Leslie (1997) academic capitalism is largely focused on techno-science fields, like biotechnology, material science, computer science, and other fields close to the market, like business administration and economics. These subject fields have closer ties to economic sectors and they are seen as strategic to national and regional economic development. In these areas, institutions and faculty are able to develop research-related market relations. These findings are also corroborated by Schartinger et al (2002): basic natural sciences, social science and humanities do not have the ‘market potential’ that these areas have, and in these areas engagement in academic capitalism is likely to focus more on education and service than research (Slaughter & Leslie 1997; Schartinger et al 2002).

Since the technological science fields have closer ties to economic sectors and seen as strategic to regional and national economic development. In order to serve the economic development, university will like to collaborate with companies which have the suitable structure to exploit their invention since it is obvious that the nature of university itself does not possess the structure for exploitation of the invention.
2.6 Company is looking for External Network

On one hand, universities have changed their role more towards academic capitalism. On the other hand, companies have also constantly realized that the sources of innovation are not to be found exclusively within the company. Rather, innovation is often the result of collaboration between different parties with complementary resources in a network economy. (Teece, 1986; Harryson, 1996, 2006; Harryson et al. 2008). Otherwise, the company will easily trap into the two dilemma of innovation as depicted in the dilemma of innovation theory earlier. In order to overcome the dilemmas, the network theory will help to solve the problem as mentioned earlier in the network theory by Sigvald. As a consequence, Corporate R&D labs have in recent years emphasized the creation of links with external sources of knowledge in order to facilitate successful innovation (Freeman, 1991; Okubo and Sjoberg, 2000). Firms are adopting this network approach as they engage in networking and in creating linkages – not as a substitute for internal corporate R&D but as a complementary activity. In this regard, the traditional company R&D paradigm as an internally developed pool of innovation is evolving to embrace the ability to assimilate the knowledge of external entities (Okubo and Sjoberg, 2000, Harryson et al. 2008).

A growing body of recently published studies demonstrates an increased interest in analyzing the rationale and expectations that induce business people and scientists alike to embark upon joint collaboration efforts (Hagedoorn et al., 2000). Van Looy et al. (2004) observed that substantial changes characterized the corporate R&D activities over the last two decades. These changes are marked by growing competition in technology markets, growing importance of knowledge factor and sharing of increasing research costs and risks with external partners. They all point to the desirability to retrieve externally developed knowledge through cooperation with academic partners. However studies have demonstrated that successfully managing of intellectual property of Universities through to the commercialization phase is a serious challenge (Wright et al., 2004).

2.7 Industry-University Collaboration to Support Learning both in Exploration and Exploitation

Based on the discussion so far, on one hand, university is more towards academic capitalism engaging in the network to reach exploitation, and company is engaging in the network to overcome the dilemma of innovation and try to reach exploration. Indeed, Industry-University (I-U) collaboration is recognised as a critical form of learning alliance, and an
essential instrument to gain speed and flexibility in technology innovation, while reducing cost in R&D. As a consequence, new and more flexible ‘triple-helix’ models of knowledge generation with an increased orientation toward the exploitation of publicly funded research has emerged which has been identified by Leydesforff and Etzkowitz. (Leydesdorff and Etzkowitz, 1996; Etzkowitz, 2003).

Then in which way university and company should collaborate to achieve both exploration and exploitation. Based on the network theory we discussed earlier, the way chosen to collaborate should take network theory as principle and also follow relationship dimension of it. University collaborates with company and acts as creative network and company collaborates with university acting as process network. University as creative network requires many efficient weak ties to access to new knowledge and company as process network should have efficient managerial structure to reach exploitation. Then both university and company should work out an efficient project network which means the personnel from both sides should be able to exchange and absorb knowledge through strong ties among them and build on trust to each other. Then the learning alliances between industry and academia can establish distinct models for collaboration that enable learning and knowledge creation within and across both opposing corners of Figure 3 and finally reach innovation. The following will describe three collaboration models in Europe which had been identified by Sigvald Harryson to see to what extent these models have satisfied with both network theory and relationship dimension of network theory.

2.8 Research on Industry-University Innovation in Europe

Both as a contribution to and as a consequence of the opening of innovation process, we see the emergence of new models of knowledge generation. For example, the so called “Triple Helix” of Industry-University-Government relations (Etzkowitz and Leydesdorff, 1998), spotlights the increased orientation toward the “business dimension” of publicly funded research. We witness the proliferation of collaboration between universities and firms which spur activity aimed at commercialization of research outcomes through licensing of intellectual property and establishing of spin-off companies (OECD, 2002).

In previous research by Harryson and Lorange, 2005; 2006; Harryson and Kliknaite, 2005; Harryson et al., 2006a; 2006b; 2007, three distinct university collaboration models had been identified by leading companies: spin-off model, outsourced model, in-sourced model.
• Spin-off model: Creating a separate spin-off company entirely dedicated to university collaboration in one core technology area.

• Outsourced model: Outsourcing the whole management of university collaboration to a specialised organisation located in a strong university environment to access specialised academic expertise when required by the customer organisation.

• Insourced model: Insourcing all university collaboration by turning the whole internal R&D and engineering division into a university-collaboration centre focused on exploitation.

Sigvald Harryson also analysed how these three models reach both exploration and exploitation and address the problem of dilemma of innovation by applying our theoretical framework. According to him, the organisational dilemma of innovation seems to be properly addressed through the organisational set-ups with project networks interlinking academic exploration and industrial exploitation through key-people with extensive know-who (Harryson, 2002a; 2002b) into both spheres. He also explained these models from the relationship dimension of theoretical framework suggesting that a dominance of weak ties is required for exploration in creativity networks, and a dominance of strong ties is required for exploitation in process networks. All companies continually spin academic webs of weak ties for initial exploration of new inventions. For promising inventions, they selectively transform certain weak ties into stronger ones to individual, organisational and inter-organisational strategic partners who become deeply involved in the exploitation of radical innovation. In this sense, the balancing act from exploration to exploitation can also be seen as an act of conversion from relatively open to more closed networks.

2.9 Research on Industry-University Collaboration in China
At present, Chinese enterprises’ research capability is very weak at innovation. According to statistics, only 25 percent of the enterprises engage in research themselves and research cost only count for 0.56 percent of their total income, among them large and medium sized enterprises count for 0.71 percent and among all the enterprises only 0.3% possess their own patent. Under these circumstances, cooperation with university is very essential. At present, 80% of state-owned large and medium sized enterprises engage in university collaboration. According to the statistics, during 2005 contract for I-U collaboration is up to 7314 and
investment involved in the contract account for 22.12 billion RMB. The following will depict the most popular models applied in current Chinese I-U collaboration.

2.9.1 University National Science Park
The Zhejiang University National Science Park (ZUNSP) is one of the 15 national university science parks jointly approved by Ministry of Science and Technology and Ministry of Education and located in Hangzhou and it is built for hi-tech pioneers. The ZUNSP relies on Zhejiang University, her various disciplines, talent resources and strong technology forces serve as backbones for technology innovation and incubation of the ZUNSP. The ZUNSP strongly backs up technology innovation, transfer of research achievements, and the incubation of high-tech enterprises, training of technology talents and spreading of high-tech industry. Moreover, some enterprises within Science Park are directly invested by universities. The following will depict in detail how the university invested enterprises work.

2.9.2 University Invested Companies
Most of top universities in China spin-off companies in order to exploit certain core technology based on the conviction that exploitation should be run outside university. All the top 15 universities spin-off companies based on their core knowledge: the top 15 universities have the largest researchers in number and they are considered to be the most qualified researchers as well in China; as a result, these universities will create many technological achievements every year and accordingly companies have been set up to commercialize these technological achievements. For example, UNIS technology Co ltd is set up by Tsinghua university in 1988, and Tsinghua university is still holding 62% of the share; Founder Group was invested and created by Peking university in 1986 and etc. The following part will take Zhejiang University Investment Holding Company as an example to illustrate in detail how the university invested companies actually work in China.

ZheJiang University Investment Holding Company is established on 8\textsuperscript{th} of December, 2005 and the registered capital is 150 million Yuan invested by ZheJiang University and the feature of this company is State-owned Company. ZheJiang University Asset Management Commission and invested company jointly exert the right to manage the company. The company will mainly deal with the operation of the company on daily basis, but for the things like system reform and basic statistics, work has to be done under direction of the ZheJiang
University Asset Management Commission. On the top of that, the vice chancellor is the director of the board for this holding company. Zhejiang University Holding Company is under direction of Zhejiang University and even main personnel come from Zhejiang University like vice chancellor, therefore, it is rather to say these enterprises will rely on university research capability are foundation for these enterprises than companies will rely on university.

Normally, when these companies are set up at the beginning, they are based on one core technology invented from one college of university and companies are set up to exploit the invention. University invested companies here are mainly acting as process network in order to exploit university research invention and university act as creative network on the other hand. It is obvious that best professors and students will be accessible for the company which makes this creative network very effective. However, university invested companies as process network require large and hierarchic organisation structure which requires significant capital raising and managerial skills. It is hard for the university to raise significant capital as an academic organisation.

It seems that there is no obvious project network available which is essential to interlink both creative and process network according to our multi-network approach. However, it is hidden within both company and university. The professors have an open network of mainly weak ties to their students and gradually build up strong ties with those students who are selected as their Master or PHD students, and professors initially have close relationship with companies’ personnel which make them be able to interlink students’ creating activities with the process network for exploitation based on the condition that the company’s top personnel are from university.

2.9.3 Establishment of High Technology Companies in Partnership with Enterprises

It has been mentioned above that nearly all the top universities have their own spin-off enterprises, however, this had come across the problem of capital raising and market risks sharing. Therefore, in recent years, more and more HEIs have begun to establish high technology companies jointly with enterprises. Generally, enterprises input capital while HEIs invest in technology and become a shareholder by converting technology into capital. This mode can solve the problems of both benefit sharing and protection of intellectual property rights and it is now considered an ideal way for HEIs to transfer technology to industry.
However, its long-term effect remains to be seen. So far, Tsinghua University has established 28 high technology companies in partnership with enterprises in such a manner.

To address the problem of capital raising and market risks, university tend to establish companies together with enterprises. Although it is similar to the university invested company model, here university only become a shareholder mainly through injecting technology instead of main shareholder as in company invested companies model. Therefore, university is still acting as creative network and it is the joint invested enterprises act as process network which will overcome the problem of capital and market risks which make the process network can be more effective than above model.

However, the project network here may not be as effective as above one due to the reason top personnel or management team from company do not come from university side and professors may not have initially contact with them. Then the problem remains how to build strong ties in order to effectively interlink both creative and process network.

2.9.4 Joint Project Development
Joint project development is the mode for small and medium sized companies who wish to solve their technical problems appeared in their organizations. Companies give certain research problems had happened within the company to the university technology transfer department who will inform these problems to all the professors and researchers on campus to see who is able to solve the problem, whoever is capable of and willing to solve the problem for the companies will contact the technology transfer department, then the contact between the company and professor set up by the transfer technology department. For this mode, there is a phenomenon that all detailed research problems will be gathered to science department of local government first, afterwards, the science department will send them to university technology transfer department. After a period of cooperation, university and company get to know each other and feel confident to each other, then the companies may also become a member company of the university are able to send their own problems directly to university without the local science department. But the detailed contract between companies and professors will depend on their own negotiation, at the same time contract has to follow the rule of technology transfer department as well. This has lead to another model in China that is collaboration with local governments.
2.9.5 Technology Transfer through Collaboration with Local Governments

As a result of economic reform, the influence of local governments has been strengthened. Especially, the transference of new technology from university to enterprises requires local governments to act as the medium; normally university will sign collaborative contracts with local governments. For example, Tsinghua University has signed collaborative contracts with eight provincial and municipal governments, including Beijing, Guangdong, Hebei etc., and 40 county-level governments such as Daqing, Changzhou, Shenzhen etc. Then local governments will introduce company information to the university and build bridge between university and enterprises. This can be further explained through joint project development we mentioned above: university will sign the contracts with local governments to build collaborative relationship, then local governments will collect information from enterprises side about their intention of university technology transfer and their research demand. This mainly has dealt with the problem of lack of information exchange between the university and enterprises governed by local governments.

2.9.6 Building-up a Science and Technology Co-operation Network of Chinese Universities

One of the major functions local government perform is to build bridge between university and companies as mentioned above. Apart from this, another approach of co-operation network has been implemented to bridge between HEIs and companies called cooperation network of Chinese universities. Tsinghua University is exploring the ways of transferring R&D information through the Internet. In May 1998, seven universities including Zhejiang and Tsinghua and the Science and Technology Development Centre of the State Education Commission set up the “Science and Technology Co-operation Network of Chinese Universities” (UNITECH, http://www.uec.com.cn/). It is an inquiry system for information about academic research inventions and enterprise demands built on the Internet. Its purpose is to build a bridge between HEIs and enterprises to improve the transfer of R&D results. The services provided by UNITECH include the provision of information about R&D inventions from university and enterprise demands, key laboratories from HEIs, local high technology development zones, government industry policies and etc. The clients of UNITECH are all the HEIs and companies that have access to the Internet. With 30 members of HEIs in UNITECH, information about the results of 3857 R&D projects has been made available and recently about 60,000 visits to the website had been registered.
2.9.7 Joint-lab Model

Another popular model of I-U collaboration in China is joint-lab on campus. In this case, the companies and the universities jointly set up a lab on campus. For example, China Unicom had set up a joint-lab with perking university for conducting research in database analysis; Haier had signed the contract on 15\textsuperscript{th} of October, 2007 with North China Electric Power University to set up an energy saving Research centre. Fudan University and Lucent Technologies Inc. signed an agreement to co-establish Fudan-Lucent Technologies Bell Lab. According to the agreement, School of Information Science and Technology of Fudan and Bell Labs will start researches on the advanced application of communications and computer science based on the joint laboratory.

2.9.8 Post Doctor Work Station

According to company’s project research requests, post doctors will be recruited by the companies after passing the examination of the company. During the stay at the station, company has to provide necessary research equipment and condition for post doctors to conduct research and university will offer salary, bonus and other social welfare like medicine for post doctors, accommodation will be provided for them as well. During the stay at work station, post doctors have to obey the state and university regulation about post doctor working in the station and they can be dismissed for some circumstances like against university regulation and academic moral and lack of ability and both supervisor and station consider not suitable for further stay. During the stay at work station, any research outcomes like patent, published articles, university will be the first author authority and the post doctor himself/herself will be the first author. It can be seen that this is similar to industrial PHD in European countries.

2.9.9 In-sourced Model

All models mentioned above are companies come near to university and collaborate with them. However, some are cases that companies will also bring university resources inside. The simplest approach is to bring professors and students into the organisation to assist company research. It can be illustrated by collaboration between East China University and Star Lake Bioscience Co., Inc ZhaoQing GuangDong. East China University had helped Star Lake in ferment of carmine and guano sine, during this innovation, university had sent their professors more than ten times to the company to coach company’s researchers analyze and discuss about the research data, also sent their master and PHD students to work together with
company researchers to develop the particular technology. Since the companies bring in the professors and researchers into the companies which has similar point as in-sourced model mentioned by Sigvald Harryson, but the difference is that here professors and students are brought to the company from time to time instead of working together on daily basis as in sourced-model mentioned by Sigvald Harryson. This is a very success story since the project emphasized on the commercialization from beginning and the company bring the professors in not only co-develop the technology with Star Lake but also make researchers from Star Lake practically grasp the technology which ensured the success of exploitation as well.

Moreover, companies will also establish an affiliated academy inside company according to its needs and cooperate with universities. For example, GuangTian (TianJin University) mechanical-electronic R&D centre is that company bring university research into the organisation. Furthermore, since not all companies are able to bring university research into their organisation, the top universities will found R&D centre located at industrial focus area for all the companies located nearby to access, for example, Tsinghua university has set up a Tsinghua University Shenzhen R&D centre located at the Shenzhen industrial focus centre to serve all the companies in this area.

This model is not as popular as other models in China. Bringing professors and students into organisation to support weak ties transform into strong ties and the open network gradually turns into closed network, which had significantly supported validation and exploitation of emerging technologies. By bringing in professors and students into the company, researchers from both sides have expanded their understanding of opposite needs.
CHAPTER THREE  METHODOLOGY

3.1 Research Design
The purpose with a research design is to construct and guild the study in the right direction as observations are collected, analysed and interpreted. According to Yin (1989), a research design is the logic that links the data to be collected and the conclusions to be drawn to the initial questions of a study, indicating the steps that will be taken and in what sequence they will occur. There are several classifications of research designs such as exploratory, descriptive, causal and case study research, and the decisions of what methodology to employ lies within the essence of the research questions and the objectives of the study (Creswell, 1998). The purpose of this study was to study the collaboration between Chinese firms and Chinese Universities. I intend to conduct a qualitative exploratory case study with multiple cases on two Chinese universities and two firms in China. These universities and firms had been selected as the bases for my investigation to provide a sufficient number for my cross-case analyses (Eisenhardt, 1989). Furthermore, the reasons for this research design will be outlined in the following sections.

3.1.1 Research Approach
When conducting research one can use either or both quantitative and qualitative methods. Normally quantitative research looks at a large group of cases, people or units and measures a limited number of features. Such a method transforms the data to numbers and quantities, and statistical analysis is further conducted on the gather material (Yin, 2003). Qualitative studies engage in collecting data, analyse and then interpret it, and the focus is on one or a few cases over a limited period of time. According to Yin (2003), qualitative research is often used in relation with case studies where the aim is to obtain a better understanding of the stated research problem by gaining thorough information about the subject. Hence, if the aim of the research is exploratory in nature, and seeks to increase the understanding of an area that is known about, then a qualitative approach would be appropriate (Hendry, 2003). This study is therefore designed to be qualitative in nature in order to obtain further insight of the collaboration between firms and universities, and to enhance and deepen the knowledge and understanding of the collaboration.

Grounded Theory
One of the most commonly used qualitative methods is grounded theory (Creswell, 1998), and is a process by which a research generates theory that is grounded in the data (Strauss & Corbin, 1998). The data is collected through interviews, field notes, observations, or other varieties of pictorial or written material, which are then analysed to reveal patterns or concepts to be used as the building blocks of theory (Strauss & Corbin, 1998:13). The main characteristics of this design are the continuous comparison of data with emerging categories, in order to maximise the similarities and differences of the information (Creswell, 2003). The procedure therefore allows for a systematic analysis of the data and follows a repeatable procedure. According to Charmaz (2000:510), “the rigor of grounded theory approaches offers qualitative researchers a set of relationships among concepts”. Hence, the foundation of grounded theory research is the development of a theory closely related to the context of the phenomenon studied (Creswell, 2003). However, the purpose with this research is not to generate an entirely new theory based on findings. The main goal is to extend and adapt proposed conceptual model, which is based on the research on three distinct university collaboration models studied by Harryson (Harryson and Lorange, 2005; 2006; Harryson and Kliknaite, 2005; Harryson et al., 2006a; 2006b; 2007), and to generate propositions that can function as basis for hypothesis generation for another study that can be tested in the future. I thus hope to provide valuable insights into the collaboration literature on collaboration between firms and universities.

3.1.2 Exploratory Research

As the term suggests, exploratory research is often conducted because a problem has yet not clearly defined, or its real scope is unclear. It allows the researcher to familiarize him/herself with the problem or concept to be studied, and perhaps generate hypothesis or propositions to be tested (Yin, 2003). Hence, the main purpose of exploratory research is to gather as much information as possible within a specific problem area. The researcher is as a result given a comprehensive view of the problem area. In addition, such type of research often deals with new and discovered topics, where little research has been previously done (Yin, 2003). With reference to the introductory part of my paper, little research has been conducted on I-U collaboration, especially, very little research on Chinese firms’ collaboration with Chinese universities. Hence, exploratory research will provide deep insights into this particular area of research.
3.1.3 Research Method

There are five major research strategies one can apply, and these are experiments, surveys, archival analysis, history and case studies (Yin, 2003). Each method has its advantages and disadvantages depending on the following conditions (Yin, 2003); (1) the type of research questions stated, (2) the extend of control an investigator has over actual behaviour events, (3) and the degree of focus on contemporary as opposed to historical events.

According to Yin (2003), when the researcher tries to ask “how” and “why” questions, case study is the recommended research strategy to use. Such as method is also applied when the investigator has little control over events, and the focus is on a commemoratory phenomenon within a real-life context (Yin, 2003). Our problem definition mainly wants to examine the question of “how” and “why”, and seeks to answer the question how Chinese firms had collaborated with Chinese universities. By examine how these firms and universities had collaborated; I hope to capture the underlying factors influencing their models to collaborate. Hence, in order to gain a through understanding within selected area of research, case studies are the most appropriate research method for this study and will be elaborated on below.

Case Study Design

According to Eisenhardt (1989), case study research is usually considered to be most appropriate in the early stages research, which is arguably the state of the I-U collaboration literature. As mentioned earlier, the amount of research conducted on the I-U collaboration has increased since 1990s, however, there are still a large number of issues that remain rather unexplored. Eisenhardt (1989) argues that by employing a multiple case study approach, researchers are encouraged to study patterns that are common to cases and theories, and to avoid chance associations (Sperling, 2006). I have chosen to apply a multiple-case study design, as it makes it possible to detect emerging patterns between universities and firms which is corresponds with my research objectives. Moreover, Eisenhardt (1989) argues that there is no ideal numbers of cases in the multiple cases approach, but recommendations between four and ten cases. I have chosen four cases to include in our study, which would produce convincing and grounded findings, and a cross-case comparison would be possible (Eisenhardt, 1989).
3.1.4 Sample Selection & Screening of Cases

The potential case companies were selected based on the logic of theoretical sampling, which is recommended when using grounded theory (Charmaz, 2000). A theoretical sampling procedure dictates the researcher to choose participants who have experienced or are experiencing the phenomenon under study (Yin, 2003). Top management of the companies and universities have thus been chosen as our interviewees since they clearly are the most knowledgeable sources of information about the collaboration between Chinese firms and Chinese universities.

Theoretical sampling is according to Yin (1994) based on replication logic, where each case is carefully selected so that they either predicts similar results, or produces contrary results, but for predictable reasons. According to Eisenhardt (1989), the goal of theoretical sampling should be chosen cases that are likely to replicate or extend the emergent theory. What is important is the potential of each case to aid in developing theoretical insights into the dynamic of the start-up phase being studied. Hence, following the recommendations of Eisenhardt (1989), the selection of cases was not random, but rather extreme cases of firms and universities were selected. According to Churchill (1991) cases that display contrasts or extreme situations are most useful, since it is easier to find differences or determine what distinguishes two extreme cases than to compare and find differences between two averages or normal cases.

This thesis is based on multiple case studies of two High-Tech companies and two Chinese Top Universities: Hua Wei Technologies, West Components AB, ZheJiang University and FuDan University. As there are no directories and public available resources to identify High-Tech companies, these companies were given by my supervisor, Associated Professor SigvaldHarryson and his student, Han Yang. Additionally, since a precise and universally accepted set of definitional criteria for a firm to be classified as a High-Tech company and the companies were selected based on the following criteria:

- At this moment in time, firms can be seen as highly flexible innovation leaders in their respective businesses
- Firms should have had great experience in I-U collaboration
The preferable respondents for my interviews were the persons who have greatly involved in the I-U collaboration in their daily work and needed to have the right and in-depth knowledge about the I-U collaboration.

Lastly, it was also chosen due to the easy availability of the data.

I believe that the two case companies chosen to be included in my study were in accordance with the theoretical description of High-tech companies. In addition, the companies were chosen based on interpretation of high tech firm as one that produce/develop products or components that are highly sophisticated, spend a significant amount of resources on research and development, and employ a large proportion of scientific and technological workers. In order to confirm these assumptions I further investigated the firm’s web pages, press articles and releases, and other Internet sources.

Also two universities included in the multi-cases studies: Zhejiang University and Fu Dan University. Both Universities are the top universities in China according to the Chinese official evaluation for many years. Accordingly, both universities have collaboration system to support the I-U collaboration.

3.2 Data Collection
I started the data collection by gathering information about the chosen companies and universities from secondary sources such as internet sites, university database, newspaper, press articles and releases, company printed materials and other written sources. Secondary data can be defined as: data that have already been collected for some other purpose than the researcher faces (Saunders et al 2003: 188). However, in order to get a better understanding of the chosen High-tech companies and two top universities, my primary means of data collections was through in-depth interviews with the top management whose daily job greatly involved in the I-U collaboration and thus had most influence or knowledge about the I-U collaboration. Furthermore, an interview is one of the most important sources of gathering case study information, as the researcher is able to collect more specific and exploratory information about the area of investigation (Yin, 2003). Sauners et al. (2003) have found that managers are more likely to agree to be interviewed, rather than complete a questionnaire, especially where the interview topic is seen to be interesting and relevant to their current work. An interview provides the respondents with an opportunity to reflect on events without needing to write anything down. This situation also provides the opportunity for interviewees
to receive feedback and personal assurance about the way in which the information will be used. Nevertheless, the weakness of interviews are the possibility of being biased due to poorly constructed questions, and the risk of the respondent giving the interviewer information that he or she wants to hear.

3.2.1 Interview Guild

The primary data was collected through personal interviews using a semi-structured interview guild. Compared to unstructured interviews, as semi-structured approach had prior to the interview determined the sample, size, the people to be interviewed, and the questions to be used (Ghauri & Gronhaug, 2002). This technique allows for the interviewer to get deeper insights into the larger and complex problem area.

A checklist of questions was used to guild the semi-structured interviews (Appendix one), which was used on research questions introduced in chapter1. The section in the guild has been chosen with the attempt of getting a good interpretation of the area under investigation, and has been developed after extensively researching the I-U literature and the underlying theories. Furthermore, in order to construct the interviews and to secure that the areas of concern were covered, the guild was made in advance of the interviews.

3.2.2 Interview Process

As the cases were introduced by my supervisor and his student and the contacts had been previously done through them, there is no any difficulty in making the interviews. All the interviews are conducted through the telephone due to long distance. Each in-depth interview will last 45 minutes to an hour. With the acceptance of the respondents, the interviews will be telephone recorded, and for back up reasons, notes will be taken during the discussion. During the interview, questions could be reformulated or modified and additional sub-sections added. Each interview will be transcribed into a text document on the same day it takes place. If any points from the discussion needed to be clarified, the respondents will be contacted by Email or telephone. A detailed case study will be later written for each firm and university, which serves to make me more familiar with each case, and to be able to investigate any patterns in each single case before conducting a cross-case analysis. Each case study will then e-mail to the respondents for comments, control and acceptance in order to ensure the reliability of the data.
3.2.3 Data Analysis

A research design should not only state the data are to be collected, but it should also reflect what to be done after the data have been gathered. One should therefore seek to find the logic linking the data to the propositions and criteria for interpreting findings; it is the intimate connection with empirical reality that permits the development of testable, relevant and valid theory” (Glasser & Strauss, 1967 in Eisenhardt 1989: 532). Data analysis in qualitative study is a continuous process (Nachmias & Nachmias, 1992), and the analysis of the data includes several steps. According to Miles & Hubermans (1994) the analysis of the data includes three stages; data reduction, data display and conclusions & verifications. Data reduction is concerned with the transcribing interviews, making summaries, and identifying analytic themes. The second stage, the data display involves the presentation of the reduced data in an organised and compressed assembly of information that permits conclusion to be analytically drawn. These displays will further assist the researcher in understanding and observing certain patterns in the data or determine what additional analysis or actions must be taken (ibid). In the final stage, analytic conclusions may begin to emerge and defined themselves more clearly.

I have relied on the three stages analysis described above in my study. Significant time was put into gaining a deep understanding of each case before conducting a cross-case analysis. Following Eisenhardt’s (1989) and Yin (1994) recommendations, each of the four cases were analysed independently, also known as within-case analysis, which is detailed case study write-up. The information from the interviews and other secondary sources were thus written down in descriptive narrative allowing the unique patterns of each case to emerge before the cross-case comparison (Yin, 1994; Eisenhardt, 1989). The overall idea is to become thoroughly familiar with each case as a stand-alone entity. A cross-case was then conducted, where commonalities and differences were identified. This cross-case searching tactic forces the researchers to go beyond the initial impressions and improves the likelihood of accurate and reliable findings (Karlsen, 2006). The findings were then summarised into a table in order to simplify and display the data, and compared to the existing and relevant literature, before conclusions were drawn, and propositions generated.

3.3 Research Validity

According to Yin (1994), the criteria for judging qualitative research is construct validity, internal validity, reliability and external validity. Validity can be defined as to what degree the
findings really measure what they are aimed at measuring, and if the findings capture what they are supposed to do (Gauri & Gronhaug, 2002). According to Miles & Huberman (1994), the ideal validity hinges around the extent to which research data and the methods for obtaining the data are deemed accurate, honest, and on target. The validity of findings was fundamentally dependent on the precise recounting of the early firm circumstances. Steps were therefore taken to mitigate this problem. First, the interview has to be done with the top management whose daily job involved in I-U collaboration or if not possible, with a member of the top management team with direct knowledge of the founding conditions and circumstances of the firm. I also tried to formulate questions in a way that would exclude any misinterpretations.

Construct validity means establishing the correct operational measures for the concepts being studied (Sperling, 2006 & Yin, 1994). I increased the construct validity of research by employing multiple sources of evidence, and then compared these to each other, known as triangulation. In addition, drafts of the case study report were reviewed by key respondents to ensure correct use of operational measures. Moreover, internal validity refers to the credibility of the research and the creation of a causal relationship, whereby certain conditions are shown to lead to other conditions (Miles & Huberman 1944). Hence, do the findings of the study make any sense? In order to deal with this validity problem, pattern search across cases have been conducted to identify whether there are any significant deviations or similarities between the case companies. In addition, all interviews were written down soon after each interview.

Reliability is concerned with how well the research methods yield the same results on other occasions and if similar observations will be reached by different observers, the stability of our research findings (Ghauri & Gronhaug, 2002). Hence, the goal of reliability is to minimise errors and biases. In order to minimise the errors and biases in the study, all procedures of the study were well documented. The reliability has also been increased by the use of multiple measures. External generalisability deals with whether the research findings can be generalised, and applicable to other research settings (Saunders et al., 2003 & Yin, 1994). The external validity has been increased in this study through the use of four cases studies. According to Eisenhardt (1989), the more cases you have, the higher the validity of the study as that there are several cases that you can generalise. Glaser & Strauss (1967:30) argue that a single case can indicate a general conceptual category or property; and more cases can confirm the indications. In addition, sufficient detailed description of case companies has
been provided. Our sample also includes companies from different industries, which improves the external validity of the results compared to some previous studies that tend to be industry specific. Additionally, the external validity was also enhanced by comparing the findings with existing literature. (Eisenhardt, 1989; Miles & Huberman, 1994). However, it is not viable to jump to any general conclusion and generalise our findings from only four case studies, and thus the necessity of further research across other sectors and within other countries is necessary and obvious.

Abductive Approach
The foundation of the project is an inductive pre-conceptualization of the know-who based approach to K&I Management (Harryson, 1998; 2000; 2002 and 2006). Deductive analyses of formal theories on networking, innovation, entrepreneurship and knowledge creation will be conducted. Accordingly, a new theoretical model will emerge based on similarities and convergences between inductions from focused empirical observations at a limited number of companies. With Glaser and Straus stressing the discovery rather than the verification of theory, with the researcher progressing from the data to empirical generalization and on to theory, induction is seen as the key technique. Deduction will be conducted from selected sections of a broad array of theories – partly outlined further below.

As stated by Alvesson and Sköldberg (1994), induction and deduction are not the only alternatives. The authors propose an abductive approach as a combination of, and alternation between, induction and deduction whereby the one influences the other so that both the empirical and the theoretical analyses are continually reinterpreted to create new knowledge in the course of the process. Abductive approach can be described as a combination of the inductive and deductive approach. The abductive approach makes a pragmatic hypothesis-based start possible to be followed by both empirical and theoretical research for confirming the hypothesis. Abduction is particularly useful for the interpretation of patterns, which corresponds well with the purpose of this project that will identify networking patterns between academic institutions, individual researchers, research teams and small and large companies to drive commercialization of academic research.
3.4 Criticism

General criticism against case study method

Although the case study is distinctive form of empirical inquiry, many investigators nevertheless have disdain for the strategy. Perhaps the greatest concern has been over the lack of rigor case study research (Yin, 1994). Many times the case study investigators has allowed equivocal evidence or biased views to influence the direction of the findings and conclusion (Eisenhardt, 1989).

A second concern about the case study is that they provide very little basis for scientific generations. The answer is that case studies, like experiments, are generalizable to theoretical propositions and not to populations or universes. A third frequent complaint about case studies is that they take a long time and result in massive, unreliable documentation. This complaint may be appropriate, given the way case studies have been done in the past (Feagin et Al., 1991), but this is not necessarily the way the case studies should be done in the future. Despite the fact that these common concerns can be allayed, as above, one major lesson is still that good case studies are not easy to do (Yin, 1994), and this study is an attempt to come up with a set of propositions which can be further tested by building propositions.
CHAPTER FOUR  The cases of FuDan University, ZheJiang University, West Baltic Components and HuaWei Technologies

4.1 FuDan University

Generally, small and medium sized firms tend to collaborate with universities in order to make up for any shortages they have in both needed equipment (expensive and out of their budgets) and research capacities. Conversely, large firms tend to be more cautious when considering collaboration; the benefits of shared equipment and research become less and the risks of leaking core technology to the competition become greater, often these are not risks worth taking when a large firm has sufficient resources to not need to collaborate.

For firms seeking collaboration the first step is to contact a professor at the University, and there are a number of ways for them to make this approach: famous professors are well known in certain industrial circles and they can be readily accessible through exhibitions and meetings. The government will often facilitate matters by arranging additional meetings for the universities and firms to get to know one another.

In most cases, the firms are responsible for defining a topic based on their needs and the professors then assess the contribution they can make based on their research capacity regarding available time and resources.

After these discussions, and when an agreement has been made by both sides, a contract will be signed for collaboration. At the same time, the professors’ colleges will make a record of the contract and the professors will have to agree to present a base fee to the University since they will be accessing University labs and students.

It is common for this “joint project development model” to last several months and one PhD student will normally be able to complete such a project within a semester. The professors are seldom involved in operating such projects in practice, it is instead the PhD/Master students that play the key roles in actually doing the projects. The students will have access to the labs and equipment on campus and can conduct the research individually, only seeking supervision from their professors once they come across a problem or need particular guidance.
Having said this, frequent communication with the firms is required during the research in the form of progress reports, for example. So while the professors may not be actively involved in the research they will need to ensure that they are fully informed on the projects at all times. For example, in a five-stage project the companies will probably only leave two or three stages to the university; only in rare cases is a university asked to complete all of the phases. The university will also have to contact the company to check the semi-finished goods/research at each stage. Moreover, both universities and companies will arrange meetings to discuss any problems that occur during research, or the university will send students to the company to further understand and discuss the problems. On top of that, there will be regular communication meetings between the university research teams and the company research teams. Even after finishing the project, it is common for the university to offer technology consulting to the company. A problem that can arise in doing this is that the students directly involved in the projects initially will have finished their courses and no longer attend the university, this means that specific questions, like the methods of collecting data, can be hard to answer.

Generally speaking, students will not take the project topic as their own dissertation topic since it is for solving a specific company problem and the knowledge scope is not deep enough for academic research and dissertation/thesis topics at PhD level. Likewise, Masters students will tend to be looking at far deeper and more complex issues than the kinds offered by these specific problem projects.

As for patents, companies normally like to purchase the rights from the university and put the research into commercial production. A main problem involved in these projects can be the different goals driving each side: universities like to find the best solution to the problem, regardless of eventual production cost, whereas the firms are reluctant to put high-cost solutions into production and would rather pursue other ways, even though they may not be the ‘neatest’ solution to the problem.

**4.2 ZheJiang University**

Initial contact between the university and the company can originate from both sides: the company will come to the university when it comes across problems in the course of technology development and the university will come to the company for transferrence of any technology achievements.
There are several main approaches that the company will use to contact the university: company personnel may know certain personnel from the university and these may also know how to search and contact the university themselves; another way is to make contact through the government, which encourages companies to collaborate with universities as part of the local economic development policy. Moreover, the government will sometimes grant money for companies to collaborate with universities and set up a project according to their requests. For the company, the management team will normally lead the personnel from the research department to make contact with university.

There are some big state owned companies that come to the university, but normally it is small and medium sized companies since in China most companies are currently private, small to medium sized; especially in the ZheJiang area.

"Joint project development” can also be called ”contract patterns”. Companies will sign contracts with the university directly if they make contact without government assistance. There are two kinds of contracts: one is called a ”consulting contract” and is for relatively easy problems and finishing times less than one year; the other is called a ”proliferation contract” and is for difficult problems that could take up to three years.

Companies and universities may set up ”joint labs” after a period of collaboration. Normally, the university gives out the plans for a joint lab and the company will invest in it, though it is sometime invested in by both the company and the university, which can offer certain equipment on campus. The professor who accepts the project will shoulder the main responsibility for the joint lab, but he/she will then ask other collegues and professors, as well as other students, to join in. Communication between the university and the company is particularly important in a joint lab. However, the company will not tend to send personnel into the university at the begining or at the end of the project, instead the professors or students will travel out to the company to deliver progress reports and present findings.

It is normal procedure for an outside expert, often a third party, to conduct a mutually agreed test at the end of the project. This test is used to determine whether or not the university has delivered on its part of the contract. If this test is not passed then the university will be obligated to continue (or even redo) the work until the test can be passed and the contract is
considered fulfilled. As such, it is very important that any contract is clear from the outset, to both parties, and that both parties are fully aware of their own limitations.

Students can take the project topics as their own thesis topics if their supervisors agree, but if they do so there are restrictions placed on the content they can use: students will not be able to mention any industrial 'secrets', for example.

In addition, it is up to both the company and the students to decide whether or not they would like to recruit or to be recruited.

Companies which have had previous collaboration experience tend to collaborate again in the future. Additionally, professors tend to accept the larger projects which are lead by the government, or initiated through government contacts, since this provides a good record once the project is completed. Working on smaller projects for local companies provides a source of revenue for the professors but has little impact on a longer term record or the prestige of the department.

The main difference between foreign and domestic companies is that foreign companies tend to be mainly large companies; this is due to the fact that smaller foreign companies have difficulty entering the international market.

4.3 West Baltic Components
The company will normally approach a university first, since many technology-based projects and special technology teams are required in order to keep up to date on technology. In China, although the company will directly approach the professors first, the university has to be contacted officially since the professors are administered by the university from a personnel point of view. On the company side, although the project manager might make initial contact with the professors, it will be the management team from the company that will negotiate the project details since it is not only the technical research that needs to be considered: other issues, like finance and resources, are involved too.

Short term projects are approximately one year in duration whereas long term projects can be from 3-5 years; state offered projects, like the 863 project, can last 7-8 years. The company approaches the university first with a technical request, and also takes charge of the project in
terms of direction and desired results. Normally company researchers will give out a "wish list", presenting several technological requests to the university. From this the university will provide a theoretical groundwork in terms of the basic concepts needed to develop the technology and the way this can be achieved within the university’s resource capacity. Some projects require only a short time in the lab before they can be put into production; other projects may require much more development and lab time before they can be put into production.

Research that takes place in a university lab is invariably led by the university professors and students, as they are using university equipment on campus, although company researchers are still largely involved in the projects and will directly affect the kind of data to be collected and how to solve problems as they occur based on their own ideas and opinions.

Joint labs tend to be reserved for large projects such as those involved with the car industry, and the government may act as a sponsor and an investor to bring companies and universities together. This practice is designed to support certain state industries, assisted by the fact that often the company will also act as an investor for the lab. The lab will normally be set up near campus since the larger projects often start from original theory and so need access to as many university resources as possible. This does not prevent researchers from the company attending the lab to give direction at every level.

The data collection methods will be agreed at the beginning of the project, as these can determine the course and limitations of the research. It is absolutely vital to the company that the university be given clear and correct directions at every stage of the project since without clear guides and targets the university, more focused on theory, may follow concepts of less practical value. Obviously, it is practicality and efficiency that are the main concerns of the company. On the other hand, the university will definitely send researchers to the company to better understand the company needs. These will mainly visit the production lines to ascertain what materials and equipment the company uses since the research should correspond to these. Without these constant checks and directions the value of the research for the company will be lowered.

A PhD work station is jointly funded by the university and the company and, generally speaking, the equipment and resources available will be better than those of the university
itself. In most cases, the company will act as sole investor and own the property. This allows the company to keep up with any changes in technology and maintain a modern operation. Human resources will come from both sides and the university will take advantage of the facilities by sending as many PhD students as possible.

In the theoretical analysis of the PhD work station, several details on the process are mentioned: students sign a contract, with both the company and the university to work at the work station, and this contract will normally be two years long. Once an agreement between both parties is reached, the student can start work. During the work at the station, the students work very closely with the researchers from the company; technically, the students actually belong to the company during their time at the station. Despite this technicality, it is university professors who act as supervisors over the students and guide the research work at the station.

On completion of the research at the work station, many students take the project topic as their own thesis topic and companies like to recruit students involved in these types of projects: at the time of completion the companies will already have a good idea of who they are recruiting.

Normally patents are shared between the university and the company, but for company dominated projects or for specific products, the patent will usually belong to the company. If products are based on developed theories, then there is often a shared patent for the theory itself, while the patent for the products will belong to the company. A key concern for the companies is the fact that universities like to publish papers after collaboration, this is essential for the university research teams to do but risks leaking technology to the competition where the companies are concerned. Therefore, firms are very concerned about confidentiality agreements with the universities.

The goal is important for both the company and the university, but the goal itself might change over the course of the project, depending on the results of the research. As a result, it is vital for both sides to accurately assess their own flexibilities where changing goals are concerned before any collaboration is agreed to. This is to determine whether or not the university has the ability to undertake other relevant research based on a changed goal, and whether or not the company has the capacity to change the materials and equipment to be put
into production based on a changing goal. Otherwise, one of the biggest barriers to I-U collaboration can occur: where the company thinks the university cannot deliver what they want, while the university believes a particular research direction is not what the company wants. In short, miscommunication.

4.4 HuaWei Communication Technologies

The telecommunication industry in Europe is considered to be the most developed in the world and many universities engage in leading-edge telecommunications research centred around future product development. Therefore, Huawei Technologies has collaborated with universities not only for specific product development but, more importantly, for keeping up with future technology development which is essential for company future development and for a company to remain competitive.

Huawei researchers often attend lots of world-class exhibitions and meetings where they meet with university professors. Even if there are no professors in attendance, there is still the chance for introductions to be made through referrals. Therefore, making contact has not proved a problem for Huawei. One further approach Huawei may make to establish contact with a university or professor is through the internet. With the development of university websites, information about the professors is quite transparent, and even direct contact information can be found. Huawei will contact the professors directly, since professors in Europe have independent powers to make decisions about their own projects and whether or not to collaborate with outside companies. In the company, it is the management team that confirms the feasibility of the project first and also takes other aspects, like resources and production, into consideration in order to fit collaboration into an overall company strategy.

Defining the project topic is a two-way process about finding a match between the university and the company based on their individual capacities and available resources. The topic can be hard to define because the direction that future technology may take is not always easy to predict, this can directly affect development plans and impact on which aspects research should be focussed on. Take KTH, which is a good wireless network controller, as an example: defining a topic has to be discussed at great length with the university, such things as the trend future technology will follow and which aspects of this would benefit from further study as well as an appraisal of capacity and available resources need to be taken into account. This type of discussion is essential as research projects need to be fully justified from
the start: a large investment goes into collaboration but the result of the research, or its applicability, can never be guaranteed and nor can anybody say for definite which research will be the most useful.

The most popular model Huawei uses is Joint project development, and the projects will normally last six months. Professors and students use the labs on campus to conduct the research and the company will pay the professors on completion of the project. There are lots of discussions throughout the projects; for example, over a twelve-month project, a seminar will be arranged every four months bringing people from both sides to discuss the project. In addition to the large seminars, smaller meetings will be arranged to take place every month, either in person or through conference calls. This keeps everybody fully informed and updated at all times.

Regarding the joint-lab model, it is the university that attracts the company as they normally have large labs, and these tend to encourage the company to want to form a dual group; the management team of the joint lab will then come from both sides and it is common for company project managers and researchers to join the lab and conduct research alongside the students. Alternatively, the company and the university can set up a lab together close to the campus. This model also requires a very close and strong collaboration and, as before, both sides have to discuss and cooperate at every stage on what they are going to do in the future once the lab set up. For this reason, Huawei will normally only cooperate with universities that they are familiar with and at present Huawei has not yet built up any joint labs with any universities in Sweden.

Many students take the project topic as their own thesis and this is also one of the reasons why professors like to collaborate with companies: collaboration provides professors with the chance to get a deep insight into problems from practical industrial point of view as well as offers the opportunity for their students to study more practical problems.

The main problem that companies face is with communication and information exchange: this is resolved provided that the companies provide enough information to the university and if universities discuss any problems at every step with the companies. Therefore, no matter which model is used, good communication is essential and information must be presented to both sides in a timely fashion. Very few universities can make products and so they will
mainly perform conceptual research, this is why universities will not normally consider the production aspects as much as a company. A recurring issue with this method is that even complex designs that serve the purpose well may not always be feasible (or viable) from a production point of view.

The patent is negotiable: about 60 percent of the time universities like to keep the patent, in the other cases the company will purchase the patent from the universities, not too surprising considering the fact that the technology is valuable for future product development. Generally speaking though, universities like to try and keep patents for themselves.

In my experience, universities are very good at studying theory and can produce good innovative ideas; this makes it worthwhile for companies to collaborate with them for medium and long-term projects. Where short-term projects are concerned, universities are normally given very specific requests, and this can be hard for them due to the wide range of concepts they will want to deal with. On the other hand, companies do not have the ability to produce the same quality of topic research that a university can, and this is one of the main reasons why companies like to collaborate with universities as it helps them prepare for future competitive markets.
CHAPTER FIVE ANALYSIS OF FINDINGS

This chapter will give a comprehensive analysis of the above four cases: there are three main models involved in the four cases: joint project development, joint-lab, and PhD work station. All the interviewees explained the joint project development model that they are actually involved in; they also mentioned other models, like joint-lab and PhD work station. The similarities and differences among these three models will be analysed in detail in the following:

5.1 Size of Company and Project

As described in the literature review, joint project development is mainly for small and medium sized companies and this corresponds to the cases from both Fu Dan University and Zhe Jiang University, though the reasons for each are different.

The interviewee from Fu Dan University explained the reasons for collaboration as being due to the company’s lack of resources and capability to conduct its own research, whereas the interviewee from Zhe Jiang University explained that a main current feature of current Chinese economy is that small and medium sized private companies, and large state-owned companies, will not apply for a simple joint project approach. On the other hand, both West-Baltic and HuaWei Technologies admitted that a joint project approach is one of the most popular ones they employ (apart from in the cases of very large projects, where they become involved in long term collaboration by using joint labs or PhD Work stations).

It can be concluded that the collaborative model the companies adopt is not only dependant on the size of company but also depends on the size of the project. Generally, it is the scope of the project rather than the size of the company that will have a greater effect on this determination: small and medium sized projects normally result in a joint project development, while large projects tend to result in joint lab or PhD work station as they are for longer terms of collaboration.

5.2 The Field of Collaboration

In the literature review it was mentioned that I-U collaboration research will normally focus on hard science, like material science, chemistry, business administration or economics, which are closely related to economic development. All four case companies have invested
most of their research resources into research focusing on hard science. Moreover, FuDan University, which mainly applies joint project development, indicated that it is mainly for specific problem solving:

*Generally speaking, students will not take the project topic as their own dissertation topic since it is for solving a specific company problem and the knowledge scope is not deep enough for academic research and a dissertation/thesis topic for a PhD or Masters student, they will have to go far more deep and complex than the specific project problem.* (2008-6-3, Zhang Zheng, PhD student, FuDan University).

On top of that, HuaWei claim that companies will mainly apply for joint-labs for future technology development and to increase competitiveness; West Baltic Components have also indicated that joint-labs and PhD work stations for large projects are preferred by the government and companies for developing future technology and supporting certain national industries. In conclusion, all the models are directly related to economic development, and joint project development focuses on a specific problem area whereas joint-labs and PhD work stations are more concerned with the fields of future technology development and competitiveness.

### 5.3 How Long the Project will last

There is a significant difference in duration between the projects chosen for joint project development and those for joint labs. For joint project development, in all cases studied, both universities and companies indicated that the projects last from about four months to one year; the Fu Dan interviewee said it is possible for one student to complete the project within one semester.

For joint-labs, the projects tend to last much longer; the interviewee from West Baltic suggested that joint-labs are normally reserved for long term projects lasting 3-5 years, or for large projects, such as state-offered projects, which can last 7-8 years. The interviewee from Huawei further confirmed the view that joint-labs are for large projects and also that they are not specifically for one project or one product, they are for universities to undertake long term research into future technology. The research done in a joint lab may not be immediately applicable, but in the long run it is beneficial to the company as it keeps them ahead of the market in terms of technology, it is this that is the main purpose of a joint lab.
5.4 Who the Company Makes Contact With and the Channels for Reaching the Personnel

In all four cases it is agreed that the company will directly contact the professors first, as is the method in Europe. In the case of HuaWei, the professors have been contacted exactly as they would have been in Europe, not surprising since HuaWei is based in Sweden and collaborates with European Universities. In China, despite the fact that companies contact professors directly, the major difference between China and Europe is that it is the university administration department who is in charge of collaboration and so also plays a key role. In both FuDan and ZheJiang University cases (although the interviewees were not certain whether a company had to contact the university administration department initially), it was indicated that the professors had to make a record at the college of any collaboration agreements and had to give a certain percentage of the collaboration fee to the university (on the grounds that the projects will access university labs and students). The West Baltic interviewee is certain that company had to contact the university administration department prior to a collaboration agreement being reached as it is to this department that the professors ultimately answer to.

The channels used to reach the professors are also similar among the four cases: professors are normally well known in certain industrial circles and professors and companies can meet through exhibitions and advanced technology meetings which offer the opportunity for both sides to get to know one another and build a foundation for future collaboration. One additional issue that concerns the way companies can reach professors in China is the role of the government, which arranges meetings for both companies and universities. The interviewees from both ZheJiang University and West Baltic Components emphasized the importance that the government has had when introducing the university to companies, while the interviewees from FuDan University and HuaWei Technologies did not mention the role of government at all.

It can be concluded that companies in China will contact professors first and only if they are unsuccessful will they apply to the government. The government plays a particularly important role when companies wish to reach universities for the models of joint-lab and PhD work station which involve long term collaboration.
This corresponds with the point in the literature review that the government will introduce both universities and companies for collaboration as a kind of middle man; another key introduction tool is the internet network. Both local governments and internet act as a medium for building bridges between universities and companies to solve any information exchange problems. This could be from creating initial contacts to strengthening relationships, in all cases both play significant roles. From the perspective of a theoretical framework, both the internet and the government aid in transforming weak ties to strong ties. This is vital for all collaborative models: project networking is nearly nonexistent for joint project development since this model falls short in the ability to build even weak ties, never mind successfully transform them into strong ties and link both creative networks and process networks.

Even in the case of joint-lab project networks, collaboration as an organisational set-up, the government can help to further build trust between the two parties which will facilitate the building of strong ties. Moreover, although local governments and the internet can act as middle men to assist building weak and strong ties initially, a successful project network will depend on the relationship between team members from both the university and the company.

5.5 How Personnel from the Company Contact the University

It is the professors that the companies make initial contact with and it is agreed in all cases that it is the project managers who discuss the project technology aspects with the university. Additionally, the management team needs to be associated with the project from the beginning, as confided by the interviewee from HuaWei Technologies:

For the company, it is the management team which needs to consider the project first since it is they who need to confirm the feasibility of the project. The management team will also take other aspects, like resources and production, into consideration. This is part of the company’s strategy which also needs to fit into the overall company strategy. (2008-6-15, Zhang Kai, Engineer, Huawei).

That the management team will harmonize the project is a good thing if it is analyzed from our framework: process network requires taking all the production aspects into consideration, such as finance, marketing and manufacturing; that the management team is able to take all these aspects into consideration ensures a successful process network.
5.6 Who defines the Topic?

This section regards the question of who will define the topic of a project. All case examples expressed the same points for each of the collaboration models: first, the FuDan university interviewee said that it is the company’s responsibility to define the topic based on their needs and that the university will check whether or not they are capable of satisfying these needs, signing the contract if they believe they are.

Both case companies agreed with this expression in that the importance of their needs and requests was paramount and that it was up to the university to measure its capabilities where the satisfaction of these needs is concerned. Although the interviewee from ZheJiang University has not addressed this particular question directly, he has expressed the same view by illustrating another observation: most barriers are due to cases when a university cannot deliver on a company’s request due to capability and resource issues.

West Baltic Components have expressed the importance of a company request:

A company will come to a university first with a technical request, and may also take charge of the project, and the university will become the project collaborator. Normally company researchers give out a wish list which presents several technology requests for the university. Then the university will provide an original theoretical concept for the technology requests and a way they can be reached based on their technology capacity. (2008-06-03, Ma Hui, Manager, West Baltic Components)

In conclusion, it can be seen that the question of who will define the topic is mainly one about how to define a topic that matches both a company’s requirement and a university’s capability.

5.7 How Universities and Companies Communicate during Collaboration

In all cases similar views were expressed on communication between company and university on the joint project development model: that with joint project development the researchers from the university conduct research using the lab on campus under the direction of a supervisor and that company researchers do not become involved in actual research work at all. Regular meetings and problem discussion groups are arranged to discuss the progress by the university and any problems that the university has come across. The interviewee from Huawei Communication technologies worded this as:
For example, on a twelve-month project, a big seminar will be arranged every four months to bring people from both sides together to discuss the project. At the same time, small meetings will take place every month, either face to face or via telephone. In these small meetings, fewer people are involved than are in the big seminars. (2008-06-15, Zhang Kai, Engineer, Hua Wei).

Compared to joint project development, which tends to leave the project for the university to complete, joint labs and PhDs work stations rely in part on company researcher involvement. Both case companies agreed that company researchers will join the lab to conduct the research alongside the university. Both companies give the same reason for working closely with university researchers: that the company needs to fuse both theory and practical goals together and continually give the university direction on practical processes, which is a vital consideration for the company. HuaWei Communication Technologies emphasised that company researchers join the labs and give direction to the university:

This model is a one of very close and strong collaboration, once a lab is set up the company and university have to discuss and cooperate at every step as well as agree on what they are going to do in the future, so for the joint lab model we will normally cooperate with a university that we are very familiar with. Moreover, the company project managers and researchers will also join the lab to conduct the research together with students. (2008-06-15, Zhang Kai, Engineer, HuaWei).

As illustrated in the framework, only a project network can successfully link both creative and process networks. Communication between the university and the company can be considered to be the most essential issue since it determines whether or not a successful project network can be built and perform well. This directly impacts how teams in the project network make efficient information exchange and knowledge transfer. Therefore, it can be concluded that ease of communication between the university and the company will determine the success of the collaboration.

5.8 The Location of the Lab and PhD work Station
There is an issue with the location involved for both joint-lab and PhD work station: both companies agree to be located near campus, or on campus, due to the reasons mentioned earlier: that the research in a joint lab is not only for one project or product and so the university should have maximum access to be able to take advantage of the diversity of
thought common to an academic institution. HuaWei Technologies chose to co-use a lab already set up on campus.

5.9 Will Students Take a Project Topic as Their Own Thesis Topic?

Regarding the issue of students taking a project topic as their own thesis topic at the completion of a collaborative project, universities almost invariably have a viewpoint opposite to that of the companies. Both HuaWei Technologies and West Baltic Components felt that students were very willing to take on the project topic as their own thesis topic due to the fact that it will provide a practical study that will link the academic world to the real world, for both students and professors. However, although the interviewee from ZheJiang University said students can take a project topic as their thesis topic, the FuDan university interviewee expressed a completely different point view indicating that the project topic would not be suitable for thesis study:

*Normally the students will not take a project topic as their own thesis topic since collaborative projects are too ‘easy’ [in that they are primarily concerned with a practical aspect] and do not probe the theory in enough detail to be considered appropriate material for Masters or PhD students; in short, their thesis and dissertation topics will normally be far more difficult than the project problem. If we take the project question as our thesis topic, we do not think that we can actually solve the problem for the company. (2008-06-03, Zhang Zheng, PHD student, Fu Dan University).*

Therefore, it can be concluded that whether or not a student will take a project topic as their own thesis topic will largely depend on the project itself, and if the project can be expanded upon to provide a subject of sufficient complexity to be regarded as appropriate material for a Masters (or PhD) thesis.

5.10 Issues on Patents

For patents, both universities expressed the view that the company would like to purchase the patent in full. While in both company cases, where joint-labs and PhD work stations were mentioned, a different view was expressed: HuaWei Technologies indicated that although the university generally likes to keep the patent, it is normally discussable: a company will purchase the patent if the company considers it very valuable for future product development,
otherwise universities will keep the patent. Moreover, West Baltic Components were more specific about sharing the patent, as follows:

*Regarding the patent, normally the university and the company will share it. But for projects company dominated and with lots of specific products involved, it will belong to the company. Some products are based on theory, and so normally there is a separate shared patent for the theory itself and another, which belongs to the company, for the products generated.* (2008-06-03, Ma Hui, Manager, West Baltic Components)

It can be concluded that for a joint project development model it is normal for the company to purchase the patent in full, while for joint-labs and PhD work stations, since there is more theory involved, a patent is usually shared, the specific details of which need to be discussed between the two parties.

5.11 The Main Problems with Collaboration that Impact Success

The main problem in all cases, collaborative model used regardless, is to do with the difference in goals between a university and a company. A university will normally like to figure out the best solution for a problem based on theoretical studies, while a company is much more concerned with the commercial value of the research (such as the cost and the feasibility of putting it into production). The most successful cases (as agreed by all four case companies) are when the needs and biases are matched on both sides. The interviewees from both ZheJiang University and HuaWei Technologies expressed this as following:

*The most important successful factors in I-U collaboration are: a) to make the contract as clear as possible and b) to match the company’s requests with the university’s capabilities, and it is point b) which is the most essential point.* (2008-07-12, Han Yang, ZheJiang University)

Matching both sides’ needs is the most important factor to success, but the interviewee from West Baltic added a valuable point on this which is recognising that needs change continually and so matching changing needs is also a key point for both sides to consider:

*The goals are important for both the company and the university, but the goals might change during the course of the research, as a result it is vital for both sides to check their own
capability and to adjust to any changes before (and during) collaboration. If the university has the ability to do other relevant research based on a changed goal and if the company has the capacity to adjust materials and equipment then changing goals can alter the direction of a project. (2008-06-03, Ma Hui, Manager, West Baltic Components)

On top of that, the interviewee from HuaWei Technologies also suggested that a main reason for companies to collaborate with universities on a topic is the diffusion of thought present in a university and the potential a university can bring with innovative ideas.

From my experience, Universities are very good at theoretical studies and have very good innovative ideas, so it is good to collaborate with them for medium and long-term projects which will take advantage of their innovative ideas. But for short-term projects, universities normally have to be given very specific requests in which cases their diversity of though can be a disadvantage. (2008-06-15, Zhang Kai, Engineer, Huawei)

5.12 Case Analysis by applying Theoretical Framework

For a joint project development model, a company approaches a university in order to gain access to the knowledge, creativity and theoretical exploration and to build a creative network, in this model the problem lies with the project network; for the other models mentioned in the literature review, it is relatively easy for a company to build strong ties with professors and then be able to maintain them. However, for a joint project development model, it may take time to build strong ties between professors and company personnel and this will greatly impact on any exploitation of the process network. Moreover, it is hard to maintain the strong ties once the project has been completed.

The joint-lab and the PhD models are different to joint project development in that the university does not become deeply involved in the process network but mainly acts as a creative network. It is obvious that these joint lab and PhD work station models are acting as project networks to maintain both strong ties and weak ties to the original source of academic research which will ensure networking effectiveness. By bringing professors into the labs and post doctorates into the PhD stations, the company is able to build strong ties with the professors, and also the professors have an open network of weak ties with their students. It seems that this model is able to successfully link both creative and process networks through a project network such as a joint lab.
CHAPTER SIX CONCLUSION

This paper started with extensive theoretical research and literature reviews to present a framework based on theories on knowledge creation, innovation and networking. The framework was illustrated and validated through four cases—two cases from university and two cases from company. Through our theoretical framework, the academic science domain becomes a logical partner to handle the full phase of exploration and support the process of exploitation. In particular, this framework and empirical research suggests that weak ties are useful for inspiration in exploration, but that strong ties are required to support exploitation. Networks support creation and application of knowledge all the way through to the factory complex where social interaction between individuals, groups and organizations is fundamental to the corporate knowledge creation process. This paper provides a new theoretical rationale for I-U learning alliances as a natural way out from the managerial problem of trying to perform both exploration and exploitation. It also had been addressed how different models for industry-university collaboration accelerate application of knowledge for enhanced flexibility and performance in innovation.
CHAPTER SEVEN   IMPLICATIONS FOR BOTH UNIVERSITY AND COMPANY

1. As mentioned in the literature review that most companies in China are lack of research capability and invest in it only counts for very small amount of their income, therefore, it should be suggested that company managers should realize the importance of collaboration with university and get out of dilemma of innovation.

2. In China, professors from university are the main personnel need to be contacted, while at the same time, building up good relationships with university officials is unavoidable since professors’ relationship with them. On the top of that, building good relationship with local government is also essential, which will assist companies to build both weak and strong ties with university and other things like land and policy support can be acquired from local government.

3. Matching company’s needs with university capacity is vital in collaboration, which will determine success or not of the collaboration to a great extent. Therefore, it is important for managers to exactly understand their own needs on one hand and aware of universities’ capacity on the other hand. On the top of that, communication between two parties had become the most important aspects for successfully exchange this information and build effective project network for collaboration.

4. When universities collaborate with companies, they should keep exploitation in mind from the very beginning to the end and take this into consideration when conduct the research.

5. Revise university reward system, salary and promotion should not only depend on the publish of the paper, but also feasibility of transference of their research achievement should take into account in order to make all professors and students recognise the importance of it.
APPENDIX ONE: INTERVIEW GUILD

1. What is the topic / area of the collaboration project?

2. How did the project start?
   a) The company approached the University?
   b) The company made direct contact with certain professors?

3. At what level are the contacts from the company?
   a) Senior manager  b) Engineers within the company  c) Others

4. Does the company have previous collaboration the university? Through alumni network? Or a joint lab?

5. Before a collaboration project starts, are there any administrative procedures from the university that both parties have to gone through?

6. Who defines the topic / task of the project?

7. How long does the project last (If very long, how did the turnover of students work out during the procedure?)

8. How do you set up a research team for the project? By professors, university, college?

9. If the project involves students, can the students include part of their degree thesis in the project? Does that process (to integrate project cooperation into degree thesis writing) require complicated administrative procedure in the university?

10. Does the company send employees to the university to help or do they invite students and professor to work in their premises? How often do they track down / follow up with the process and collect feedback? How do they do that?

11. Are there any IPR issues happened during the projects, if so how does it usually end and how much does the company typically pay for the collaboration/research results/IPR?

12. How does the company evaluate the result (solution that works/new patent/new employees)?

13. Were any of the students involved in the project recruited by the partner-company afterwards?

14. Any new or follow up projects from the same company?
## APPENDIX TWO: TABLE OF CHINESE COMPANIES CREATED AS SPIN-OUTS FROM UNIVERSITIES

<table>
<thead>
<tr>
<th>University</th>
<th>Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tsinghua University</td>
<td>TongFang Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Tsinghua Unisplendour Corporation Limited</td>
</tr>
<tr>
<td></td>
<td>Cheng-Zhi Shareholding Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Tsinghua Science Park Co., LTD</td>
</tr>
<tr>
<td></td>
<td>Liaoning Road &amp; Bridge Construction Corporation</td>
</tr>
<tr>
<td></td>
<td>CapitalBio Corporation</td>
</tr>
<tr>
<td></td>
<td>Thunip Holdings Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Shenzhen Yuanxing Bio Pharm Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Beijing Huahuan Electronics Co., ltd</td>
</tr>
<tr>
<td></td>
<td>Beijing Tsingshang Environmental Art &amp; Architecture Design Institute</td>
</tr>
<tr>
<td></td>
<td>H&amp;H Investment Management Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Tsinghua Unigroup Ltd</td>
</tr>
<tr>
<td></td>
<td>Coway International Tech Trans Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Coway International Technology Transfer Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Chinerge Co., ltd</td>
</tr>
<tr>
<td></td>
<td>Beijing Global Safety Technology Co., ltd</td>
</tr>
<tr>
<td></td>
<td>Shijiazhuang yongsheng huatsing liquid crystal Co., ltd</td>
</tr>
<tr>
<td></td>
<td>Beijing Unisplendour M&amp;C Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Huaneng Shandong Shidao Bay Nuclear Power Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Hangtian Kegong Satellite Technology Limited</td>
</tr>
<tr>
<td></td>
<td>Zhuhai Yueke Tsinghua Electronic Ceramics Co., ltd</td>
</tr>
<tr>
<td></td>
<td>ZheJiang ZheHua Investment Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Hua Yi Holdings Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>China Hi-tech Group Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>SBI&amp;TH Venture Capital Enterprise</td>
</tr>
<tr>
<td></td>
<td>CEC &amp; Huatsing Microelectronics Engineering Center Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Beijing Zehua Chemical Engineering Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Shijiazhuang Development Zone Yongsheng Huatsing Liquid Crystal Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Lord Abbett China Asset Management Company Limited</td>
</tr>
<tr>
<td></td>
<td>Cernet Corporation</td>
</tr>
<tr>
<td></td>
<td>China Xinjiang Sunoasis Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Zhuhai Tsinghua Science Park Venture Capital Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Golden Sun Securities Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>Hebi Coal &amp; Electronics Co., Ltd</td>
</tr>
<tr>
<td>Peking University</td>
<td>Founder Group</td>
</tr>
<tr>
<td></td>
<td>SinoBioway Group Co., Ltd</td>
</tr>
<tr>
<td></td>
<td>BeiDa Jade Bird Group</td>
</tr>
<tr>
<td></td>
<td>Beijing Peking University Resource Group</td>
</tr>
<tr>
<td></td>
<td>Peking University Science Park</td>
</tr>
</tbody>
</table>

56
<table>
<thead>
<tr>
<th>University/Company Name</th>
<th>Website/Link</th>
<th>University/Company Name</th>
<th>Website/Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beijing Peking University WBL Biotech Co., Ltd</td>
<td></td>
<td>Peking University Zi-Yuan Hotel</td>
<td></td>
</tr>
<tr>
<td>Pulead Technology Industry Co., Ltd</td>
<td></td>
<td>Zhejiang University</td>
<td><a href="http://www.kggs.zju.edu.cn/">http://www.kggs.zju.edu.cn/</a></td>
</tr>
<tr>
<td>Zhejiang University National Science Park</td>
<td></td>
<td>Zhejiang University Hou-Qin Group Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Zhejiang University Yuan-Zheng Group Co., Ltd</td>
<td></td>
<td>Zhejiang University Xin-Yu Group</td>
<td></td>
</tr>
<tr>
<td>Hangzhou-Jiaxing-Huzhou Company</td>
<td></td>
<td>Zhejiang University Investment Holding Company</td>
<td></td>
</tr>
<tr>
<td>Zhejiang University National Science Park</td>
<td></td>
<td>Zhejiang University Yuan-Zheng Group Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Zhejiang University Xin-Yu Group</td>
<td></td>
<td>Zhejiang University Hou-Qin Group Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Hangzhou-Jiaxing-Huzhou Company</td>
<td></td>
<td>Zhejiang University National Science Park</td>
<td></td>
</tr>
<tr>
<td>Zhejiang University Yuan-Zheng Group Co., Ltd</td>
<td></td>
<td>Zhejiang University Xin-Yu Group</td>
<td></td>
</tr>
<tr>
<td>Wuhan University Science and Technology Park Co., Ltd</td>
<td></td>
<td>Wuda Geoinformatics Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Wuda Zhuoyue Technology Co., Ltd</td>
<td></td>
<td>Wuhan University I&amp;C Integrated Medium Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Wuhan University HoYo Co., Ltd</td>
<td></td>
<td>Wuhan Hiteck Biological Pharmaceutical Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Wuhan Hong-Yi New Materials Co., Ltd</td>
<td></td>
<td>HuBei Wuhan University Silicone New Materials Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Wuhan Wuda Jucheng Strengthening Industrial Co., Ltd</td>
<td></td>
<td>Wuhan Wuda Jucheng Strengthening Industrial Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Wuhan Road Materials Co., Ltd</td>
<td></td>
<td>Wuhan Wuda Jucheng Strengthening Industrial Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Wuhan Kaidi Electric Power Co., Ltd</td>
<td></td>
<td>Wuhan Wuda Jucheng Strengthening Industrial Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Wuhan Wuda Yunshui Eng &amp; Tech. Co., Ltd</td>
<td></td>
<td>Wuhan Wuda Jucheng Strengthening Industrial Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Wuhan Techtop Satellite Technology Development Co., Ltd</td>
<td></td>
<td>Wuhan Wuda Jucheng Strengthening Industrial Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>ShenZhen Digital Traffic Technology Co., Ltd</td>
<td></td>
<td>Wuhan Wuda Jucheng Strengthening Industrial Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Wuhan WuDa TianYuan Bio-Tech Co., Ltd</td>
<td></td>
<td>Wuhan Wuda Jucheng Strengthening Industrial Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Wuda LuZhou Biological Technology Co., Ltd</td>
<td></td>
<td>Wuhan Wuda Jucheng Strengthening Industrial Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Shanghai Fudan Forward Science &amp; Technology Co., Ltd</td>
<td></td>
<td>Shanghai Fudan Forward Science &amp; Technology Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Shanghai Fudan Microelectronics Co., Ltd</td>
<td></td>
<td>Shanghai Fudan Microelectronics Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Shanghai Fudan Kingstar Computer Co., Ltd</td>
<td></td>
<td>Shanghai Fudan Kingstar Computer Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Shanghai Fudan Guanghua Information Technology Co., Ltd</td>
<td></td>
<td>Shanghai Fudan Guanghua Information Technology Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Shanghai Huahong Integrated Circuit Co., Ltd</td>
<td></td>
<td>Shanghai Huahong Integrated Circuit Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Shanghai Fudan-zhangjiang Bio-Pharmaceutical</td>
<td></td>
<td>Shanghai Fudan-zhangjiang Bio-Pharmaceutical</td>
<td></td>
</tr>
<tr>
<td>Shanghai Fudan Techsun New Technology Co., Ltd</td>
<td></td>
<td>Shanghai Fudan Techsun New Technology Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Fudan Shenhua Purification technology Co., Ltd</td>
<td></td>
<td>Fudan Shenhua Purification technology Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Shanghai Fudan Water Engineering Co., Ltd</td>
<td></td>
<td>Shanghai Fudan Water Engineering Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Zhongshan Medical Co., Ltd</td>
<td></td>
<td>Zhongshan Medical Co., Ltd</td>
<td></td>
</tr>
<tr>
<td>Northeastern University Institute of gold Technology Precious Metal Materials Factory</td>
<td></td>
<td>Northeastern University Institute of gold Technology Precious Metal Materials Factory</td>
<td></td>
</tr>
<tr>
<td>DongDa JiXie Factory</td>
<td></td>
<td>DongDa JiXie Factory</td>
<td></td>
</tr>
<tr>
<td>ShenYang North Traffic Heavy Industry Group Automation Engineering Technology Development Company of Northeastern University Construction and Installation Engineering Company of</td>
<td></td>
<td>ShenYang North Traffic Heavy Industry Group Automation Engineering Technology Development Company of Northeastern University Construction and Installation Engineering Company of</td>
<td></td>
</tr>
</tbody>
</table>
| North Eastern Neusoft Co., Ltd  
Northeastern University Engineering and Research Institute  
Northeastern University Metallurgical Technology Institute Co., Ltd  
Shenyang Neusanken Industrial Furnace Manufacture Co., Ltd  
Shenyang NEU Advanced Metallurgical Technology Co., Ltd  
Shenyang Energy Conservation Technology Development Co., Ltd  
Liaoning NEU Fromed Section Co., Ltd  
Shenyang DongDafulong Mineral Material Technology Research and Development Co., Ltd  
Wearnes Technology (Shenyang)Ltd.  
Shenyang KuiWang Decoration Materials Co., Ltd  
Shenyang YuChen Construction Engineering Corporation  
Shenyang XinDong Da Technology Co., Ltd |
| China University of Petroleum  
http://www.upcholding.com |
| China University of Petrol Holdings Ltd.  
Shtar Science & Technology Group  
Shandong Shida Hengye Science&Trade corporation Ltd  
Shandong Shida Shiyi Technology Co.,Ltd  
Shandong Shida Engineering Co., Ltd  
Shida Lanboshi Science Co., Ltd  
UPC Boya Printing Co., Ltd., Dongying  
Shida Dongqing Petroleum Technology Co., Ltd., Dongying  
Shida Technology Venture Co., Ltd., QingDao  
Shandong Shida Shenghua Chemical Co., Ltd  
Dongsheng Petroleum Development Stock Co., Ltd  
Dongying Commercial Bank Co., Ltd  
Shida Furui Friction Engineering Co., Ltd  
Shandong Shengbanglinruier Pineline Engineering Co., Ltd |
| Tongji University  
http://cyb.tongji.edu.cn |
| Shanghai Tongjifangdishan Co., Ltd  
Tongji University Science and Technology Park Co., Ltd  
Shanghai Tongji Construction Co., Ltd  
Shanghai XinHao Microelectronics Co., Ltd  
Shanghai Tongji Xueshi Information System Co., Ltd  
Days Hotel Tongji Shanghai  
Shanghai TL Chemical Co., Ltd  
Shanghai Tongji Biological Product Co., Ltd  
Shanghai RIA Technology Research Co., Ltd  
Shanghai Tongji Engineering Consulting Co., Ltd |
<table>
<thead>
<tr>
<th>Rank</th>
<th>University</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peking University</td>
<td>314.00</td>
</tr>
<tr>
<td>2</td>
<td>Tsinghua University</td>
<td>229.12</td>
</tr>
<tr>
<td>3</td>
<td>Zhejiang University</td>
<td>68.98</td>
</tr>
<tr>
<td>4</td>
<td>Northeast University</td>
<td>44.87</td>
</tr>
<tr>
<td>5</td>
<td>China University of Petroleum</td>
<td>36.95</td>
</tr>
<tr>
<td>6</td>
<td>Wuhan University</td>
<td>22.26</td>
</tr>
<tr>
<td>7</td>
<td>Tongji University</td>
<td>20.94</td>
</tr>
<tr>
<td>8</td>
<td>Fudan University</td>
<td>18.61</td>
</tr>
<tr>
<td>9</td>
<td>Harbin Institute of Technology</td>
<td>16.24</td>
</tr>
<tr>
<td>10</td>
<td>Shanghai Jiaotong University</td>
<td>14.39</td>
</tr>
</tbody>
</table>
APPENDIX THREE: LIST OF CHINESE COMPANIES ACTIVELY PURSUE I-U COLLABORATION

Shanghai Baosteel Group Corporation, http://www.baosteel.com
ShenYang Brilliance Automotive Co., Ltd
Changhe Automobile Co., Ltd http://www.jxcn.cn
Chery Automobile Co., Ltd http://xjtunews.xjtu.edu.cn
China Mobile Communications Corporation, http://www.c114.net/news
China Telecom Corp. Ltd http://sm.xmu.edu.cn
FAW Group Corporation http://www.ligongda.com
Geely Automobile http://forum.netbig.com
Haier Electronics Group Co., Ltd
Harbin Hafei Automobile Industry Group Co., Ltd http://www.histc.gov.cn
Hisense Electronics Company Limited http://www.univs.cn
Huawei Technologies Co., Ltd
Inspur Computer Technology Company http://www.jri.com.cn
Lenovo Group Limited
Liao Ning Zhong Wang Group Co., Ltd
China Mengniu Dairy Company Limited
Nanjing Automobile Group Corporation http://baike.baidu.com
Qinghai Huading Industrial Company Limited http://www.qhhdsy.com
Beijing Shougang Steel Company Limited http://www.jri.com.cn
China Petroleum and Chemical Corporation http://www.chinaccm.com
TCL Corporation http://www.whu.edu.cn
ABBREVIATION

MNCs: Multinational Companies
R&D: Research and Development
ZUNSP: Zhejiang University National Science Park
UNIS: Tsinghua Unisplendour Corporation Limited
HEIs: High Technology Institutions
UNITECH: University Technology Co-operation Network
ZJU: ZheJiang University
APPENDIX FOUR: COMPANY AND UNIVERSITY FACT SHEETS

Zhejiang University

Main campus address: No.388, Yu Hang Tang Road, XiHu District
Hang Zhou, Zhe Jiang Province, China, 310058
Phone: +86 0571-88981358
Fax: +86 0571-87951111
E-mail: zupo@zju.edu.cn

Year of Foundation: 1897
Type: public
President: Yang Wei
Faculty: 8,475
Students: 42,916
References: University Website:
www.zju.edu.cn
FuDan University

Main campus address: No.220, Han Dan Road, Shang Hai, China, 200433
Phone: +86-21-65642222 or 65643333
E-mail: xishi@fudan.edu.cn

Year of Foundation: 1905
Type: public
President: Wang Shenghong
Faculty: 2,300
Students: 44,300
References: University Website:
www.fudan.edu.cn
Huawei Technologies Co. Ltd.

Main campus address: Huawei Technologies Co., Ltd. Bantian, Longgang District, Shenzhen, 518129, PR. China
Phone: +86-755-28780808
E-mail: support@huawei.com

Year of Foundation: 1988
Type: privately-held Company
Founder: Ren Zhengfei
Headquarters: Shenzhen, China
Industry: Telecommunication
Revenues: 16 billion USD (2007)
Employees: 70,000 (2007)
References: Company Website:
www.huawei.com
Westbaltic Components AB

Main company address: Baumansgatan 4, SE-593 32 Vatervik, Sweden
E-mail: peter.nyblom@westbaltic.com
Year of Foundation: 2007
Type: privately-held Company
Headquarters: Vastvik, Sweden
Industry: Telecommunication
Revenues: approx. 700Mkr
Employees: approx. 450
Number of plants: five in Sweden and one in China
References: Company Website: www.westbaltic.com

Westbaltic components
AB

Hellmer Industries AB
Hellmer Industries Shenzhen
Hellmer Die Casting
Lars Höglund AB
Lars Höglund i Flen AB
REFERENCE

Amabile, Teresa M. (1996), Creativity in context: update to The social psychology of creativity, Boulder, Colo.: Westview Press


Etzkowitz, Henry, (2008), the triple helix: university-industry-government innovation in action, New York: Routledge


Hagedoorn, John, Narula, Rajneesh (1998), Innovating through strategic alliances: moving towards international partnerships and contractual agreements, Oslo: STEP group


Innovation and Recipient of Industrial R&D Support’, Research Policy, 25, pp. 1047-1058


Collaboration in Sweden’, Research Policy, 29, pp. 81-98


http://zjusp.zju.edu.cn/aboutus_en.php
http://www.tsinghua.edu.cn/qhdwzy/cxy.jsp#2
http://www.pku.edu.cn/enterprise/cxy.jsp
http://www.kggs.zju.edu.cn/
http://www.ustc.edu.cn/zh_CN/column/000298/
http://www.hustgroup.com/new/industries.asp
http://www.whu.edu.cn/cn/cyfz/qyjj.htm#3
http://www.hustgroup.com/new/industries.asp
http://www.uec.com.cn/
www.huawei.com/corporate_information/research_development
www.uec.com.cn
http://www.cutech.edu.cn/cn/kjcy/A0111index_1.htm
http://www.neucy.cn/attachcom.php
The University of Kalmar

The University of Kalmar has more than 9000 students. We offer education and research in natural sciences, technology, the maritime field, social science, languages and humanities, teacher training, caring sciences and social service.

Our profile areas in research are: biomedicine/biotechnology, environmental sciences, marine ecology, automation, business administration and informatics, but we have research proceeding in most subject areas of the University.

Since 1999, the University of Kalmar has the right to accept students in postgraduate studies and to examine doctors within the subject area natural sciences.

Baltic Business School, at the university of Kalmar
Visiting address: Kalmar Nyckel,
Gröndalsvägen 19
SE-391 82 Kalmar, Sweden
Tel: +46 (0)480 - 49 71 00
www.bbs.hik.se