

Master thesis

ICT Cluster Formation In China

-----Model exploration for Yangtze Delta based on the Oresund experience

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Abstract

Yangtze Delta area which considered as the Chinese economic growing engine treats the information industry as another new mainstay industry beside the traditional industries. Within past few years, the development of ICT (information and communication technology) industry in Yangtze Delta has attracted increasing attentions from both domestic and foreign markets. In order to promote the steady and sustained economic growth, the Chinese government makes the strategy plan concerning the sustainable development driven by knowledge and technology. Under this background, the concept of cluster and regional innovation system were imported by the government and researchers. Since cluster has a significant influence on the regional development, both academic institutions and governments have conducted studies concerning cluster theory and practices in their own region. The Oresund Science region, which is located between Demark and South Sweden, has improved and strengthened the regional competitiveness, while every stakeholder enjoys benefits from this collaborative platform.

According to the current situations of the Chinese ICT market and the huge potential of development, the requirements for building up ICT cluster need to be met in Chinese market. This study would be a contribution to this area. We analyzed the influential factors by parallel analysis of both regions (Yangtze and Oresund) and then explored the possible model for Yangtze ICT cluster based on the experience of Oresund ICT. Through the qualitative and quantitative analysis, we find the result that there is no universal model of cluster that can be applied to any region directly. The model of Chinese ICT cluster needs to be investigated specifically with the consideration of the powerful government and weak collaborative environment. Moreover, we extracted some factors which used to measure the success of cluster, including the overall factors of trust, leadership, and open-dialogue. Finally our modified triple helix model was developed by combing the lifecycle and triple helix models, which we expect to show the creative idea for cluster modeling.

Key words: ICT cluster, OSR, Yangtze Delta, SWOT, Diamond analysis, Triple Helix

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Thank you all!

Lund University, June 2009

Wang Yao

Fan Cheng

Glossary

CD: cluster development, the development of cluster project.

CI: cluster initiative, the starting effort to initiate the cluster project.

ELIN: Electronic Library Information Navigator @ Lund University

ICT: Information and Communication Technology

IFCs: institution for collaboration, an organization which aims to form the collaborative environment in cluster.

MTH: Modified Triple Helix model, a refined model revealing the collaborative relationship of cluster participants based on the Triple Helix.

OECD: Organization for Economic Co-operation and Development.

OFAC: Organization for academic collaboration, an organization which aims to stimulate the collaboration between the academic institutions.

OSR: Oresund Science region.

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1. Introduction

1.1 Background

In the past few decades, China has experienced earth-shaking changes and gotten brilliant achievements, probably equivalent to the ones which advanced countries have spent a hundred years on. While, it is the truth that even China has undergone an increasing GDP with the speed of more than 10% in the past few years, today's Chinese economy still has to face the bottleneck problem. Traditionally, China is quite famous as the world's factory, and the increasing economic growth largely depends on the concentrated capital from government, low-cost labor force, and export trading, which have reflected significant effects during the last decades. However, under the current background of economic recession, the enterprises and government start to realize the importance of proprietary technology and knowledge. According to the increasing competition among the international enterprises, no firm, even a dominant market leader, can generate all the different capabilities internally that are necessary to cope with the requirements of global competition. For state-owned enterprises, it is impossible for them to be protected by the government forever. This requires a shift of economic development from individual to increasingly collective forms of organization, from conglomerated industry collaboration to the multi-organized network model.

Based on such background, in the tenth five-year plan, Chinese government established the strategy of sustainable development and Intellectual Property Law. At the same time some policies are also made to encouraged individuals or groups to explore and adopt new technology and knowledge. Under this background, the concept of cluster and regional innovation system were mentioned again by the government. In fact, the concept of cluster was imported into China as a new model for promoting the local economic development in the 1990s; however, the model in early stage was adopted mostly in low-level industries such as agriculture, heavy manufacture and secondary sector etc, with the aims of incentivizing imports, supply chain, value add and so on. High-tech clusters, such as biology cluster, medical cluster and ICT cluster with the aim to promote the innovation, and knowledge is still an unexplored area. The demand for research of this area is expanding; unfortunately, there is very little theoretical work on exploring the high-tech cluster model relating to the situation of China. In China, it does have some high-tech clusters, such as Zhongguancun, Shenzhen software centers etc, but they have lost their primary goals of Hi-tech cluster, which are knowledge production, competitiveness, and innovation. Instead, under the pressure of profit, they involve into semi-productive areas which the aims on promoting software and hardware productivities. Thus, in order to strengthen the innovation capability and form the knowledge-based economy growth in China, it is necessary to build up a new functional model for cluster development applied in the Chinese specific situation.

1.2 Research Field & Interest

Cluster, as a form of geographic concentration, is not a new concept but has become popular during the recent decades, from national and local governors, researchers to economic development practitioners. Since cluster has a significant influence on the regional development, both academic institutions and governments have conducted studies concerning the cluster theory and practices in their own region. Triple Helix Model is one of

the outcomes, and a lot of regions tried to apply it into their cluster projects. In Europe and America, some successful cases like the Oresund Science region (Denmark and Sweden) and Silicon Valley did improve and strengthened regional competitiveness, while every stakeholder benefited from this new network platform. As a rapidly developing economic entity, China has experienced big changes in numerous fields, especially in the field of economy. Also, China has a huge market with big potential and wide prospects. So it is no doubt that there exists such demand for cluster establishment in China. Then the problem is aroused as how to conduct this project? If nowadays Chinese people possess such capability to build a cluster or Science region as the Americans and Europeans did, what kind of role the Chinese government should play in the regional cluster establishment? Since there are few investigations focusing on the Chinese science region establishment, numerous questions would arise when considering the current situation of China. It is apparent that the existing models for Europe and America cannot be applied to the Chinese project directly. It would be interesting to explore in this area and form a new specific cluster model for China's cluster project.

1.3 Research Purpose

In response to the previous study, our paper intends to get the refined models for the Chinese ICT cluster based on the Oresund Triple Helix model. By analyzing and comparing these two different regional situations, we try to make clear the relationship map of ICT cluster's participants in China and provide the suggestion for Chinese ICT cluster project guidance. In order to achieve that, the question is developed as follows:

Research questions

The problem of our research is mainly about the successful factors concerning the ICT cluster establishment in China, and the model constructions. After analyzing the existing model in Oresund ICT cluster, we focus on the area of China which is Yangtze Delta area. Thus we can think about the questions as follows:

- Whether the Oresund Model could be applied to the Chinese regional innovation system, and if not, how the new model looks like?
- Whether the Chinese government should take the leadership in cluster as usual?
- Which development style is suitable for Chinese ICT cluster, bottom-up or top-down?

1.4 Delimitations

Our intention in this research is mainly focus on the model construction for Chinese cluster project based on the Oresund Triple Helix model. Since we regard the cluster as the united system which includes all three sections, it requires us to take the viewpoint independently. By delimiting us towards the independent position outside of this system, we were able to show more objective information and more extensive explanations which can produce a better conclusion.

Since Porter's Diamond model (1998) has been applied in this research field for analyzing the cluster environment and developing the specific cluster models, which presents a good solutions from the microeconomic perspectives. This kind of model would be good enough if our attention was on the economic growth. However, since we focused on the innovation capacity, the model which can show the factors influence on the innovation would be more appropriate, thus we delimited various models and construct our own triple helix model corresponding to our purpose.

1.5 Target Group

Potential target group of our research includes national and regional governments or policymakers in China who intend to develop cluster with the aim to improve the innovation capability. Additionally this paper is also aimed at academic researchers and business practitioners, who want to explore the knowledge of cluster in details.

1.6 limitation

Our research concentrates on one area of Chinese market, Yangtze Delta area. This area has very distinct characteristics which can be considered as an experimental region. This area is combined with the richest cities in China like Shanghai, Jiangsu Province, and Zhejiang Province. Since Shanghai is considered as one of the biggest global trading centers around the world, this area has more political priority and opportunities, which can also provide more convenience for ICT industry. However, the research limitation is also obvious that this area cannot fully represent all the traditional factors in the other regions of China, because Yangtze Delta is a special region that always enjoys the preferential policy and open itself to the outside world. Therefore, even if this region can get successful implementation of ICT cluster in the future, it would also be a challenge for other region to adopt Yangtze Delta area model.

Another limitation is because of the differences of regime from western countries. In China the corporations have some more restrictions from connecting with the research institutions and other related corporations due to the governmental interference. So the opinions from industry towards the government policy would be negative generally, and we consider it as an attitude problem.

Furthermore, during the process of our research, we met some problem in our on-line survey and interviews. For our Chinese survey, most of the respondents are confused about the relevant concept of cluster, which brought a lot of troubles for them to make a deep understanding of our survey then consequently affect the result of their answers. On the other hand, our interviewees are mainly from the academic institutions. Thus the points they provided have some limitations that just focused on the academic area while eliminated the consideration in the business viewpoint.

Finally, even though we consider cluster system as a whole instead of seeing different stakeholders separately, in fact we didn't get any opinion from government, which is worth to be considered in further study.

1.7 Thesis Structure

In order to clarify our research background and purpose, the paper will be started by description of the research background, problem area, study purpose and limitations (Chapter one). Further, we will introduce previous study briefly and the explorative process of our theoretical framework which will be adopted in our research (Chapter two). Then the methodology part will be presented, which methods we adopted to conduct the study. In this part, we will explain the methods of data collection and how to analyze the acquired dataset (Chapter three). Thereafter, in the fourth chapter we will describe the target regions (Oresund and Yangtze Delta), and find out the characteristics of them by SWOT and diamond analysis. Then the paper will turn to the Modeling & Empirics part. With both qualitative and quantitative methods we will examine and analyze the contextual factors of our Triple Ring model, in order to get better understanding of the target regions' features. In the end, the

original model will be present here (Chapter five). Then the following chapter will involve our analysis of the overall factors according to our Triple Ring model. With both qualitative and quantitative methods, these key elements will be examined and discussed here. The contents here will be ended by modified Triple Helix model and some suggestions for Chinese cluster development (Chapter Six). Finally, the last chapter will present the summarization of our research work and give the conclusion base on the analysis. The paper will be ended with the presentation of further study proposals (Chapter Seven).

2. Theoretical Exploration

In order to investigate the specific model, it is necessary to read the relevant theory and learn how to adopt them. What is cluster, successful factors concerning the development process, all the questions would be revealed in this part. Our theoretical framework will be developed as well.

2.1 Literature review

The knowledge about regional innovation system or cluster is not just advocated by one theory or researcher, but a whole family of concepts. Members of family include “new industrial spaces”, “milieux innovateurs”, “industrial districts”, “clusters”, “regional innovation systems”, “learning regions”, and “regional worlds”. Cluster theory dates back to the research by Alfred Marshall. His book, *Principles of Economics (published in 1896)*, includes one-chapter content on the externalities of industrial concentration and location impact. Then during the next fifty years, cluster study has been considered as a branch of economic geography and did not get enough attentions from public. However, with the increasing influences of globalization, the study concerning the regional growth started to play a central role in the field of economics and management. During the late 1990s, numerous researches have been conducted in the related area, such as agglomeration economies, economic geography, urban and regional economics, national innovation system, regional science, industrial districts, and social networks. (Porter, 1998)

Meanwhile numbers of international organizations, including the OECD (Organization for Economic Co-operation and Development), the European Commission, the U.S. National Governors Association, and US AID, have devoted major conferences and policy initiatives to this topic. Within the recent 40 years, a wealth of regions and nations has launched cluster initiatives in order to strength competitiveness. According to the survey by Solvell, Lindqvist and Ketels (2003), this numbers is up to more than 250 all over the world.

Some critics argue that the definition of clusters is too vague and the concept is thus a problematic source of policy advice. Others see cluster-based development as a useful approach. Even though such debate exists, the exploration of cluster theory still moves forward. In current study, Michael Porter has earned the great reputation in this area. In his articles, “Location, competition and Economic Development”, “Location, Clusters and Company Strategy” and “Clusters and the New Economics of Competition”, Porter makes a great contribution on giving the clear definition to cluster, identifying the different types of cluster, clarifying the successful factors and exploring the relationship between cluster participants. At the same time, numbers of research were turning to investigate business environment of cluster initiative. In 1990 Porter has introduced his “Diamond” theory (including four elements, input factors conditions, demand conditions, context for strategy and rivalry and related and supporting industries) as an analytical framework to assess business environments, which we will explain further in detail. Later in 1998, his famous book, *On Competition*, were published which organized the overall knowledge concerning the cluster theory. Porter pointed out the economic benefits brought by Cluster development in three dimensions (Figure 2.1) and the new roles which cluster creates for each stakeholder. Both are very meaningful for the later research concerning the Regional Innovation System.

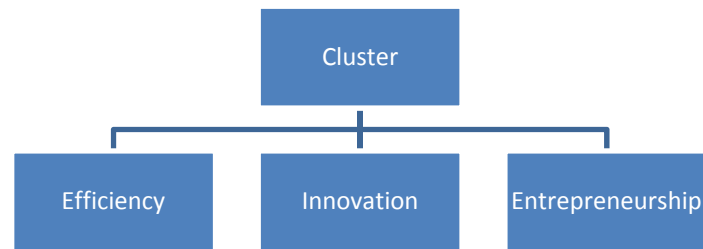


Figure 2. 1 Cluster performance in economic perspective

In addition, other studies and practitioners turn to look at and develop a new method for government policy (for example, Dohse, 2000), cluster agent (for example, Solvell, et.al. 2003) and cluster initiatives. Örjan Sölvell and Göran Lindqist (2003) present their investigation in their book, *The Cluster Initiative Greenbook*, describe and analyze the cluster initiative in great detail. The Greenbook, which is regarded as the first attempt to document the characters, disciplines, structure and process of cluster initiatives, involves a lot of quantitative analysis of the existing cluster efforts based on abroad sample data. Also it tries to summarize the overall characters and suggestion for cluster development by the comparison between each form of economy (developed, transition and developing economies).

2.2 The Theory of Regional Innovation System

Since first proposed by Michael Porter in 1990, the cluster concept has rapidly drawn tremendous attention from governments, industry companies, academics, and international organizations. As the new form of regional development system, cluster has a great effect on stimulating the regional economy growth and strengthening the regional competitiveness. Therefore during the recent years, the increasing numbers of governments and other relevant organizations have been aware the practical value of cluster. In this section, we will present the relevant cluster concepts briefly so that readers are able to get a general understanding of cluster theory.

2.2.1 Innovation, competitiveness and knowledge-based economy

Due to the importance of knowledge and intellectual capital in the new era of globalization, the 'knowledge-based economy' has become one of the most popular buzzwords in the global society. So called knowledge based economy is the form of economic growth which takes knowledge creation and innovation as the driving forces of national and regional development. Based on this, knowledge has become the new strategic source of business profit, social development, economic growth, and competitiveness enhancement. According to the conceptual description by World Bank, innovation can be defined as the process which turns knowledge (different forms, for instance, inventions, ideas, experiences, and so on) into services, products and any other practical forms. In the other word, bring the money out of knowledge is the core concept of innovation. Since the innovation process is largely dependent on knowledge production and commercialization, what is knowledge and how to utilize it are the crucial requirements for innovation. Nowadays, knowledge is no longer just referring to things which can be learnt in the school. Instead knowledge is increasing worldwide recognition as a new form of asset, which can be created and bring out the benefit. Thus, how to equip the national and regional competitiveness with knowledge is becoming increasingly the hot topic. The concept of knowledge based economy is introduced

as a solution for this.

The so-called knowledge based economy is defined by United Kingdom Department of Trade and Industry as “a knowledge driven economy in which the generation and exploitation of knowledge play the predominant part in the creation of wealth”. Moreover, the World Bank uses the following sentence to define it, “a knowledge economy is one where organizations and people acquire, create, disseminated, and use knowledge more effectively for greater economic and social development” (www.worldbank.org). In order to achieve this, Aubert explains the four pillars of knowledge economies (Good economic and institutional regime; Well educated and skilled population; Effective ICT infrastructure ;Effective innovation system) in Bounfour & Edvinsson (Aubert, 2005), which is shown in the following diagram(Details in Bounfour & Edvinsson by Aubert (2005)).

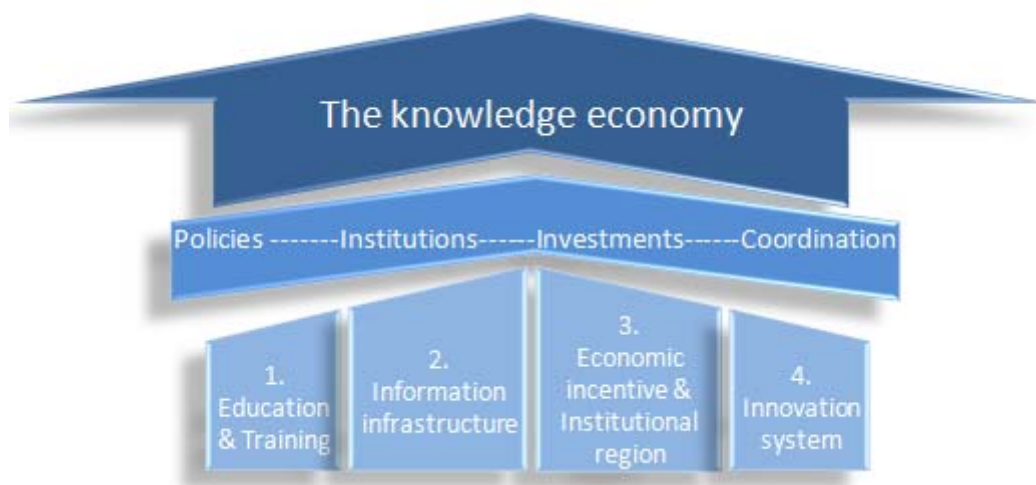


Figure 2. 2The Four Pillars of a Knowledge Economy (Aubert, 2005)

In the forth pillar explanation, the innovation system was introduced as a network of universities, Science Parks, researchers, private companies and community groups that via collaboration can interact and explore global knowledge and develop new mindsets.(Philip Hansson,2007) The cluster-based economic development is imported as such strategy of regional innovation system.

According to the research by Sölvell (Figure 2, 2), as one form of economic agglomeration, cluster has more significant impact than others, on innovation and upgrading by building the network among the related institutions. This so called cluster-based economy is imported as a new model for knowledge based economic growth. Under this background, all elements affecting the context for productivity and innovation in individual firms and clusters have to be looked at so as to improve a location’s competitiveness. (Ketels, 2003). For supporting this form of economic growth, some concepts concerning the cluster theory need to be clarified and investigated deeply.

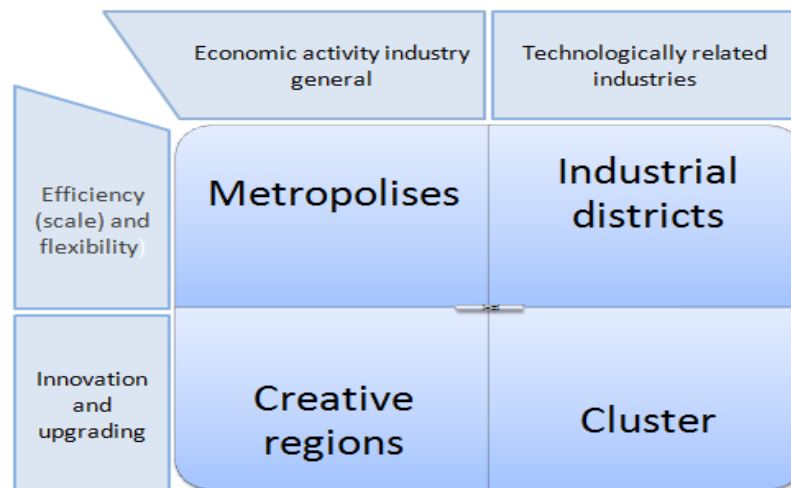


Figure 2. 3 Different types of economic agglomerations (Sölvell et al. 2003)

2.2.2 Cluster Theory

Theoretically, clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions, (for example universities, standards agencies, associations and governments) in particular fields, linked by commonalities and complementarities. (Porter, 1998,) The essential concept of the cluster theory is to establish the collaborative climate to strengthen the competitiveness, which presents a new thinking way about the development of national and regional economies. Based on the thoughts of Porter, clusters give the new meaning to the roles which every participant should play. So that each stakeholder in the cluster has been connected tightly with each other and get the great benefit from being a unit. Under the background of globalization, a cluster may take different forms depending on their depth and specific purpose, range from city, state, country or cross-border region to neighborhood countries. (Christian H. M. Ketels, 2003) Traditionally, clusters are regarded as the extensive form of industrial concentration, which is a driving force in increasing the exports and attracting the foreign investment. In most practical projects, regional clusters are initiated and operated in this way, especially in developing countries. While entering to the new era, the old goals for clustering are diminishing in importance with the great impact by globalization. New roles of clusters have changed to be taking on the growing influences in a more complex, dynamic and knowledge-based economy. (Porter, 1998) The renewed cluster theory focuses on innovation and learning ability, rather than the static efficiencies of productivity.

- **The advantages of cluster:**

According to the explanation in his book, *On Competition*, Michael Porter has contributed to the exploration of cluster's benefit in the economic perspective, which is summarized as following three issues.

1. Cluster aligns better with the nature of competition and sources of competitive advantage than other forms of economic development, such as industries and companies.
2. Cluster provides an efficient channel for the conversation among related companies and

other institutions. Then the overall collaboration environment is established.

3. Due to the open-dialogue environment, cluster participants not only share common needs and opportunities, but also encounter the same difficulties and constrains. This connection is very crucial to competition, to productivity and even more important to innovation.

- **Benefits brought by cluster:**

Ketels summarizes the general benefits brought by cluster into four points. (Ketels, 2003)

1. Cluster is critical engines in the overall economic make-up of a region or nation. Affecting the ability of the region to be more productive and innovative, that has huge benefits for the economy at large.
2. Cluster is a more effective way to conduct microeconomic policy. Firm-level interventions are too costly and tend to distort competition, while policies directed at broad sectors or the whole economy will tend to have little effect and miss the levers critical for a specific cluster.
3. Cluster can help to identify challenges in the business environment affecting the whole economy, and they can be the testing ground for specific remedies addressing them. The economy-wide perspective often is less effective in reaching level of granularity needed to achieve improvements in microeconomic factors.
4. Cluster can help the private and the public sector to adopt a new approach of economic policy making, characterized by collaboration and joint action along a wide set of players.

- **Three ways in which clusters affect competition:**

1. Increase the productivity of enterprise or industries;
2. Enhance the capacity for innovation;
3. Stimulate new business formation.

Practically, the effect of these three influences of cluster largely depends on personal contacts, face-to-face communication, and people's social network.

- **Cluster participants:**

Generally a cluster consists of five linked and co-located sets of actors, including industries, government, research community, institution for collaboration (IFCs) and the third-part institutions (financial institutions, international organization etc.).

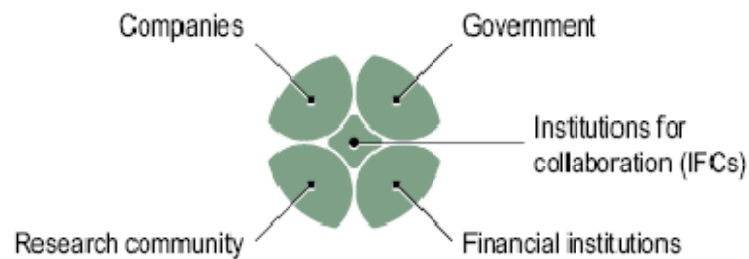


Figure 2. 4 Cluster Stakeholders (Sölvell et al. 2003)

- **The lifecycle of cluster**

The general agreement about cluster life is that cluster is dynamic and can be described as a cyclical process with four stages.



Figure 2. 5 Cluster lifecycle Model (Lord Sainsbury, n.d.)

1. Emerging or embryonic: cluster is on the early stage of growth, with the character of many new firms, rapid growth, frequent changes in firms and products.
2. Growing or established: cluster grows stably and still has room for further growth.
3. Mature: the structure of cluster is stable and meets the bottleneck for developing to higher level. The features of this stage are marked as fewer new firms, slower development, and fewer changes in products or services.
4. Declining: cluster has gotten its summit and is failing down. Sometime later cluster are able to renovate itself and enter the second-round cycle process. This stage is often

identified by stagnant or declining employment growth, more firm deaths than births, few or no changes in products.

- **Some Cluster Projects**

The early discussions on clusters focused on clusters with international importance and leading world market positions, such as the financial clusters in New York and London, the media cluster in Hollywood, the IT cluster in Silicon Valley, the automotive clusters in Southern Germany and Detroit, the telecom clusters in Stockholm and Finland, and the textile/fashion clusters in Northern Italy. (Christian H. M. Ketels, 2003)

Saxenian (1996; p. 2) described Silicon Valley as a regional network-based industrial system that promotes collective learning and flexible adjustment among specialist producers of a complex of related technologies. Furthermore, it is widely accepted that knowledge spillovers are geographically bounded within a limited space over which interaction and communication is facilitated, search intensity is increased, and task coordination is enhanced (Feldman, 2000; p. 389).

In Europe, some clusters have been started a long time ago like Catalonia and the Basque country in Spain, Veneto in Italy, Scotland in the UK, while others have started with the last few years, especially some cross-border clusters. Oresund region is a typical case.

2.2.4 Triple Helix Model

This so called Triple Helix refers to a spiral model of innovation, which is opposite to the linear model that captures multiple reciprocal relationships among institutional settings (public, private and academic) at different stages in the capitalization of knowledge (Riccardo Viale & Beatrice Ghiglione, Fondazione Rosselli, 2005). These three institutional spheres which formerly operated at arms' length in liberal capitalist societies are increasingly working together, with a spiral pattern of linkages emerging at various stages of the innovation process (Riccardo Viale & Beatrice Ghiglione, Fondazione Rosselli, 2005).

Actors of Triple Helix:

The actors, according to roles and models of action which involve various and varied cultures, can be separated and belonging to the three worlds: academia, government and business. Then innovation can be brought out by the collaboration between each actor.

Some typical instances of actor's interaction:

- Academic researchers bring their own technologies into business, even create the companies.
- Business people work in universities as guest lecturers or in the research centers as consultants.
- Researchers work part time in a company as consultants or assist the project with the commercial purpose.
- Cooperation between academic researchers and businessmen in the IFCs, with the aim to transfer the knowledge and new technology.

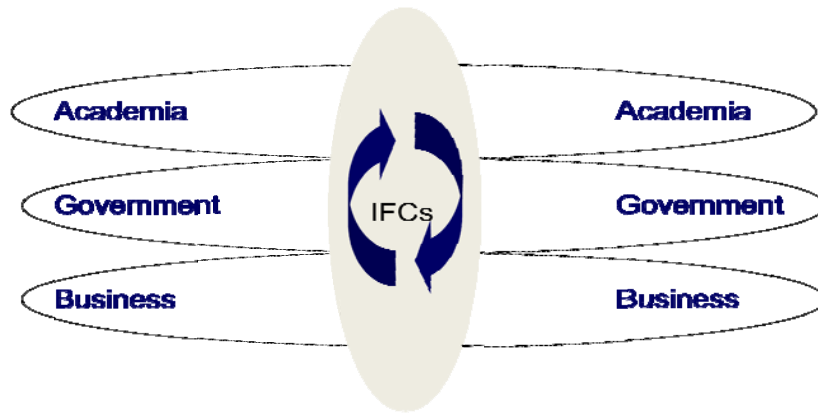


Figure 2.6 Triple Helix Model (www.oresundit.com)

2.3 The Theoretical Framework of Our Thesis

To identify the successful factors of hi-tech cluster, we need to find a suitable theoretical framework to support our research. Since the cluster's success is largely decided by the actions of different stakeholders, including multiple levels of government and public agencies, companies, universities, research institutions, business association, international organization and any other institution which would affect the environment of cluster (European cluster Memorandum, 2007), to investigate the cluster cases cannot be conducted independently from the overall contextual analysis. Both Macro and Micro background of politics, business, and academy in certain region will definitely benefit the cluster study. Therefore, we first conduct SWOT analysis on the general regional environment of both Oresund and Yangtze Delta region. By this comparison, we hope to get clear understanding of the capability of Yangtze Delta, if it has such potential to have ICT cluster implemented. Then in order to narrow down our study area, we adopt Porter's Diamond tools to investigate the supporting factors for cluster development. Then, we try to construct certain cluster models to express the relationship of cluster participants based on Diamond analysis and Triple Helix theory. In addition we will combine the lifecycle model and Triple Helix model to analysis the process of Chinese ICT cluster development, intent to find specific model concerning the Chinese cluster. The general theoretical framework is shown as follow:

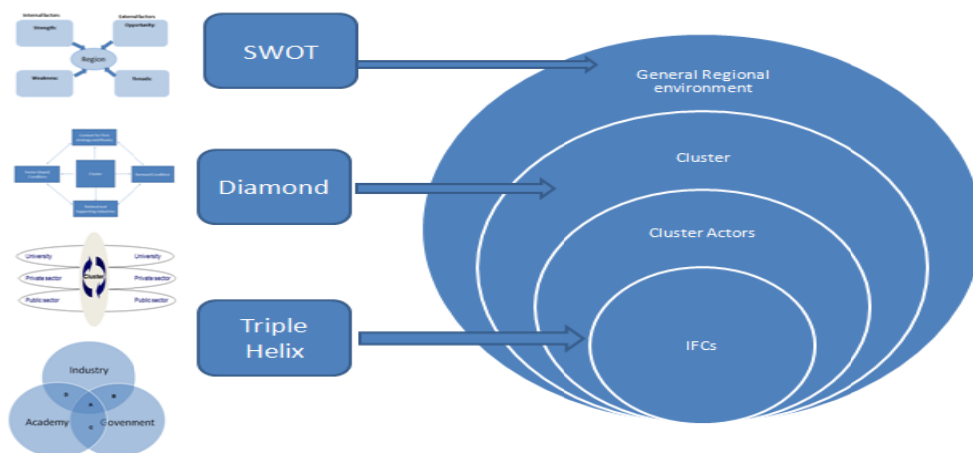


Figure 2. 7 Theoretical Framework of Our research

2.3.2 SWOT analysis:

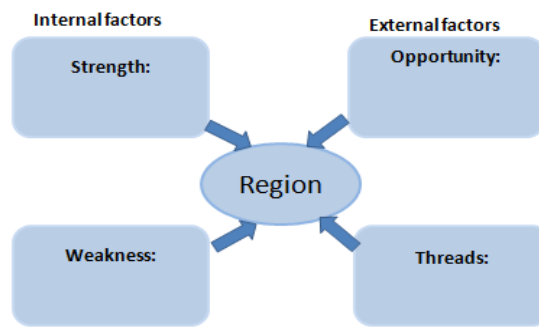


Figure 2. 8 SWOT analysis for regional environmental scanning (Porter,1990.)

Basically SWOT is a strategic planning method used to evaluate the **Strengths**, **Weaknesses**, **Opportunities**, and **Threats** involved in a project or in a business venture. It involves specifying the objective of the business venture or project and identifying the internal and external factors that are favorable and risk to achieving that objective (to implement the innovation system project) (Wikipedia, 2009-05-03).

In our study, we consider the region as a united system or organization, the similar concept to a company, and industry. So when we do SWOT analysis, we imagine a region as certain kind of a big company as a whole, which has the resource, products, services, and their own competitiveness. So we think SWOT is the perfect tool for environmental scanning of cluster.

2.3.3 Diamond analysis:

Since created by Michael Porter (porter, 1990 & 1998) in his famous book, *The Competitive Advantage of Nations*, the diamond model has been proved as a useful tool for the analysis of cluster competitiveness. Mostly, diamond model is applied to look at the cluster's performance and potential opportunities by scanning the four factors (shown in Figure 2.9).

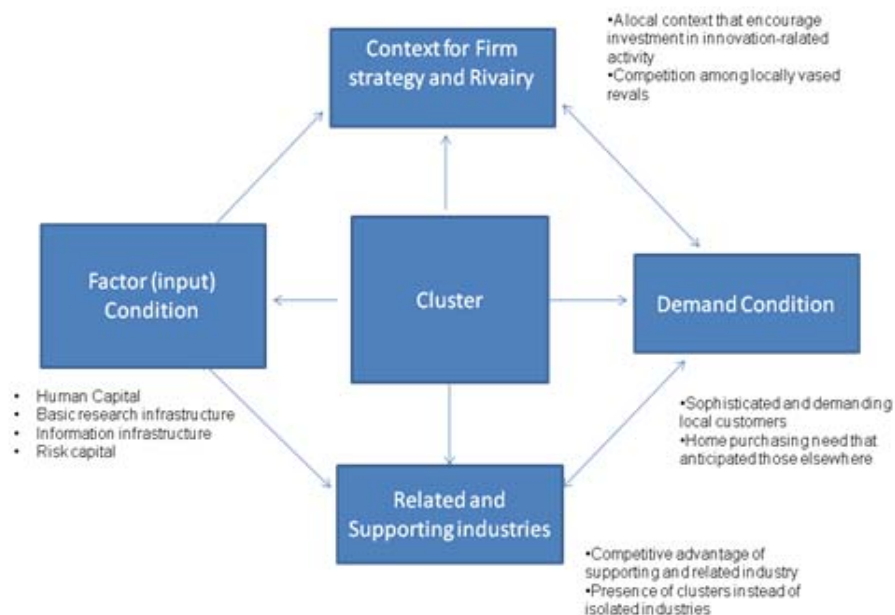


Figure 2. 9 Diamond Model (Furman & Porter, 2002)

- **Factor conditions:** human resources, physical resources, knowledge resources, capital resources and infrastructure specialized resources are often specific for an industry and important for its competitiveness.
- **Demand conditions:** one market can help companies create competitive advantage, when sophisticated home market buyers pressurize firms to innovate faster and to create more advanced products than those of competitors.
- **Related and supporting industries:** industry can produce inputs which are important for innovation and internationalization. These industries provide cost-effective inputs, but they also participate in the upgrading process, thus stimulating other companies in the chain to innovate.
- **Firm strategy and rivalry:** The way in which companies are created, set goals and are managed is important for success. But the presence of intense rivalry in the home base is also important; it creates pressure to innovate in order to upgrade competitiveness.

All these factors interact with each other to create conditions where innovation and improved competitiveness occurs.

2.3.4 Modified Triple Helix:

In order to narrow our research area, we form our framework with the focus on the three major sectors of cluster, industry, academy, and government. Each of them has their own factors which we use to measure the capability of the region to establish a cluster. Also based on this framework, we will try to form a specific cluster model by refining the Triple Helix model. Here we involve the set theory to make clear the interconnection between each cluster's participants.

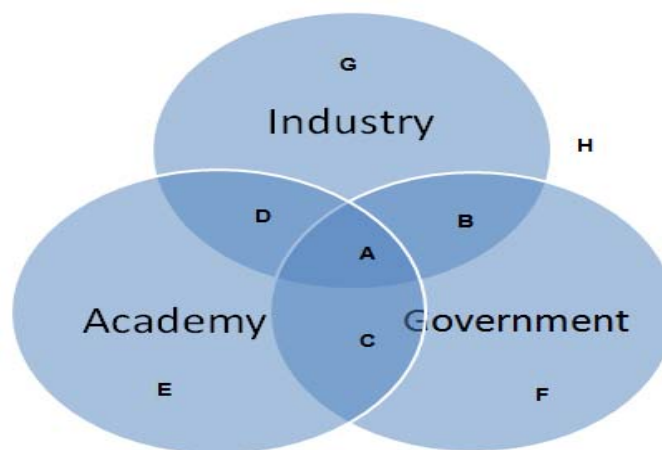


Figure 2.10 Modified Triple Helix

Description of MTH:

- **G=Industry, E= Academy, F=Government:** generally our MTH model is based on the Triple Helix model. There are three main stakeholders involved here (in cluster), industry, academy and government. We present them as the different ring area (**G**, **E** and **F**). **G** stands for industry or business sectors, where companies can interact with each other, the same as **E** for Academy and **F** for Government.

- **Intersection area:** the performances of cluster participants are intimately linked, in other words, the network in which academy, industry and government are often coincide and overlapped. In MTH, the overlapping area of industry and academy, which is symbolized as $G \cap E$ (or $A \cup D$) represents the interaction between academic institutions and industry, the same concept as $A \cup B = G \cap F$ (government and industry) and $A \cup C = E \cap F$ (government and academic institutions).
- **A** stands for the common area where all the participants involve achieving the common goals by collaboration. The activities that happen in this area require the fully participation of each stakeholders. Then theoretically the IFCs should be located in this area.
- In order to narrow down our research area, the influence from **other organizations** is neglected in the MHT, for instance the international organization. We locate it in the outside blank area of our model, H.

Then in order to establish the innovative cluster's environment, some elements which regarded as so-called successful factors should be possessed in advance, and these factors are located in the different areas, where the different participant should pay attention to realize them by reforming their behaviors.

- **Industry:**

1. For business section, **competition (G)** is always the first issue which should be mentioned when talking about cluster. Porter considered competition as one of the most crucial things for cluster implementation. Because the truly creative business environment can only be achieved by forming the fairly competitive market, and only by this way will the innovation will be brought out due to such fully engagement of competitors. Thus we locate this element in the area G.
2. To build and maintain the **Open-dialogue business environment (G, D, B and A)** is perhaps the most tough task for cluster development. Because there is always some kind of barrier between cluster participants, especially people from the different sectors. Therefore, to bridge conversation of different people is the No.1 mission for IFCs or public associations. In addition, open-dialogue is the shortcut to build the trust among the different people. In our model, this element should be located in the area of $G \cap D \cap B \cap A$.
3. According to the discussion in cluster green book, **dominative firms (G)** plays an important role in cluster establishment. In most countries, some industries are monopolized by central enterprises, so that the major resource is controlled by these firms and the price is also decided by people instead of market. The direct negative effect of monopolization is that the collaboration is hard to be achieved because of the weak competitive market. Thus when we do the research on cluster, the influence of dominative firms can never be ignored. Then we located it in the G area.

- **Academy:**

1. As the same as industry section, **open-dialogue environment (E, C, D and A)** is important for academic institutions. Nowadays, researchers enjoy the benefit brought by collaboration with other partners, especially in the field of hi-tech exploration. With the help of industry and government, academic people become

easy to reach the available resources for their study.

2. Apparently different countries have the different **educational system (E)**. The open and advanced ES would be very beneficial for the knowledge creation and innovation. On the other hand, the closed and sheltered one would have a negative impact on the transformation of knowledge and human resource. Thus we located it in the area of E
3. A serious and unbiased **research atmosphere (E)** is the foundation of knowledge production and innovation. This is so it would be worth to discuss the ownership of research findings and Plagiarism in this section.

- **Government**

1. Too much **political interference (A, B and C)** would surely result in the dissatisfaction from industry and academy, thereby decline the effect of collaboration. On the other side, the right and moderate political interference would guide the cluster grow in the right way, meanwhile other participants will get the benefit from such official influences. Then we position it in the area of A, B and C.
2. **Network initiative (A)**. Based on the porter's cluster theory, in the beginning stage of the cluster initiative, government plays a vital role in the network establishment. Also the establishment of IFCs can't be successful without the help of government.

- **Overall factors (located in all the area):**

1. In most cluster initiative cases, **trust** is considered as a valuable intangible asset for cluster project. Also building the solid relationship is usually the first step of cluster formation. According to the green book, a successful cluster initiative is based on the overall trust environment, which largely depends on the good personal network. So we located the factor of trust in all areas.
2. The sustaining and multiple **financial supports** is the definite crucial element for the cluster project. Without the plenteous funds, cluster projects would be dead eventually. Furthermore, the different share of cluster's funds would influence the leadership or roles that each stakeholder should play in the cluster development. Therefore, we decide it as one of the overall factors.
3. The **leadership** of cluster is one of the hot topics in the cluster's research. Who will take the role as a leader during the cluster development, industry, academy, or government? Because of both the political and economic benefits, government is never willing to lose the powerful position in the cluster. Otherwise based on the previous experience of cluster projects in the Eastern Europe, the government support is very important in the beginning stage of cluster initiative, especially for the financial resources. According to the survey result in Cluster Green book (Sölvell et al. 2003), the specific character of cluster largely depends on the different type of leadership. Thus we decide the factor of leadership as an overall element.

3. Methodology

As methodology is a rationale and philosophical assumptions that underlie a particular study relative to our scientific method of our research process, it is the suitable approach to present out ontological and epistemological views.

3.1 Quantitative and Qualitative Methods

For our thesis we will adopt both qualitative methods and quantitative methods to carry out our research and solve the final problem. The focus of our research is about how to use the successful industry cluster model in Oresund region to adapt Chinese Yangtze Delta area. In our research we adopt on-line survey as our quantitative research method. The sample size for our survey is calculated by statisticians using formulas to determine how large a sample size will be needed from our target population in order to achieve findings with an acceptable degree of accuracy.

Compared to quantitative research, qualitative method in our research is much more subjective than quantitative research and uses very different methods of collecting information. Individual and in-depth interviews will be carried out in the process of interviewing people from the enterprises and academic institutions in our research. The nature of this type of research is exploratory and open-ended. In our research 4 people come from Oresund Region in Scandinavia and one comes from Chinese university are interviewed in-depth.

3.2 Pre-study

The aim of our pre-study was to help us to get a deeper understanding of the ICT cluster in Oresund Region and the situations of nowadays Chinese market. We started to find the existing model of Oresund Region which has been applied successfully for 8 years, collected all the useful information about the developing process, and then we analyze the Yangtze Delta area in China to find the differences between these two regions. Compared to Oresund Region, which factors should support the new cluster building and which should bring the obstacles during the starting stage. According to this pre-study, we got the increasing understanding about the current situations in both sides which are well helpful for conducting our on-line survey design, the target interviewees, and the questions of our interviews.

3.3 Reviewing of previous studies

Reviewing of previous study is a kind of simply description of what others have published in the form of a set of summaries, but we also need to take the notice that the form of literature should be a critical discussion which can be shown with the insight and an awareness of differing arguments, theories, and approaches (www.unc.edu, 2009-04-29). It should be a synthesis and analysis of the relevant published work, linked at all times to your own purpose and rationale (Wikipedia, 2009-04-29). The aim of a literature review is to show the reader that they have read, and have a good grasp of, the main published work concerning a particular topic or question in our research field (Wikipedia, 2009-04-29). The process of our reviewing previous study will contain these following sectors: finding models, narrowing the topic, considering whether our resources are available currently.

Finding models require one to be looking for the previous study in the same area of our interest or in the discipline and then read those to get a sense of the types of themes we

might want to look for in our own research or the ways to organize our final review. The simplest way we did was just put the word “review” in the research engine of ELIN along with our topic of ICT cluster.

There are hundreds or even thousands of articles and books in the relevant areas of our study. This required us to narrow down our topic which can help us to limit the number of resources we need to read in order to get a good survey of the material. Moreover, it is also an important approach to tap into our professor’s knowledge in the Science region and ICT cluster. These relative questions can help us to find and determine quickly the most seminal pieces in the field.

Our research is about how to use the existing model to adapt current Chinese market, and this requires us to use information that is as current as possible. In our research of Yangtze Delta area, the current situations of Yangtze Delta area are constantly changing according to the world’s economic situation, the latest government policy, and the academic researches. Information even two years old could be obsolete. However, in our research of the Oresund area which has been developed for nearly 8 years and ICT for more than 4 years, a survey of the history of relevant literatures are necessary, because what is important is how perspectives of Science region and ICT cluster have changed within a certain time period. Analyzing the historical studies can help us to get the overall view of the developing process. For these historical studies, we need to consider what is “hot” and what is not to select our target literatures.

3.4 Data Collection

Data collection is a kind of interrelated activities aimed at gathering good information to answer research questions. After the steps of reviewing the previous studies, doing survey and interview, data collection offers us instance for assessing research design within each approach to inquiry (Creswell, 2007). Through the interviewing procedure, the data about relevant people’s experiences, feelings, and what they contributed to the construction of the local science region can be combined together for future utilize. At the same time, data analyzing text and other multiple forms of data may present some extra challenging task for our qualitative research.

The most important part during the data collection process is that we should consider the multiple phases in collecting data. Phase extended beyond the typical reference point of conducting interviews or making observations (Creswell, 2007). The process for our research data collecting is to locate our research objectives who are the CEO of Oresund IT, and the researchers in the academic institutions from both two regions. In our research, we decided to choose the CEO of Oresund-IT and some experts of the academic institutions. So our final research data will be based on the information which would be collected from these two approaches.

3.4.1 Online survey and interviews

During our research process, in order to get adequate information from our objectives, the methods we use are the online survey and interview. Interview and survey are the further steps of data collection and analysis. By combining it with the quantitative methods of data analyzing, our results can be more persuasive.

A survey is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. With a survey, we can get first hand

information which will be original from our researching objects. By using the online survey, we can collect the data in a very low-cost way. Also, the standardized answers make the further research of data arrangement and data analysis easier. The participants of our survey are mainly from the companies or academic institutions in Oresund region and Yangtze Delta area. The main questions in on-line survey for the employers concentrated more on their individual experiences of the science region's building and their real feelings of the obstacles, drawbacks, and dominances during the process of cluster's building. With the service of ServeyGizemo (www.serveygizemo.com), our on-line surveys were constructed by both Chinese and English versions, and we try to involved the considerations as much as possible. The process of analyzing survey data are contained with exporting the raw data from the website (www.serveygizemo.com), transferring the raw data into the readable data by SPSS, using SPSS to get the statistic results, and data analysis concerning the key factors.

Interviewing provides us with a direct approach to get close to first-hand resource from the experts. In our research process, interviews with the CEO of Oresund-IT and three teachers of Lund University were done by face-to-face forms, and the interview with the professor from Chinese university was done by telephone form. All these interviews were booked in advance. Before interviewing, the contents of the each interview was prepared separately and carefully that everyone's questions are different from each others' which are based on their focused areas. During the process of each interview, we used recorder to record the audio information which were transferred into text form later (appendix 9.1, 9.2, 9.3, 9.4, 9.5). Through the interview conversation with the CEO of Oresund IT, professors in Lund University, and a professor of Chinese university, we can get to know their own views about what the real situations of the science regions, and what their expecting implementations are. This qualitative research method interview attempts to understand our research from the subjects' point of view, to unfold the meaning of peoples' experiences, to uncover their lived environment prior to scientific explanation (Yin, 2003). We prepared our composition of interview focusing on some main questions, such as the reasons for building up the science region in China, what the achievement for the Yangtze Delta region is, how to eliminate the differences between these two regions when the Oresund model will be implemented, how to communicate with the different departments and so on.

Our first interview was held with Moodysson, J. (April 15th, 2009). The main purpose of this interview was to get the overall information from the academic researcher's perspective. We took our face-to-face interview in Moodysson's office which is located in CIRCLE of LUND University. The interview lasted for nearly forty five minutes, and the entire interview was recorded in the audio with the permission from Mr. Moodysson. This audio material provided us with the raw data in verity.

Our second and third interviews which were held with Kitagawa, and Benner were all face-to-face interviews. These two interviews focused more on the policy part from the public or government perspectives. According to our triple Helix model, the government is the inevitable part of the whole model. Based on the limitation of our interpersonal relations, it is difficult to meet the government officers. Thus, the points of view from these two professors who did a lot of research on this area should be the essential materials for us.

The fourth interviewee, Yu was the professor from Chinese university which was located in Yangtze Delta area. Since Yu lives in Yangtze region, we had to have this interview through phone call, and the audio material was recorded by special web-phone. Yu gave us lots of factors about the current situations in Yangtze Delta area, which include the situations and

obstacles of connection between academic institutions and enterprises, the drawback of the government policy, and the developing direction in future. This interview provided us with plentiful information as our researching background in Yangtze Delta area.

Our last interview which can be considered as the most important interview was held with Gustafson, M. Before this interview, we collected all possible information from the previous interviews and other related materials, and prepared a lot in our questions. As the expert of Oresund-IT, his suggestions about the model of Oresund Region helped us to construct the final version of ICT cluster Mode (figure 6.9). The whole process of face-to-face interviewing took more than one hour.

According to Bryman & Bell (2003), our interviews are mostly conducted in unstructured way which was called qualitative interviews. This kind of interview does not request the interviewees to answer the specific questions while in a more generality way that most of their points can be expressed spontaneously. In the process of interviewing, most of interviewees can elaborated described their own feelings or points from our open questions, and some of important information was discussed without us asking the questions. Based on the previous interviews, we could prepare our later questions with more concentrations, and deeper thoughts.

3.4.2 Data collection approach

There are two types of data we can get from the research process which are primary data and secondary data. Before carrying our research we can collect information during the procedure of literature reviewing. These literature reviewing data are original from books, reports, articles, white papers, documents and involves mainly literature about the research of Oresund ICT cluster and Yangtze Delta region in China. Primarily the articles were searched via the databases using the keywords like: Oresund region, ICT cluster, science region theory, Chinese cluster. A great deal of materials was acquired from publications of research institutions in Southern Sweden and Denmark, and some of from Chinese universities. As this study should be implemented through the international areas, the concentration of the study should be expanded to different target areas.

The primary data should be collected in three separate parts and several different ways, which include observations and interviews in an environment, face-to-face interviews of several cluster experts and researchers in academic institutions and two versions online surveys answered by the members within ICT clusters in Oresund region and Chinese area. The findings and how the data was collected are described in appendix 7.

According to our interviewing process, we observed the free-flowing communications among the cluster organization, enterprises, and academic institutions. The primary information during the observations was from the CEO of IT Oresund who worked at the organization of connecting the industrial companies and the experts in certain universities.

The interview data was provided by one CEO working in Oresund ICT cluster, three associate professors from Lund University, and a professor from Chinese university. For different interviewees, we designed different contents of interviews which concentrated on their preferences and professional areas. For the CEO, our questions were almost from the commercial direction which focused on the business part, such as the functions of the cluster organization, the expected profit from the investment of academic research, and the competitions among the same industrial enterprises within one cluster. For the academic

part, our questions were mainly from the research purposes which include how to transfer the research into the commercial value, how to attract the investments from the enterprises to get more research capital, and how to communicate with the different research institutions to acquire new knowledge and qualified talents. Moreover, the interview of Chinese professor was generally focused on the current Chinese situations, the obstacles to carry out the academic research, and how to build up the potential cluster based on the existing “software” and “hardware” facilitates.

The last important part to collecting primary data was the online survey. The survey was both written in English and Chinese which can be understood easily by the people in both regions. The online survey in English version was answered by members of IT Oresund, employers in other ICT companies in Demark, and the staffs and teachers of Lund University and universities in Demark. The online survey in Chinese version was answered by the employers from the companies located in Yangtze Delta, the professors and experts of Chinese universities in Yangtze Delta. The both English survey and Chinese included 27 questions with a mixture of open questions about the current situations of clusters and the view points from the people with relevant working experiences in ICT cluster. The informants that answered the survey all occupied high positions within their separate institutions.

3.5 Validity and ethical Issues

How to measure the quality of scientific research contains two components: the importance of the research topic and the validity of the experimental results. The importance of the research topic is usually evaluated in the context of potential risks and benefits to both subjects and society at large (Singer & Vinson, 2002). It is obvious that our research should provide the greatest possible balance of benefits to risks. Also, if our research results are not valid, they do not reliably or faithfully represent reality (Singer & Vinson, 2002). Consequently, our research which may be incorrect if our conclusion drawn on the basis of the results, thus our research results may contain low value to the scientific quality. If there is low value within our research results, the benefits of our research cannot outweigh the risks to our participants. Thus the standard scientific quality for our research should be expected to produce valid result.

Moreover, there are several reasons why we should consider research ethics. If we upset our research subjects of survey participants, there will be a risk of losing their cooperation or honesty. Also, if we upset our research subjects' CEO and academic researchers, there will be the risk to losing access to the subjects, to funding, or to other resources. Ethicists do not fully agree on the necessary components of informed consent, but it is clear that it must contain at least some of the following elements: disclosure, comprehension and competence, voluntariness, the actual consent or decision, and the right to withdraw from the experiment (Singer & Vinson, 2002). Disclosure means that we must provide our interviewees with the enough relevant information before they decide to participate in our survey or interview. This kind of information should include but not be limited to our purpose of the research. Some unexpected risks within our research procedures of analyzing objective, on-line surveys, interviews, data collection, and data analyzing may contain the privacy of our participants, so our research may bring potential collaborations, competitions, benefits, challenges, and development to them. Thus, it is necessary to provide the subjects with all the information they need to understand how the research affects them. For example, in our research, we need to interview some academic researchers or CEOs, and it will be necessary

for us to explain that our interview may bring some risk about their academic secret or trade secret before our interview. The element of competence refers to the subjects' ability to make a rational informed choice (Singer & Vinson, 2002). This criterion is intended to protect participants, who may not understand the nature of the research, such as the new employers of the corporations. Before our survey and interview, we need to explain the purpose of study to the participants, and some general information. We should do our best to eliminate the potential harm to the participants after their participation.

4. Description of the target region

In this chapter, we will analyze the current situation of Oresund region and Yangtze Delta area based on the two analyzing methods. At the beginning, we analyzed Oresund region and the ICT cluster in Oresund region according their life circle, and we used SWOT approach and Porter's Diamond approach to analyze the cons and pros of this region. Then we also adopted SWOT and Porter's Diamond approach to analyze the situations of Yangtze Delta area especially focused on Shanghai.

4.1 Oresund science region

4.1.1 Oresund science region (OSR) description

Oresund science region is the project which aims to promote the cross-border collaboration between regional authorities, businesses, and universities based on the unique model of "double triple helix". At the beginning, OSR was initiated to cover the gap between academy and industry within the cross-border area of Swedish-Danish. With the goal of promoting knowledge based economic development, OSR takes its focus on almost every field of the society including ICT, Environment, Logistics, food and life science. (www.oresundscienceregion.org)

The following diagram shows the general structure of the OSR project:



Figure 4.1 functional structure of OSR

With the rapid growth of regional economy during the recent years, OSR has earned a great reputation for bringing innovation to regional growth, and it is now regarded as one of the most successful "triple helix" model in the world. In 2008, Oresund Science Region won the prestigious 1st prize in the EU-competition RegioStar because of its contribution of supporting the cluster and business networks. (www.oresundscienceregion.org)

4.1.2 ICT Cluster in OSR

With a strong belief in Oresund Region which marked as a leading Scandinavian ICT region, the project of Oresund ICT cluster was coming into reality. As a part of OSR, the main goals of Oresund ICT cluster are to establish the bridge between industry, government and academic institutions, stimulate the new ICT technology application, and foster the innovative environment in order to strengthen the region competition in ICT area. At present, Oresund ICT cluster is regarded as one of the most successful ICT cluster projects in Europe, with more than 100,000 employees, 12,000 companies, 8000 students, and 500 public researchers within ICT field. (www.oresundscienceregion.org)

In November 1999, a non-profit organization was initiated by Oresund University and Oresund Business Council, which finally named as Oresund IT, takes the role as the cluster facilitator within the ICT sector of OSR. This is done by uniting the Danish and Swedish ICT sectors in Oresund Region,

Oresund IT intends to help the members (Oresund IT is member-based organization) strengthen their competencies, assist the growth of Oresund ICT cluster, and make this region more attractive. They do this by delivering knowledge and contacts, initiate projects and supporting innovation together with companies, universities, authorities and investors. For specification, the work of Oresund IT can be categorized into five groups, which is shown in following diagram. (www.oresundscienceregion.org)

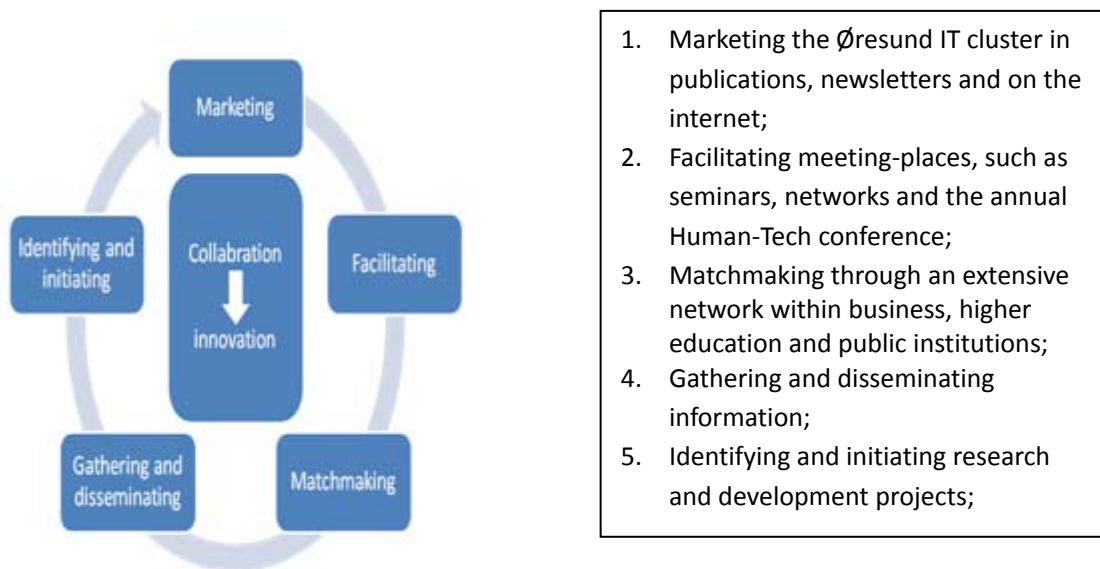


Figure 4.2 functional structure of Oresund IT

4.1.3 Some cases of Oresund ICT cluster:

Bio & IT Post Doc program: This program, which started in 2002, is a typical example of the cross-disciplinary cooperation with Oresund Life Science cluster. Both Oresund IT and Oresund biotech involve in this project in order to achieve the innovation by combing the biological and information technology.

Mcluster: This project aims to measure the climate of innovation related to mobile and wireless technology in some European regions, by bringing together advanced users from ICT industry and academy. As a part of this project, “mWatch 2006” which initiated by Oresund IT, had been conducted to study extensively the mobile climate in the Oresund Region based on the index of Mobile Readiness

4.1.4 SWOT analysis for regional environment in Oresund:

We used SWOT approach to analyze the regional environment in Oresund region to get the total understanding of both negative and positive factors of the current situations.

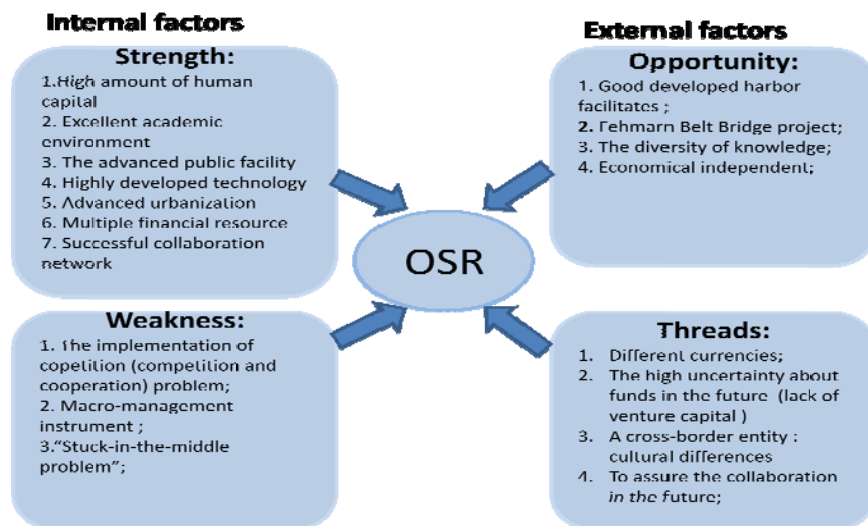


Figure 4. 3 SWOT analysis for Oresund Region

Strengths:

1. Human capital: a highly educated population and skilled labor force give the strong support for regional development, which reflected by the large number of researchers and high-technology workers in this region. Also it is regarded as the biggest advantage of Oresund region, because human capital is the major foundation for knowledge production. In recent years, Oresund region becomes much more attractive to the foreign talents all over the world, especially for Asian people. The reason for this is obvious, as the two of most wealthy countries here has a better life, a better payment, and a better working/studying environment they would dream to seek ever.
2. Excellent academic environment: The education/ research level is rather high in Oresund, according to OECD (2006), 20 higher educational institutions located in this region, some of them are world-wide famous university like Lund University in Sweden and Copenhagen University, Aarhus in Denmark. They provide the solid foundations for academic research and knowledge production. Also, these universities have very huge exchange student programs. Some kinds of collaborative relationship can be established between universities, and it did improve the diversity of knowledge by a splendid academic atmosphere.
3. Multiple financial resource: Oresund science region project is financed by international organization like European Commission, Denmark and Swedish governments, local governmental agency, the Danish Ministry of Science Technology and Innovation, the Danish Ministry of Economic and Business Affairs, industry investments, member-fee and so on.
4. Strong transportation systems cross borders for both physical materials and intangible things like knowledge. Oresund region processes the well-developed traffic system, including the world class harbor facilities, airport and railway network. Copenhagen Airport which is the busiest airport in Nordic countries and Malmö airport which is the fourth biggest airport in Sweden (BBC website, 2006). Also the cross border bridge, which is the longest border crossing bridge in the world with two track rail and four land

roads, plays an important role in the regional integration. Furthermore, the ongoing project of Fehmarn Belt Bridge will make the strong connection between Denmark and Germany. Thus, the huge potential of German market will offer a large amount of opportunities for Oresund region. For instance, more convenient shipping from Hamburg.

5. Highly developed technology: this region is always regarded as a birthplace of knowledge and technology, because most companies and universities here are very well equipped with advanced technical equipment.
6. Advanced Urbanization: Both Denmark and Sweden are the wealthiest countries in the world with the advanced welfare system, public infrastructure, good public security, and open-friendly cultures, which make it as one of the best places to live.
7. Free education in Sweden: This lures high skilled people from all around the world into the region and can enrich the process of knowledge production. (Wolff, M. F., 2003)
8. Trust inside OSR: the strong sense of trust exists in this region, in the area of business, academia, and government sector. This kind of trust is the most valuable intangible asset for OSR, which can be considered as the major resource to stimulate the collaboration and innovation.

Weaknesses:

1. The competition implementation problem: since competition is more natural behaviour for company, even for university and government. It is still hard to provide the perfect platform to stimulate cooperation. Thus, there is a need to smooth the rivalry and competition spirit inside OSR.
2. “stuck-in-the-middle problem”: there is so differentiation between the different industries that can be found inside OSR. Indeed, there is a potential “stuck-in-the-middle problem”: most of big clusters are specialised in one large industry – for instance Silicon Valley – and not spreading their efforts on different industries. This can also be strength if this differentiation is well-managed, but this appears to us more likely as a very important issue. (M. F. Wolff, 2003)

Opportunities:

1. Need for expanding the business activity- every company has a desire to expanding their business area. The combination of various clusters has stimulated the formulation of new business ventures. This would result in more ratio of input to output and also promoting innovation in the industries.
2. Agreement between Oresund and other region will improve knowledge and technology to both sides
3. Promote accession to education- as the increasing use of Information technology; it becomes more convenient for people to accession academic resources on the internet. It is also obvious that open educational environment is preferred by most universities and companies.
4. Increasing requirement of export trade- for every government, they all intend to expand their export transaction for increasing the tax income. They need the organization exactly like Oresund to capture the opportunity of exportation.

Threats:

1. The uncertainty of ventral capital: according to our interview with Moodysson (2009-04-05), one of the bottlenecks for Oresund Region is lacking of ventral capital, especially under the environment of financial crisis today.
2. Educational fee: the new policy of educational fee will be carried out in 2010. It is still hard to forecast its effects. At least it makes Oresund less attractive to the students who from third-world countries.
3. The growing exchange gap between the different currencies (SEK and DKK): in recent years, it seems be a trend that DKK becomes more worthy than SEK, which may result the unbalanced benefit between Sweden and Denmark. This situation could be worse if the exchange rates are very volatile, so that finally reduce the international visibility of the region, indeed nobody else in the world can easily understand the results, benefits, average wages etc. because of those currencies.
4. Uncertainty of collaboration in the future: since Oresund Science Region is a cross-border entity, and it makes the collaboration as a premise to the success of OSR because of the complex background. Even though the OSR is running well, it is hard to prospect if it is easy or hard to achieve the collaboration in the future, for example the risk of political conflicts.
5. Compete with other science region organization: since OSR is not only one innovative region, it has to compete with other science region organizations, like London, Stockholm-Uppsala.
6. Cultural and linguistic barriers: people in the OSR regions speak different languages, share the different national cultures. So confliction would be happened inevitably, which maybe the cause of communication problems. As a result, it would restrain the capability of decision making and slow down the execution of the business process.

4.1.5 Diamond analysis for Oresund ICT:

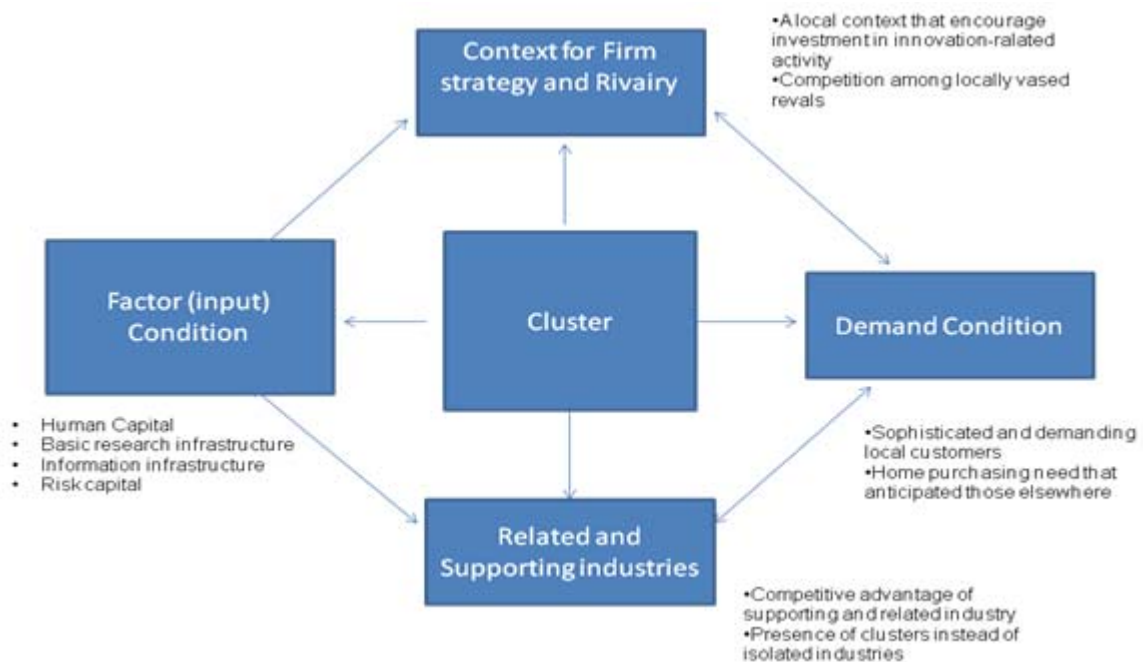


Figure 4.4 Diamond model for Oresund ICT Cluster

- **Factor conditions:**

1. **Human capital:** This region is accessible to the well-skilled labor force. Today there are 14 large academic research institutions for higher education in the Oresund Region are gathered together with in Oresund University. The number of students and researchers are 140000 and 12000 respectively (Kitagawa, E., 2009). This considerable number shows Oresund region educational sector is the largest one in Nordic area. Thus the close collaboration between university and industry can secure a proper well-skilled labor force within the cluster, especially in ICT field. According to the research by Oresund University, the Oresund ICT cluster had 100,000 IT employees, 12,000 IT companies, and total turnover of approximate 22.5 billion Euros (in 2007). Oresund Region is marked as a Human-Tech region, which means that the human dimension is a central issue in both development and use of information technology.
2. **Infrastructure:** The Oresund region has a wide advanced traffic network. Nowadays, the bridge between the southern part of Sweden and northern part of Denmark can be provided with the best approach to handle the continuing growth in transports. This advantage of the Oresund region is the presence of different transport modes which have very available capacity (Ketels, n.d.).
3. **Information infrastructure:** both Sweden and Denmark have established a wide-covering and advanced wireless network. Due to their advanced computer & networking technology, people enjoy the high quality network service with the relevant low cost.

- **Demand condition:**

The demand of the ICT products have been growing as the new high-tech world changed. The requirement not only from local area, but also from the Nordic and all over the world are increased. Based on some high qualified brands, the developing speed of ICT industry has

been accelerated. Future agglomeration of different domestic companies and domestic companies with international companies will also increase the demand of ICT industry.

- **Context for firm strategy and rivalry:**

1. Domestic and international rivalry existed among the ICT companies which may force them to update their products in time. Based on the ICT cluster phenomenon, the strategy has become a quite successful strategy. The Oresund region which consists of two parts in different nations has been considered as a whole implementing organization for marketing. By having a unified organization, the Oresund region has been considered as one of the most powerful hub of Scandinavia area.
2. The competition in Oresund is rather intense and stiff, especially in the ICT field. A large number of international enterprises are located in this region, for instance Sony Eriksson, Cisco, Microsoft, and IBM. Comparing with other small companies, they find it easy to get access to the resources and attract the engineers. However, they still have to face the fierce competition from the small companies which is flexible and growing faster.

- **Related and Supporting Industries:**

1. The public general attitude regarding the Oresund region has to be positive in order to enable the local economy to grow and the employment status to increase.
2. Most of ICT industries could export their products. Some of them are internationally competitive like Sony Eriksson which had become the world leader in wireless technology and communication area. Moreover, the knowledge could also be exported. Accompanied with the amalgamation of international enterprises, the ambition of domestic companies has been expanded.
3. As a member-based organization, Oresund IT is established to support the development of the Oresund ICT cluster.

4.2 Yangtze Delta Region

Yangtze Delta area which has been considered as the Chinese economic growing engine has treated information industry as a new mainstay industry. According to Information Industrial Affair, Shanghai's information industry which is the leader market of Yangtze Delta area has reached 7.4 trillion RMB which take the percentage of 13.8% in city's GDP at 2007. The amount of exports has reached 530 billion dollars with 13.8% of the total export amount. Base on the brilliant achievement in hi-tech market, there is no doubt that Yangtze Delta is one of the key regions that would be developed as the innovation system. According to the strategic plan of innovation system in China (2004), Yangtze Delta is positioned as one of the three regional innovation systems with the initial fund of 50 million, and Shanghai is the central city. With the sustainable input from government, there have been established numbers of hi-tech science park in this region, for instance, Zhangjiang Science Park, Suzhou Science Park, Wuxi hi-tech industry park and so on.

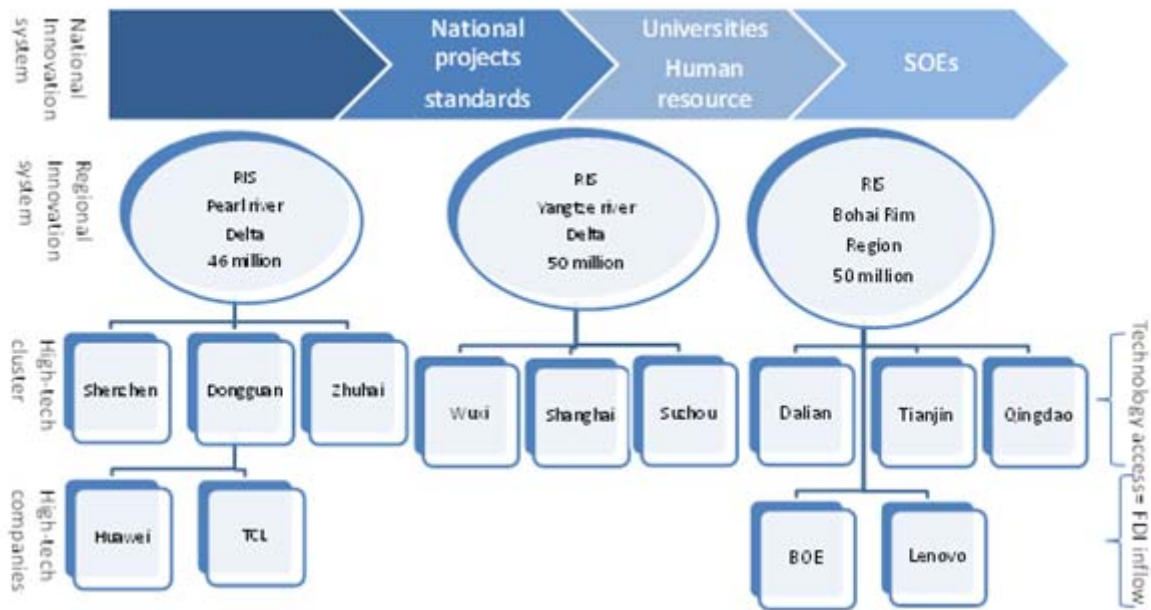


Figure 4. 5 Innovation system structure in China (Sigurdson, 2004)

In 2008, in common with other countries, China has to face up with the challenge brought by world wide economic recession. Meanwhile Chinese government has suggested the investing plan with more than 4 billion RMB and it is the key period during 2008 to 2009. Thus, the Chinese ICT market will get a huge commercial opportunity. According to the conservative estimates, in 2011 the scale of the Chinese ICT service market will be over 680 billion RMB. In 2007, the total investment of telecom included terminal unit, system equipment and system software has reached 440 million RMB, and it will be the fastest period of telecom investment in 2008 and 2009. After 2010, the investment will go into the stable period. Within 5 years, the total investment of telecom will reach 1.1 billion RMB. Based on the current situation, it is the golden opportunity for building up capital-intensive and technology-intensive ICT cluster which can make a further growing step for local development of ICT industry.

4.2.1 SWOT analysis for Yangtze Delta

Yangtze Delta area which could be considered as the most competent location sites in China has been developed for almost 30 years. As the most essential part of Yangtze Delta area, Shanghai was one of the first five special economic zones which was opened in 1984 followed by the Pudong New Zone in Shanghai in 1990 (Marilyn, 1999), and it is one of the world's largest seaports and a major industrial and commercial center of China. Shanghai is China's largest gate to the outside world and Hong Kong, Japan, U.S., and Western Europe are its four biggest trade partners. Thus Shanghai is restoring its image as an oriental foreign trade center that lures countless business (Marilyn, 1999). We also use SWOT analysis to get the total understanding of both positive and negative factors in Yangtze Delta area especially Shanghai.

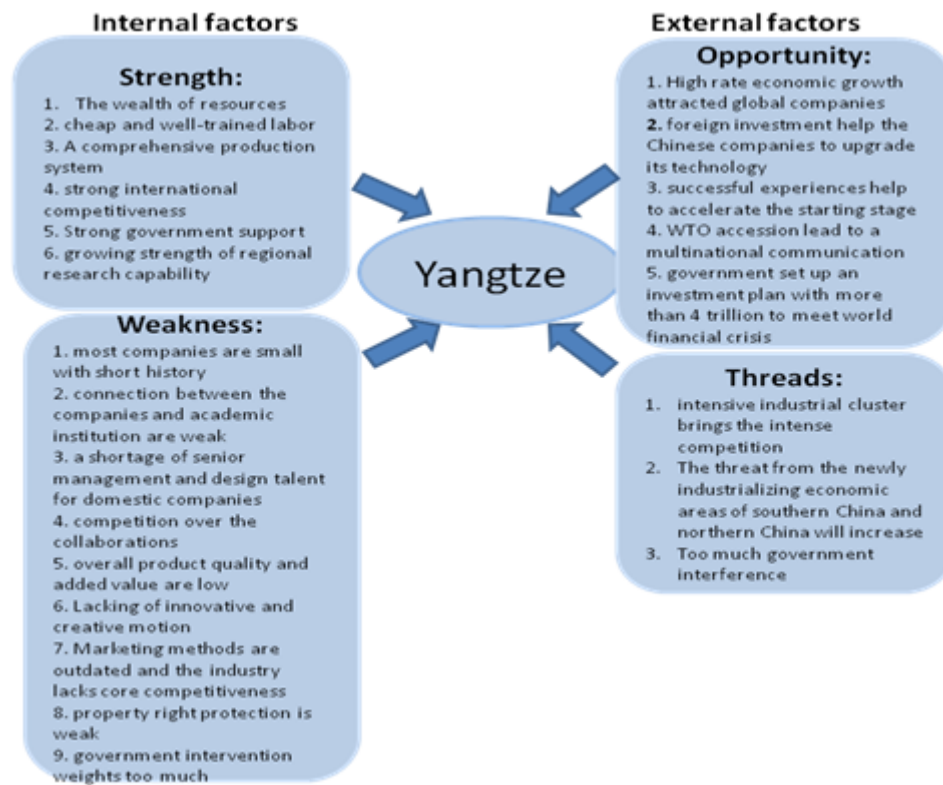


Figure 4. 6 SWOT analysis for Yangtze Delta

Strengths:

1. The wealth of resources: Shanghai as the Chinese largest city has the largest and best academic resources and material resources compared to other areas of China. There are 75 academic institutions and universities located in Shanghai and other 200 more in its fellow towns which can provide the industries and commercial institutions with plenty research resources and background.
2. An abundant supply of cheap and well-trained labor: With the largest population, Yangtze Delta region can be considered as the center of talent exchange.
3. A comprehensive production system could incorporate all the necessary ancillary industries within the same cluster that may bring cooperative development.
4. With the large amount of international enterprises incorporated in Shanghai, strong international competitiveness has been increased, which may push the domestic enterprises concentrate on the new technology or managing method.
5. Strong government support. The government in Yangtze Delta region has the strong tendency to promote this kind of innovative cluster model to adapt this area which can push them to give more priority to the local business and give them more freedom spaces.
6. The growing strength of regional research capability is proved not only by the number of R&D activities, but also by the investment scales in the research. According to the article by Nannan & Sylvia (2007), in recent decade Chinese government never stop to compete for knowledge and talents through making new polity and structural adjustments.

Furthermore, the increasing number of international corporations has launched their research departments in Shanghai, Nanjing, Hangzhou and other cities of Yangtze. Both result in the growing importance of Yangtze to the global R&D operation.

Weaknesses:

1. The scales of most companies are small with short term history.
2. The connection between the companies and academic institution are weak. Academic institutions paid little attentions on how to transfer their research findings into the commercial products. On the other side, the companies also lack the passion on how to search possible research findings from the academic institutions to make them become profits. Even though most of them have a strong willingness to carry out these kinds of activities, the communication obstacles among the government, academic institutions and industries are hard to impassible.
3. There is a shortage of senior management and design talent for domestic companies. Compared to the international companies, domestic companies have the weakness of attract highly qualified experts from other countries. Lacking of talent may lead to the innovation separation from the international companies.
4. The tendency of competition amongst the companies over the collaborations. Unlike the symbiosis relationship in the Oresund ICT cluster, the situation among the existed enterprises within Yangtze Delta area are more likely as hostile competitive relationships which may decrease the possibilities of communications within the enterprises.
5. It is true that overall product quality and added value are low in the Chinese market.
6. Lacking of innovative and creative motion. The circumstance is that most of the ICT enterprises in China do not have the strong abilities to do their own research which may cause them to just follow or copy the products. Shanghai and other fellow cities around Yangtze River have become the large manufacturing bases area which has created the problem of building up the new innovative knowledge based cluster.
7. Marketing methods for most companies are outdated and the industry as a whole lacks core competitiveness globally (Chen, 2008).
8. As the intellectual property right protection in China is weaker than the developed Western countries, most of the international enterprises have the misgivings of sharing the high technology with the demotic companies, even worse that they are not willing to investing the innovative research institutions in China, as these may make them the lost of profits.
9. The government intervention weights too much in the triple relationships which may decrease the space of industrial development. The heavier the government censorship the smaller the entrepreneurial space. The situation in China is that every affair should go through the government which means without government permit, the companies could do nothing by their own. Take the investment for instance, if one company is interested in some certain project of academic research, there is impossible for them to invest in the projects directly without the government permit. From another perspective, umbrella may decrease the competitiveness of the domestic companies.

Opportunities:

1. High rate economic growth attracted global companies to enter in. More than 10% economic growth rate has attracted the attentions from all over the world. After that more venture capital or risk investment may be accompanied with it which may bring the domestic companies more probabilities to grow up.
2. The relaxation of restrictions on foreign investment in China will help the Chinese companies to upgrade its technology at a faster rate. Accompanying with high competitiveness, the domestic companies within the cluster may be forced to catch up with them. This kind of virtuous cycle may create positive symbiosis within the cluster in the future.
3. The existing successful experiences of cluster will help to accelerate the starting stage. According to the successful model in Oresund ICT cluster, Yangtze Delta may have the good chance to avoid experiencing the same mistakes.
4. WTO accession will lead to a multinational communication which connects the local industry to the high level productive and research technologies in the world.
5. To protect native economy against the effects of world financial crisis, Chinese government has set up an investment plan with more than 4 trillion to meet the challenge. ICT industry is one of the major investing fields.

Threats:

1. The highly intensive industrial cluster brings the increasingly intense competition from the foreign-invested enterprises and large-scaled companies to the medium and small sized companies. This may create more probability for these companies to survive.
2. The threat from the newly industrializing economic area of southern China and northern China will increase. There are three dominant economic areas in China beside Yangtze Delta, thus it is also important to compete with these areas.
3. Too much government interference is always considered as a threat to economic development, which also should be considered for cluster development. One typical example happened recently in China is the Huiyuan-Coca Cola case. The Commercial Ministry of Chinese government rejected the Coca Cola's bid to acquire China Huiyuan Juice Group, which is fully demonstrated the dominative influence of the government. How to play a role in the cluster implementation would be a tough question should be considered by government officer.

4.2.2 Diamond analysis of Yangtze ICT cluster:

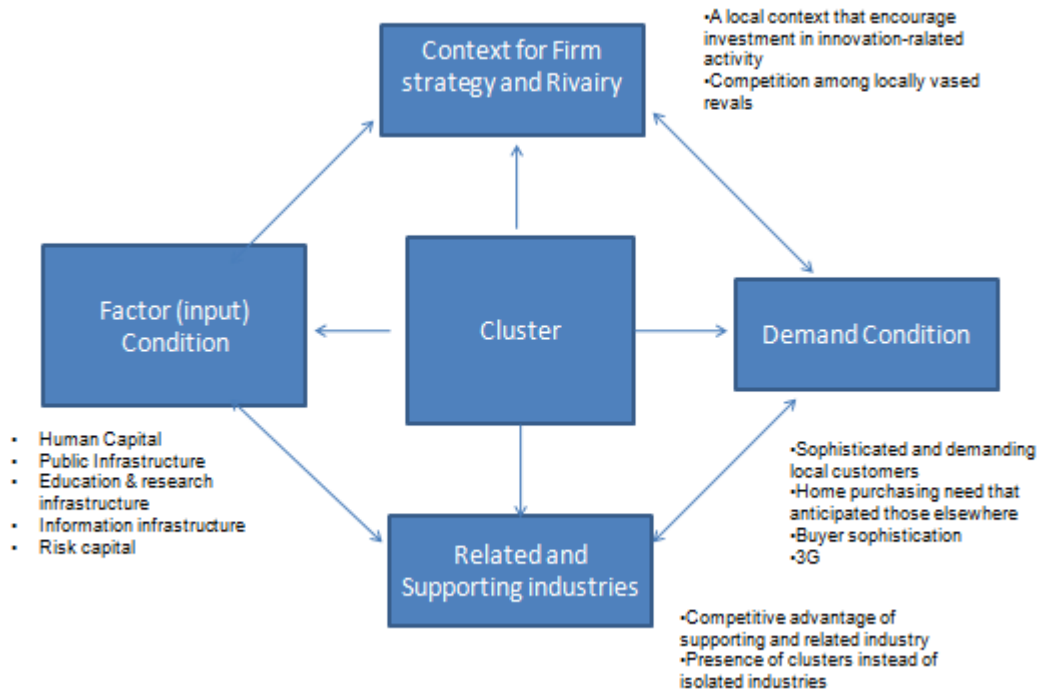


Figure 4. 7 diamond model for Yangtze ICT cluster

- **Factor conditions:**

1. **Human Capital:**

- 1) **Attractive area of Human resources:** Yangtze area is always considered as the most attractive region to talents who are from both China and abroad. Here have 244 higher educational institutions, including both nation-wide and world-wide famous universities, like Fudan, Tongji, Jiaotong, Zhejiang and Suzhou Universities. They provide a technical and well educated labor force continuously, especially the IT students.
- 2) As the central part of Yangtze region, **Shanghai** plays a remarkable role in the development of this region which takes a great advantage of its high quality, R&D human resources from national critical universities.
- 3) **Returnee:** during recent years, the numbers of returnee who used to study abroad is increasingly (national statistic bureau, 2007). To large extent, it is resulted by the impact by world wild economic crisis, but still a good thing for regional growth.
- 4) **Entrepreneurship:** no matter whether in the history or in nowadays, people in this region are well known for their natural drive for entrepreneurial spirit and skills. With the rapidly growth of ICT industry, more and more people have the desire to create own businesses in this field.
- 5) **Brain drain:** The drain of talents, especially the high-tech talents (e.g. ICT), is an increasing common problem for the development of Chinese economy not only the national growth, but also the regional development. The straightforward evidence is that there is increasing growing amount of skilled Migration to American and European countries, and low willingness of returning among overseas students. The reason for

such phenomenon is clear that people intend to seek a better life which exactly other advanced countries can provide. Even though Shanghai has become a more and more modern and urbanized international city, it is still weaker competitive than some cities of advanced countries in some social area, like environment, welfare, and payment.

2. Public Infrastructure:

After opening up to the market economy, More than 100 billion RMB budget from both the national, provincial and local governments were invested in infrastructure of Yangtze Delta during 1990 to 1995. Then from 1996, a new round of infrastructural investment has begun with focus on Shanghai, including the project of a new international Pudong airport, metro line, railway network, internet and communication facilities. Recently Shanghai government has set several goals for the Pudong District, and Zhangjiang Science Park is one of the core programs. Shanghai government issued 'Focus on Zhangjiang' policy to promote the ZISK development. (Hsien-che Lai, 2005) With the transfer of government grants from Pearl Delta to Yangtze Delta, Shanghai, Shanghai has become significantly superior to other Chinese regions, for instance Shenzhen and Yangtze Delta region.

- 1) **Improved traffic facilities:** the network of high-speed railway is completed which interconnected most of important cities in Yangtze region, like Suzhou, Nanjing, Kunshan, Wuxi, Hangzhou and Shanghai. With other improving traffic tools, this region has become the most advanced traffic infrastructural area in China.
- 2) **Reliable electricity supply:** because of the political support, this region, especially shanghai, has the priority to the resources like electricity, which is very important for the ICT industry. However, as more regions will involve the competition, political support would become declined in the future.
- 3) **High transportation costs:** Comparing per capita income, transportation cost is rather high in this region. For example, the train ticket from Shanghai to Suzhou cost 4 US dollars equivalently, and the per capita income is 2000 dollars per year. (2008-4-20)Then we get the ratio value 0.002 (4 dollars / 2000 dollars), while the value of Oresund (train from Malmo to Copenhagen, which is almost the same distance as the one from Shanghai to Suzhou) is around 0.00037. (14 dollars /37525 dollars).(2008-4-20)

3. Education & research infrastructure:

- 1) **The academic environment** in Yangtze Delta is relevant more advanced than other regions, which can be illustrated by the following diagram (measured by the number of R&D activities). Here located numerous home`s famous universities and research institutions, like Fudan University, Tongji University, Nanjing University and so on. According to the research by Chinese statistics bureau, Yangtze Delta is marked as the "rank 1" for the number of R&D activities (China statistical yearbook on science and technology, 2006).

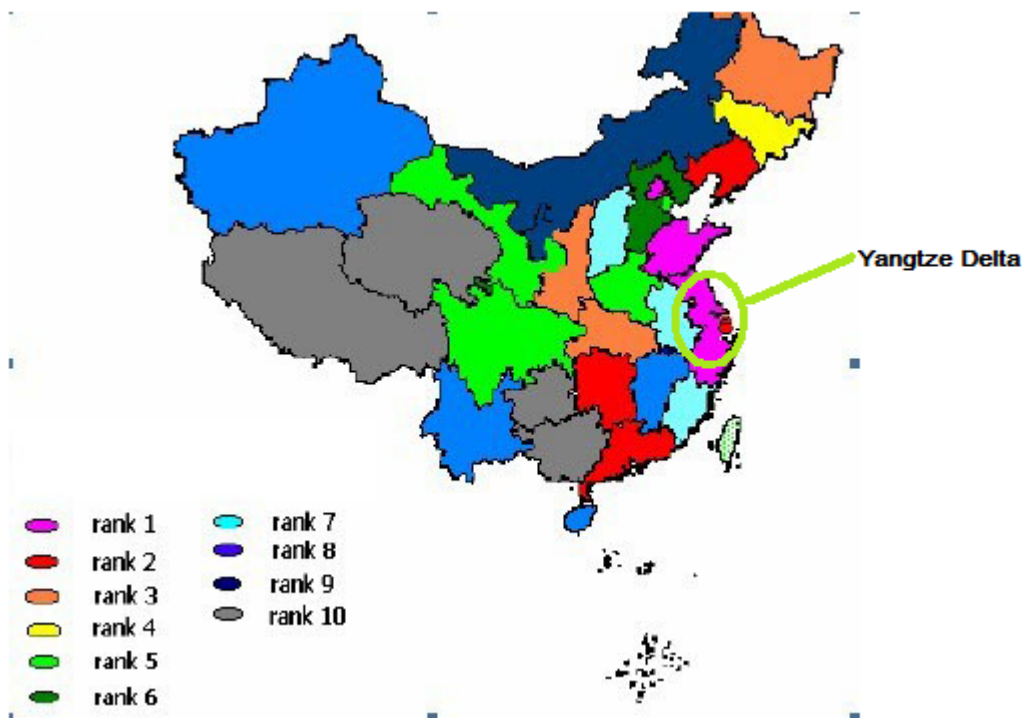


Figure 4. 8 Geographic distribution of R&D related activities in China (Carl Dahlman,2000)

- 2) As education in China becomes more open to the world, a number of donor and Diaspora funded projects is set up to support Chinese students to study abroad. According to the statistics report by national statistic bureau, the increasing amount of oversea student is up to 118515. Also the universities in this region have built the collaborative relationship with overbroad academia. One result of this **university-university collaboration** is the exchange program, which is highly positive to form the knowledge share environment.
- 3) **The sheltered education system:** the lagging education system has been discussed for a long time in China. The current system has a lot of shortage and is full of the regional protectionism. Students have to get the higher test score for entering into the college, and local students usually enjoy the preferential policy for this admission test, for instance the lower admission level. Obviously some rules are really unfair to the students from other area.
- 4) **Ownership of research findings:** traditionally, most university and research institutions make the strict rules to make the ownership of research finding belong to institutions instead of researchers themselves. According to the interview with Professor Yu (2009-4-27), researchers in China should contribute their findings to institutions because they use the university's resources to conduct the investigation. In fact, this situation usually results in strong dissatisfaction from the group of researchers.
- 5) **Weak academic network:** the interactive network between each academy is related weaker than Oresund region. Most universities are affiliated with Chinese Education Bureau, while research institutions are mostly related to Chinese Academy of Sciences. That of course results the barrier between universities and research centers. On the other hand, for universities there is also little communication in the level of researchers and students, so that the collaboration is hard to be achieve.

4. Information infrastructure:

- 1) Generally **ICT infrastructure** has been developed greatly in recent decades. With the increasing numbers of internet and mobile users, ICT services and facilities are becoming more advanced. The typical example is the launch of 3G services in 2009. Shanghai is one of the first cities which facilitated with 3G. With the help of 3G service, the quality of telecommunication service will be improved, which would be definitely beneficial for the development of ICT industry.
- 2) **Monopolized industry:** because of different economic systems, some area of Chinese economy is quite different from most European countries. One example of such differences is monopolized industry controlled by the state-owned enterprises. As an important part of ICT industry, telecommunications is completely monopolized by two nationalized companies, China Mobile and China Unicom. As a result, consumers have to accept high cost telecommunication service but with poor quality.

5. Venture capital:

Due to support from governments and international organizations, numerous risk funds are set up in this region to promote business initiative. Most of them come from government budget. For example in Shanghai, three new venture funds with the total amount of 1.5 billion RMB are launched in 2009 to support the ICT and Medical services industry.

• Demand condition:

Since entering into the 21 century The Chinese government has targeted IT as a critical task for development by opening its market to foreign investment. The goal is to reduce its dependence on IT product imports and build domestic production and innovation capacity.

1. According to the research by OECD (2002) many firms in China have devoted themselves into global commodity chains through the simplest original equipment manufacturing contracting arrangements (OEM). However, few of them have more complex design and manufacture and brand manufacturing activities. Most of the critical technologies depend on other leading countries. Domestic firms with lower levels of technology are moving out. This will not lead to innovative products and technology in the international market. So the degree of satisfaction on '**home customer needs** that anticipate those elsewhere' in the four industrial clusters are rather lower. (Hsien-che Lai,2005)
2. The income, consumption, information, and level of education of the **consumers** in Shanghai are higher than the rest of the areas in china. Hence, the sophistication and demand for products and technology are much more complex in Shanghai. High-tech firms in Shanghai should be able to react quickly and diversify to satisfy their local customers.
3. Many firms in China have inserted themselves into global commodity chains through the simplest original equipment manufacturing contracting arrangements. (Lai,2005)
4. Huge potential of **home market:** according to the new Five-Year Plan of Chinese government, the concentration of the development has changed from the foreign countries to domestic market, especially in some hi-tech industries, for instance, ICT industry.
5. **Buyer sophistication** remains relatively low and is directly related to the prosperity of the country. The transition period produced high level of inequality with small proportion of

relatively wealthy people who chose to make their major purchases abroad. For example, a large group of people here are willing to have a shopping in Hong Kong and Japan. Another cause of this phenomenon is due to the traditional idea that the commodity selling abroad has much better quality than the one selling domestically. Therefore, such consumptive idea has even worse influence on the ICT products.

6. The popularity of **3G** technology has fully stimulated the national market of communication demand and the increasing investment. The statistic data shows that within the next three years the accompanied more than ten thousands billion investment will be brought if 3G technology will be carried out. During the process of test operation, there are thirty three thousands users have become the TD-SCDMA users in Chinese market.

- **Related and Supporting Industries**

1. **Non-profit association:** from 2000, several industry associations are launched in Yangtze region, most of which is non-profit organization. Shanghai ICT industrial association is one of the most influential associations in this region. This organization was founded in 2001, and was jointly organized by the enterprises which concentrated on the ICT designing, manufacturing, encapsulation, and testing and some other relevant enterprises and public institutions. It is the industrial social organization with the non-profit purpose. Since now, this organization has been developed into the one with 370 member enterprises, and its capital has reached 173.3 billion dollars in total, and the population within the organization has reached 88616. This organization provided a well facilitated platform for communications between international cooperation and technicians trainments, and the communications among the ICT industries in Yangtze Delta to contribute to the ICT industry in cluster development.
2. In recent years, the local government of Shanghai has set up several **IFCs projects** of ICT cluster, like the Yangpu innovation center and Zhangjiang hi-tech center, which in an effort to boost the ICT's innovation capacity and increase the IT content of its industry.
3. **Lack of the central ICT Company:** in most successful cluster cases, the central company has functioned as the engine for a whole emerging cluster (Laura, 2000), like Sony Ericson in Oresund and Nokia in Finland. They outsource the business, transfer the knowledge and technology, and cooperate with other organizations, and then collaboration is brought out. Because of their contribution, the network is built covering the whole cluster. However in Yangtze even though here has numerous ICT companies, the position of central company is still vacancy. So that would be one of the difficulties for long term development of cluster.

- **Context for firm strategy and rivalry**

China, as the world factory, is the main source of low-cost, efficient, manufacturing capacity for foreign firms. To some extent, this traditional impression about Chinese economy decided the position of Chinese IT industry. Most their products are purchased by assemblers and sold as a part of a completed system. Therefore Most IT firms in China are therefore process improvement-oriented firms that offer the value-propositions of 'operation excellence. (Lai,2005). Shanghai with its talent enforcement activities, high quality human resource and R&D support, was significantly superior to the others cluster, for example Kunshan, Shenzhen and Dongguan science parks. About 70% of the factories in Dongguan are involved in further

processing transfers (also known as factory transfers) or subcontractors for foreign firms. This resulted in firms investing insufficiently in innovation activities. With the increasing competition from a number of developing regions around China, Shenzhen and Dong guan can no longer take this advantage for granted. To cope with the challenges ahead, the authorities should set up various programs to encourage investment in innovation, acquisition of new technologies and the upgrading of human resources. (Chen, 2008.)

5. Empirics & Modeling

We will in this chapter put together the results which we've got from the interviews and online survey for empirical analysis. By combining the data and previous experience, we will explore our cluster models step by step.

5.1 Empirics

5.1.1 Presentation of survey result:

Our survey has been conducted through the online survey website called Surveygizmo, between April 28th and May 14th. Survey invitations have been sent to 995 people by email. And eventually there were 56 respondents finishing our survey completely, 50% from Yangtze Delta and the other from Oresund. The following table presents the summary of data from survey. If the reader would like some further explanations of questionnaire and fully see our empirical findings, please see appendix 7.

Table 5. 1 the summary of survey result

Mean value=MV, government=G, Industry=I, Academy= A, Total=T

		Oresund	Yangtze	Notes
1.	The population of respondents, T=56	28	28	The same size of the dataset
2.	The workplace of respondents (industry: academy: IFCs)	16:33:7		The opinions from academic people will be the dominative in the survey
3.	Knowledge about cluster (MV), T= 3	1.96	1.57	
4.	Training experience (yes: no)	9:16	1:3	
5.	Cluster's influence on the regional growth (MV), T=3	1.96	1.82	
6.	The type of cluster initiative	78.57% industry-lead	64.29% government-lead	Different economic system
7.	Major financial resource (government budget, member fee, investment from industry, public funds, others)	39.29%, 10.71%, 32.14%, 7.14%, 10.71%	28.57%, 17.86, 53.57%	Multiple resource VS government funds
8.	Infrastructure	42.86%(industry)	46.43% (government)	
9.	Leadership (G; I; A; IFCs)	28.57%; 28.57%; 21.43%;21.43%	17.86%; 42.86%; 39.29	More radical opinions in China
10.	Government Influence (MV), T=3	1.11	2.29	
11.	Trust of government policy (MV), T=3	1.25	1.79	
12.	Trust of partners (MV),T=4	3.04	2.93	
13.	Preference of Research investment	53.57% direct investment	50% direct investment	
14.	Willingness of long term cooperation (MV),T=2	1.21	1.39	More strong willingness in China
15.	Satisfaction of the Communication Channel (MV), T=2	0.79	-0.18	

5.1.2 Interview

1) Interview introduction

The purpose of our interviews were mainly oriented around the universalized insights and concepts of the Oresund Region, thus it is necessary to expand our understandings and social concept of this. Based on charting extreme cases from the experts, some exceptions to the rules which may be universal can be provided through the interviews. According to our research purpose, the interview processes were based on the viewpoints of experts from Oresund region and Chinese academic institution. The results of our interviews are to understand the information from the major points of the conversations between the interviewers and ourselves, and how it compares to our own situation. The requests for our interviewees are that they are not only good conversationalists, but also good listeners (Rubin, 1995).

2) Interviewees background

Our target interviewees were mainly from the Centre for Innovation, Research and Competence in the Learning Economy of Lund University, IT Oresund, and Yangzhou University. Before presenting the interview content, it is necessary to introduce the background of interviewee in order to get a better understanding of different opinions from certain view point of them.

Moodysson is currently employed as an assistant professor in Innovation Studies at CIRCLE. His academic concentrations of this area are innovation process in the intersection of science and industry and regional innovation systems (and policies). Within 2009, he is working for the Swedish governmental Agency for Innovation Systems and Region Skåne on a project analyzing the administrative local council who were involved in regional innovation system initiatives (CIRCLE, 2009-05-17).

Kitagawa, E. is an Assistant professor in Lund University and will develop her research work at CIRCLE in line with the Linnaeus Research theme Innovation, Entrepreneurship, and Knowledge Creation– *Dynamics in Globalizing Learning Economies* as delineated under three platforms and perspectives (CIRCLE, 2009-05-17).

As an assistant professor Benner is specialized in research policy, in particular policy formation and implementation. Moreover he also studied research organization especially the management of large-scale research groups, as well as the leadership and organizational change within the academic system (CIRCLE, 2009-05-17).

Yu is a professor at Yang Zhou University. His main research area focuses on development of Information industry in Yangtze Delta area.

Gustafsson, M is a senior project manager and acting CEO in managing living labs in IT-Oresund. His main task in this occupation is to build up their project portfolio and create project that can provide their target members with expected vales. In order to assist the university to create commercial value out of the universities research, the organization played an essential role among the triple relations of university, industries and government to make the local region stronger.

- **Centre for Innovation, Research and Competence in the Learning Economy (CIRCLE)**

CIRCLE is an interdisciplinary research centre spanning several faculties at Lund University

and Blekinge Institute of Technology funded by VINNOVA, Lund University and Blekinge Institute of Technology (CIRCLE, 2009-05-17). Since it was founded in 2004, CIRCLE has become a national center for research on R&D, innovation, entrepreneurship and economic dynamics and is today the largest of the four national research center of excellence funded by VINNOVA. It is considered as a well developed connection with the most renowned research environments in the fields of innovation, entrepreneurship, and economic growth. (CIRCLE, 2009-05-17).

- **Oresund-IT**

Oresund IT was initiated in November 1999 by Oresund University and Oresund Business Council. This ICT cluster organization has supported Oresund ICT cluster became the leading Scandinavian ICT region in Sweden and Denmark.

The aim of building up IT-Oresund was to push the communication and collaboration between industry and university in the Oresund region. The initiative was funded by Danish and Swedish public authorities and EU grants (CIRCLE, 2009-05-17).

With the construction of the Oresund Bridge between Sweden and Denmark, business and contacts across borders were expected to rise. To further this development, IT-Oresund took on a role as cluster facilitator within the ICT-sector.

Within the past 8 years, since the organization joined Oresund Region, the main purpose of constructing cross-disciplinary cooperation has been reached step by step. The Bio & IT Post Doc program, started in 2002, is an example of collaboration with MVA, a sister organization within life science.

- **Yangzhou University**

Yangzhou University (YZU) is a key comprehensive provincial university, who pioneered in China the merging of institutions of higher learning. The Information Engineering College of YZU which has been established since 1984 was one of the oldest colleges in Yangtze Delta area. There are one one-level national master station, and two two-level provincial master stations with in this college. With the increasing ICT development of Yangtze Delta area, YZU has expanded the communications and cooperation with the regional universities and academic institutions. Besides that, YZU has established several academic practice bases in some international famous IT enterprises in the local industrial areas (YZU, 2009-05-17).

3) Interview content

In this section the view points from our interviewees were collected and arranged based on our previous research. The key points of contents are listed according to different categories, and the full versions of interview transcription are attached in the Appendix 2 to 6.

Oresund ICT Cluster

a) The driving force for cluster building

Historically, Oresund Region had been dominated by low-tech industries, such as the agriculture, heavy industry etc. however, within the past couple of decades, Oresund region has transformed to more knowledge intensive industries like the ICT, pharmaceutical, life science industry. During this process, universities and other academic institutions played a very strong role which serves as a knowledge provider for the industry but also as a very important provider of human capital. Because the researchers at the universities facilitated

with this strong pool of qualified labor, Oresund region is becoming a knowledge intensive industrial region. Besides the university, another factor which has forced the transformation is the influence of the big company, such as Sony Ericsson which has played very essential role in the 19080's when the IDEON Science Park established in Lund. The final factor is the government. At the beginning stage of the cluster, government sector identified the need for a new sector or initiative and it contributed collaborative effort in this process. Thus, it is clearly that the company is the driving force in order to build up the cluster, not the government or regional authorities.

b) The most important factors for building up a new cluster

When trying to build a cluster, the most important thing is to draw on existing strengths. In Oresund region, there are had two big pharmaceutical companies, and On the Danish side they had four or five big companies, we also had strong Universities like Lund University and Copenhagen University which had strong research in the field of ICT.

c) Supporting factors

There are some types of dimensions of actors and networks which may possible to support the cluster, such as promoting networks between companies and universities. Within the cluster, the region may be fragmented. If there are strong universities or companies who are not aware of each other, the supporting policy should be to make them interact and promote each other. The policy needs to target these specific needs. It is possible that there are some certain internal connections between universities and industries. However, it may be too inward looking. This create a locked situation, where focus is only placed on what one is good at and misses out on opportunities in the global arena. Over times, this causes decline. The support policy for this should support on global visibility, and to link up with other regions in the world to attract new knowledge input.

d) Origin of financial support

The public universities in Sweden are financed by the central government in Sweden. However, there has been a transformation in the university system, leading to the unvisited becoming more dependent on external funding. From this form, the university has become the type of entrepreneurial university. The most popular type is being as the PHD students and being employed by the companies who may be paid while doing their thesis.

e) Obstacle at the early stage of building cluster

1. Limited venture capital. Compared to US, Oresund lacked the venture capital in the early stage. It is necessary for getting the venture capital at the beginning stage of the innovation process. The venture capital for discovering is the best way to identify the market.

2. Another challenge is that science based industries are often created by academics. The experts of the clusters are very skilled in their specific niche, but are often very bad mentors. They don't have skills to run a company or make a business plan, to make money out of science. That requires the special support to help scientists to run companies.

3. From the long term perspective, engaging in the industry in the first stage could also be biggest challenge. The cluster may face the risk that if they fail in their idea, they should start over again, and each cluster should build from the bottom, if they want the cluster sustainable and live for long time.

f) The way to manage the competition and collaboration within the cluster

It is helpful to have big international companies in the cluster which are doing well on branding or marketing. However, for long term sustainability, it also can be a problem in that the larger company must attract the entire engineer and all the best research and other material things. On the other hand, for the medium sized or small sized companies, they don't have so many possibilities to pay high wages because it is not the same for them to get the knowledge compared to the large company. But for the financial crisis now, the large company trying to cut down will ensure that there will be a lot of people getting out of market, this will be good for the whole market as the small company will be able to get access to the researchers or maybe engineers that are highly skilled which they could not afford before. When the economy is going through some recession, the possibility for the small companies may increase and they can get the access to the increased knowledge. It is good for the society to provide opportunities for them to do something else, as the society has very large responsibility to take care of these people and encourage them to find new ways. There are some good sides and bad sides. From the collaboration perspective, the companies should be open to other companies. Even though they are competitors in the market, they also need to share the ideas with each other. Thus, the first step is to build up the trust among the different companies.

IT-Oresund (IFCs)

a) The financial support for IT-Oresund

The financial support mainly comes from universities, industries and public sectors which take 80% and another 20% are from the industry which can be informed as the members' fee, but the members' fee is a quite small part of the origin of financial support.

b) Initiation of IT-Oresund

Originally, the Oresund region was started by a cross board project in different countries, then the industry and region get together and picked out some area to focus on, and ICT was one of them. So actually the money was original from Europe Union. But then after 3 years, the EU founding was over, and we turned the organization into member organization. The cluster organizations can support the development of the cluster, but the main force should be from the companies themselves.

c) The role of university in IT-Oresund

The university played a very important role, as the universities is the one institution which will provide company with the well educated knowledge both in present time and in the future. So it is necessary to connect the demand from the industry with the university. Thus the university can make the education that the industry wants. The organization can be treated as a kind of gateway between the university and enterprises which can link them together. Within the database of the IT-Oresund organization, there are more than 11 universities, 10000 ICT companies, 5000 researchers in the public sectors which can provide the chances with both industries and academic institutions to match their requirements.

d) The role of government in IT-Oresund organization

The government played a small role in the Oresund region. The organization can get the some money and some contributions from the government, but the government didn't control what they are doing. Generally, the organization decided by themselves, and made

their own decisions and strategies which are based on the industry.

e) The stage of the IT-Oresund cluster and the challenge

All the interviewee from Oresund region agrees that the Oresund ICT cluster is in the mature stage. It takes 8 years for cluster to get productive and to give some benefits back to the society and companies. During the whole process that it had been experienced, the most essential factor the organization should notice is that they should pay sufficient patient, as it would take long time before seeing the result such as building up the facilitated databases and interpersonal relationships. The challenges that accompanied with this stage are mainly about lacking interests from the media and from the public sectors. As it has gone through 8 years at this stage, the interest from the external world cannot be compared with the beginning stage, thus it is harder to get new funding. The way which should be adopted at this stage is to renew the mature stage, and try to get more innovative products which may attract more investment. (Gustafsson, April 24th, 2009)

5.2 Modeling

Based on the previous study of cluster establishments and some practical cluster project experiences in China, we designed an ICT cluster model which aims to show the clear relationship among each of the participants in Shanghai region. (Figure 5.1)

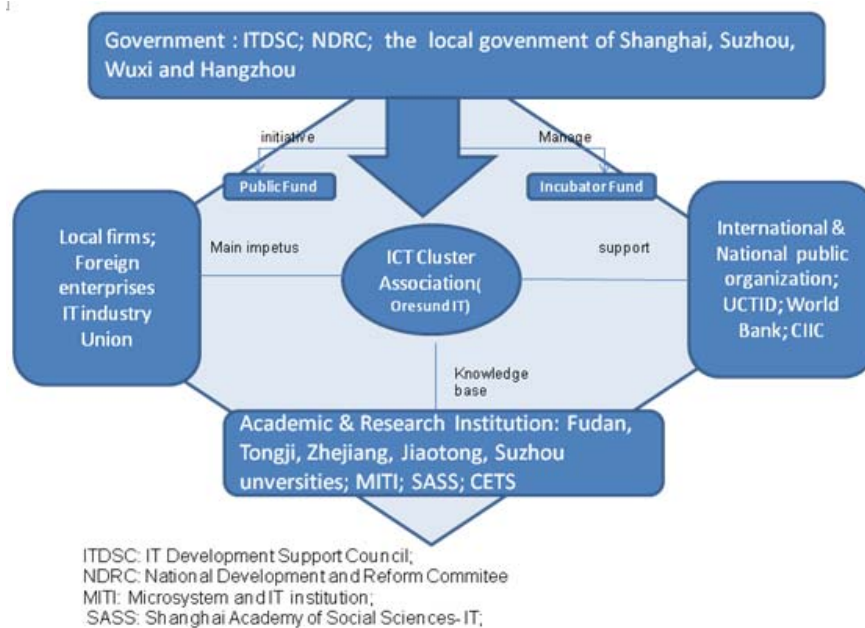


Figure 5. 1 Original model of ICT cluster

This model is established based on the Triple Helix model, which tries to involve the government, industry, academic institution into the ICT cluster. We set the roles to different participants which we think they are supposed to be. Basically, there are five dominant components within the model which are government, enterprises, academic & research institutions, international & national organizations, and ICT cluster associations (or IFCs). Firstly, according to the Chinese political situation, government plays a significant role in cluster initiatives especially in the beginning stage. In China, Most cluster projects are started or financed mainly by government agencies. Governmental influence is hard to be erased,

especially in the starting stage (Yu, April 27th, 2009). So we take government as a leader in ICT cluster (At least in the starting stage).

Secondly, the industry (Business Company) is the driven force for the innovation, because they find the needs from market and bring the money out of knowledge. In such innovation system, companies provide financial support and business skills which is the main motivation for the cluster growth. The enterprises are the origin of the transforming place for the research result to the commercial products. Otherwise, the academic institution can gain sufficient financial support or venture capital from the enterprises which could be the further research motion in the future. The academic and research institutions are the origin of the knowledge for the local firms, foreign enterprises and IT industry Union, and it offers the powerful innovative background and human resource areas.

International organization and other supporting organization can provide their professional experience and partial financial funds for cluster building. In addition, the more important role of this kind of participant is to connect the cluster to the other regional systems, both in China and overbroad.

Finally, the ICT cluster association is between the enterprises and academic & research institutions which can provide them with the communicative approaches as facilitators. While the connections between theses expecting activities may face up with the certain obstacle such as lack of the interpersonal network, or target projects or funding. The goal of building up the associations of ICT cluster was to eliminate these obstacles which can offer a very convenient communicative channel for both sides.

6. Analysis and Result

Based on the dataset which collected by online survey, we involve the quantitative analysis by SPSS in this research which would be quite helpful for revealing the general opinions referring to cluster. Additionally, expert opinions are also valuable to consider as the qualitative method, which would be complementary to survey result. Generally we will follow the modified triple helix framework to conduct the analysis by examining the core elements which located in different areas.

6.1 Analysis of overall factors

Based on our triple ring model, we try to find the influential factors of CD by examining the overall factors with the quantitative and qualitative method, which are trust, financial support, leadership and open-dialogue environment.

Trust:

First, we examine the trust environment of both regions from two points, how much people have a confidence in partners of competitors, and how much people trust the government policy.

1) Trust of partners (competitors):

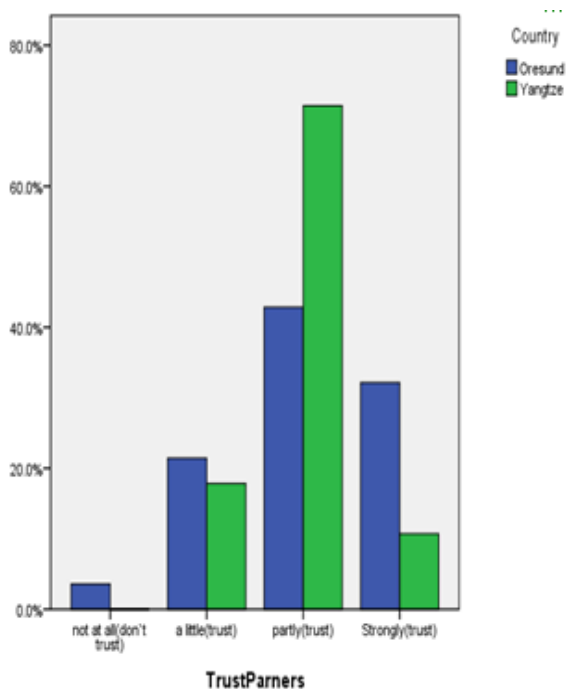


Table 6.1 Mean-value comparison of partners trust

TrustofPartners (China)

Institution	Mean	N	Deviation
Academy	2.93	14	.475
Industry	2.83	12	.577
IFCs	3.50	2	.707
In total	2.93	28	.539

TrustofPartners (Sweden)

Institution	Mean	N	Deviation
Academic	3.00	19	.882
Industry	2.50	4	.577
IFCs	3.60	5	.548
In total	3.04	28	.838

Figure 6.1 Bar Chart of trust environment

Table 6.1 indicates that the overall collaborative environment in Sweden is much better than in China. According to the mean value which we used to measure the trust between partners

(or competitors), people from Oresund have the higher level of sense of trust to their competitors and cooperators (3.04), whereas the result of Chinese respondents is 2.93. Furthermore, in figure 6.1 we can see that the majority of Chinese respondents (74%) don't show much trust to their partners. To some extent, it brings down the quality of trust (mean value). While the opinions from Oresund is quite spreading, and more than 30% people show the strong sense of trust in their business.

2) Trust of governmental policy

To examine the public trust towards the governmental policy, it is necessary to analysis the public aptitude concerning the influence of government on the cluster development.

Government Influence

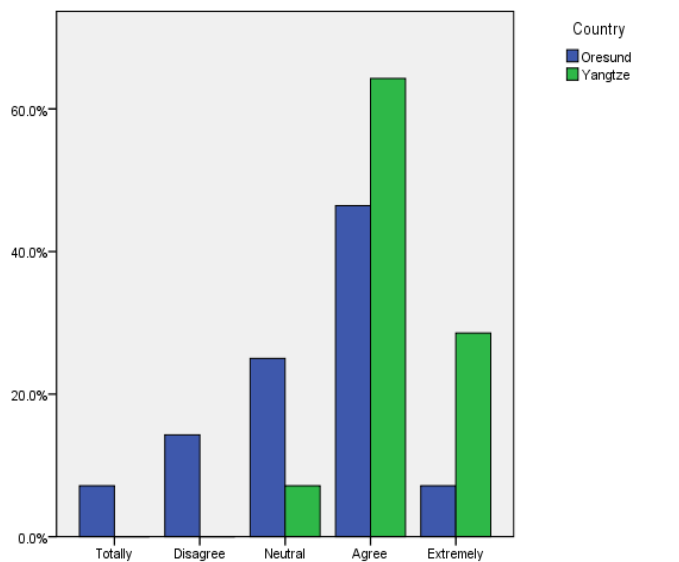


Table 6.2 Mean-value comparison of Government Influence

Government Influence

Country	Mean	N	Deviation
Oresund	1.11	28	1.423
Yangtze	2.29	28	.763
In total	1.70	56	1.278

Figure 6. 2 Confidence of governmental influences in cluster development

According to the result above, Chinese respondents have a significant higher level of confidence on the influence of government than Oresund, which is twice the value. Even more than 90% agree that Chinese government would surely play an important role in the cluster development, and no one chooses the “disagree” answers at all. On the other hand, the feedback from Oresund spread on all the five choices. Around 20% people do not agree that government has the positive influence on the cluster, even 8% have an extreme answer (totally disagree). Why this happens? Professor Yu from Yangzhou University gives us his opinions on this situation. Traditionally Chinese people have a large dependency on the authority of government due to their thousands years Feudalism. People’s opinions concerning the government result in their aptitude to the governmental policies.

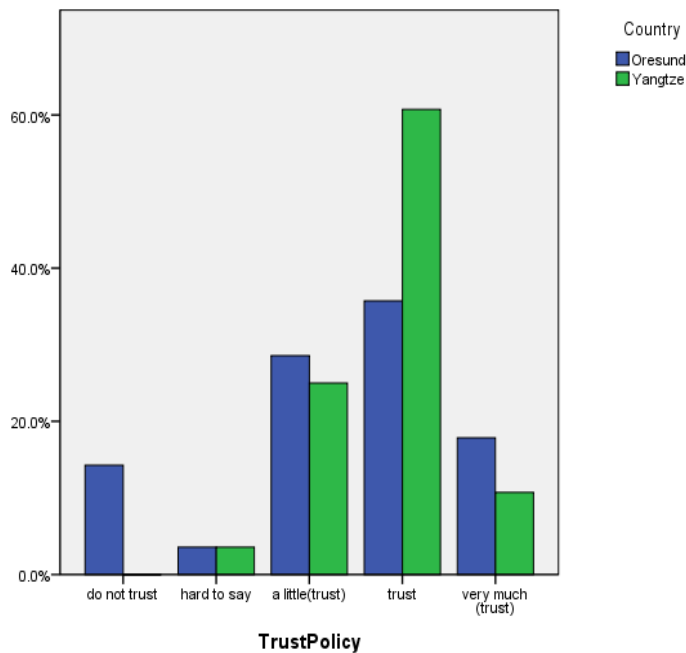


Table 6. 3 Mean value comparison of trust of governmental policy

TrustofPolicy			
Country	Mean	N	Deviation
Oresund	1.25	28	1.555
Yangtze	1.79	28	.686
In total	1.52	56	1.221

Figure 6.3 public trust of governmental policy

Base on the results above, Chinese respondents have a little higher confidence on governmental policies, which is consistent with the survey result of government influence. Moreover, the figure 6.3 indicates that the Oresund people can be doubtful about the policy. Around 18% of respondents have a habitual attitude of skepticism or resistance to the governmental policy. On the other hand, almost 100% Chinese respondents give the trust to governmental policy concerning the cluster without any suspicion. Based on the relevant lower deviation value, we find that this kind of trust in Chinese is more stable and not easy to change. To some extent, this result proves the expert opinions from the interviewees.

According to Mr. Benner’s opinion (May 07th, 2009), the active open-dialogue environment is one of the prerequisites for the successful cluster. For governmental policy, it requires the full engagement of cluster participants in the decision making. People should have the right to make suggestion to the governmental agency if this policy would impact on their lives. In Oresund ICT cluster, people share thoughts, knowledge, resources, and personal network to achieve the collaboration. They would rather participate in the decision making of public affairs than just accept it. If avoiding the public opinion from the policy-making, the open-dialogue channel would be blocked and collaborative atmosphere can never be reached. Therefore, after 40-year development of cluster, governments in both Denmark and Swedish would like to hear the different voice from public, even opposite to their plan. Whereas the answer from Yangtze reveals that Chinese people more used to accept the policy than affect it. According to Yu (April 27th, 2009), even though sometimes people don’t feel satisfied with government and policies, what they usually do is just to bear it not to argue against it. Perhaps this is a part of Chinese Confucian philosophy. Another important thing is that today’s Chinese political system can’t offer people more chances to participate in this kind of decision making.

Financial support:

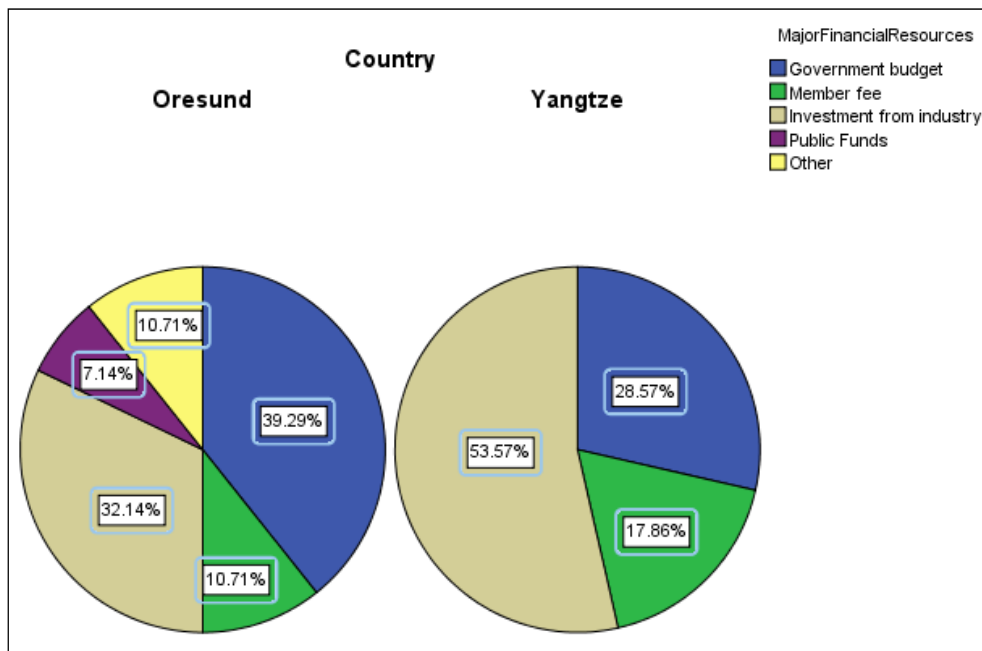


Figure 6. 4 Major Financial Resources of CD

This diagram reveals that people’s opinions about the financial sources of CD are quite diversified. Government budget (39.29%) and industry investment (32.14%) are considered as the major part of financial support, but there are still other ways to finance the CD, which is corresponding to the current situation of Oresund ICT cluster. In Oresund, the running of ICT cluster (or IFCs) is supported by multiple financing. “The major part comes from industry which is around 20%, and government”, says Gustafson (April 24th, 2009), “the rest is from university, member-fee and others”. From the viewpoint of Benner (May 07th, 2009), the CD would get much benefit from the multiple financial channels, which makes the cluster independent of any sector. Like he said, “we are equally strong”.

Additionally, from the figure above we find that the government budget is the biggest part of financing for Oresund, while the second for Yangtze. Almost 54% Chinese respondents regard the industry as the major financial resource of CD, which is a little bit inconsistent with the result of public trust concerning government. If Chinese people are so dependent on the government, why they become reliant on the industry in the economics perspective? Professor Yu shares his opinion about this, “during recent 30 years, Chinese people have enjoyed the benefit brought by the market-oriented economy. Then more and more people realize the importance of industry in the economic development.” This is a good point for CD in China.

Leadership

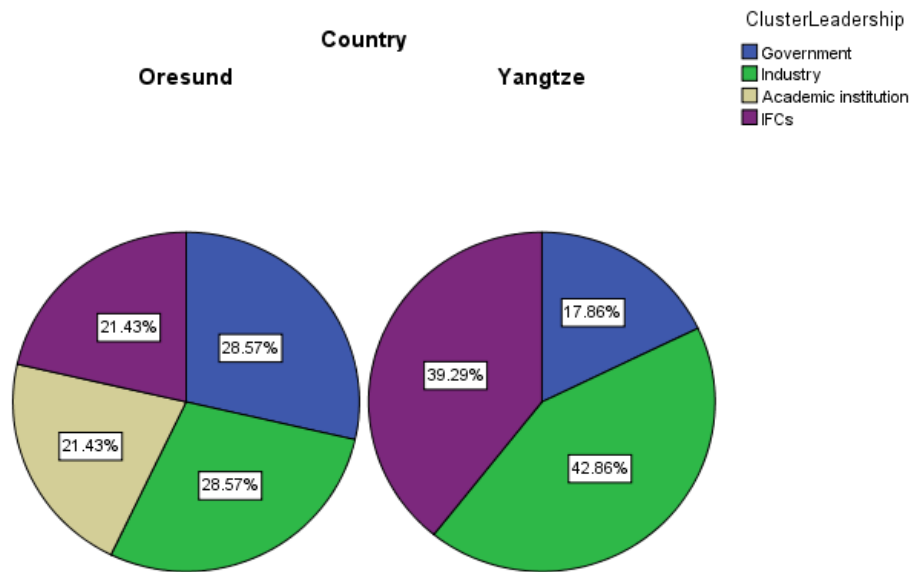


Figure 6.5 Cluster leadership

The feedbacks from Oresund indicate that there is no dominative opinion concerning the leadership issue, which shows the public preference to the balanced structure of cluster's leadership. There is no dominant role in cluster. That is the key point for establishing the collaborative cluster environment. According to Benner's thought (May 07th, 2009), in Oresund ICT industry, academy and government are equally strong, no one can make a decision for other participants. They only do the things what they are good at, and then the innovation and collaboration would come out automatically. "Let people in the right position do the right things" (Gustafsson, April 24th, 2009) that can be regarded as the main idea behind the triple helix and OSR. Conversely, in china more attentions are paid to industry and IFCs, which is 42.86% and 39.29% respectively, and only 17.86% respondents give the vote to government. Based on this figure, we get a conclusion that Chinese people start to realize the importance of IFCs and industry in the process of building a cluster, and want them to take the role of leader for CD.

Open-dialogue environment

We try to examine the collaborative environment in both regions from three points. First investment preference of industry when they want to finance the academic research; second, how much the willingness of that people want to keep the long-term cooperative relationship with other cluster sector; Third, satisfaction towards the communication channel between the ICT industry and university.

Investment Preference of industry (into academic research)

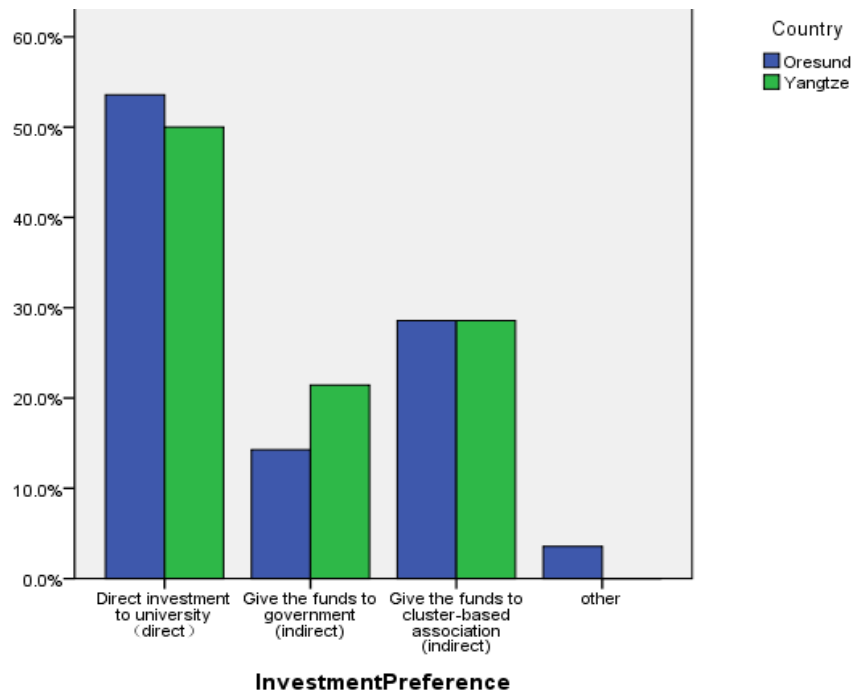


Figure 6. 6 Investment Preference of industry

Both regions have more or less identical results, which show that people prefer the direct way to invest into the academic research and try to avoid the government interference. Gustafsson confirms this finding that usually industrial company would like to finance the research directly, instead through the third party. A part of Oresund IT’s job is to match the relation between venture capital and research. Then the cooperation would occur between them.

Willingness of Long-term Cooperation

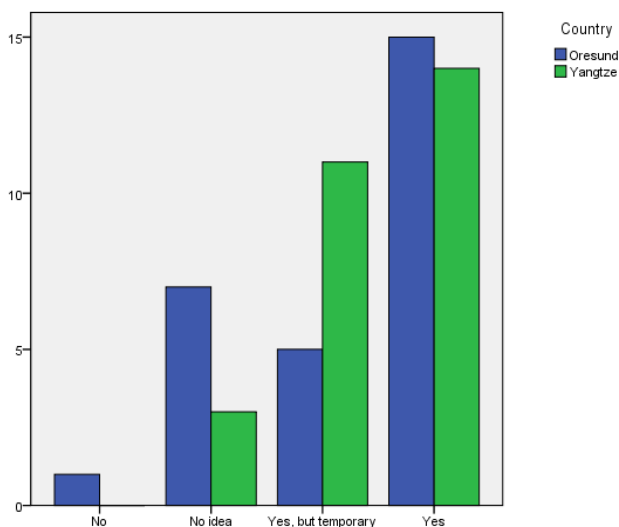


Figure 6. 7 willingness of long-term cooperation

Table 6. 4 mean value comparison of willingness of cooperation

WillingnessofLongtermCooperation

Country	Mean	N	Deviation
Oresund	1.21	28	.957
Yangtze	1.39	28	.685
In total	1.30	56	.829

We find that in both regions there is a high aspiration of keeping the long term cooperative relationship between industry and academic institution. However the feedback from Yangtze indicates that 40% people want to achieve the cooperation in the temporary way, which means the long term relationship is unnecessary for their business. According to Yu (April 27th, 2009) to build and maintain the strategic relationship with academic institution is very costly and time-consuming project for industry, and usually the outcomes are not so significant. So to some extent the long-term collaboration with university is kind of test to the patience of company, because the final target of such cooperation for company is to promote the business profit. Thus business people prefer working with researchers with the clear and sensible goals.

Satisfaction of Communication Channel between industry and academy

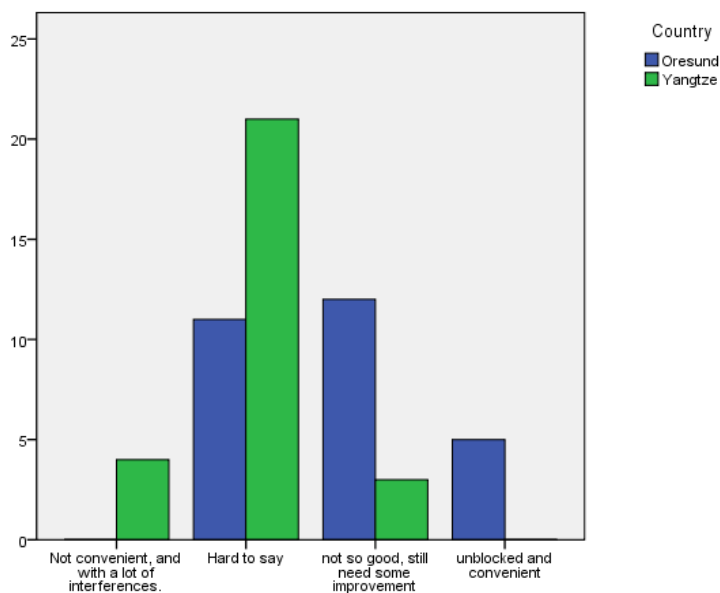


Figure 6. 8 Satisfaction of Communication Channel

It is clear that people in Oresund have the higher level of satisfaction (0.79) concerning the academy-industry communication. But for China, it is not so good according to the negative mean value, which reveals the public dissatisfaction about the current collaborative environment in China. The reason is complicated. Base on the expert’s opinions from interview, we summarize three points for this situation.

First, the institution for collaboration is very important for forming the effective conversational environment. In OSR, there are numbers of institutions established for this purpose. Oresund University, which is university network organization comprising 12 universities, assists to promote the collaboration between the academic institutions. Another organization in OSR, Oresund IT tries to map the connection between business man and researchers in the ICT section. Also some universities have their own department for stimulating the innovation and cooperation, like VINNOVA in Lund University. (Kitagawa, E., April 22th, 2009). In China, the numbers of this kind of organization is still not enough and the functions are limited, especially in the University. Therefore, to establish the functional

Table 6.5 mean value comparison of satisfaction concerning the communication channel

CommunicationChannel			
Country	Mean	N	Deviation
Oresund	.79	28	.738
Yangtze	-.04	28	.508
In total	.37	56	.752

collaborative organization is one of the core tasks for CD.

The second point which we think is important is concerning the ownership of research findings. In OSR, it is belong to the research's themselves because of the crucial contribution to their researches. As Benner said, "researchers can right it (research findings) over to industry or university, but the start point is investigators own their research." By contrast, in China the system is totally different so that researchers have to give the right to organizations. "Most Chinese researchers are really angry with this unfair regulation", says Yu. Academic people got the real damper on their enthusiasm, because people can't see the hope of their hard-work. The phenomenon of plagiarism is increasingly worsening, and the academic environment is not as serious any more. "

6.2 Refined model

Based on the professional opinions from interview and data analysis, we refined our model by modified the relationship of stakeholders when cluster is advanced. According to Benner's opinion (2009-5-7), our original model could be effect when cluster is in their starting stage, but when entering to the growing process, most of such form of cluster are dead which can also be proved by the experiences of numerous European cluster projects. In addition, Gustafsson from Oresund IT suggested that the IFCs should be located mainly in the inter-area between industry and academic institutions in order to avoid the interference from government. As politicians do not have experience about academy and business, based on his experience most successful clusters are achieved by bloom up instead of political plan. Therefore, our renewed model is shown as follow.

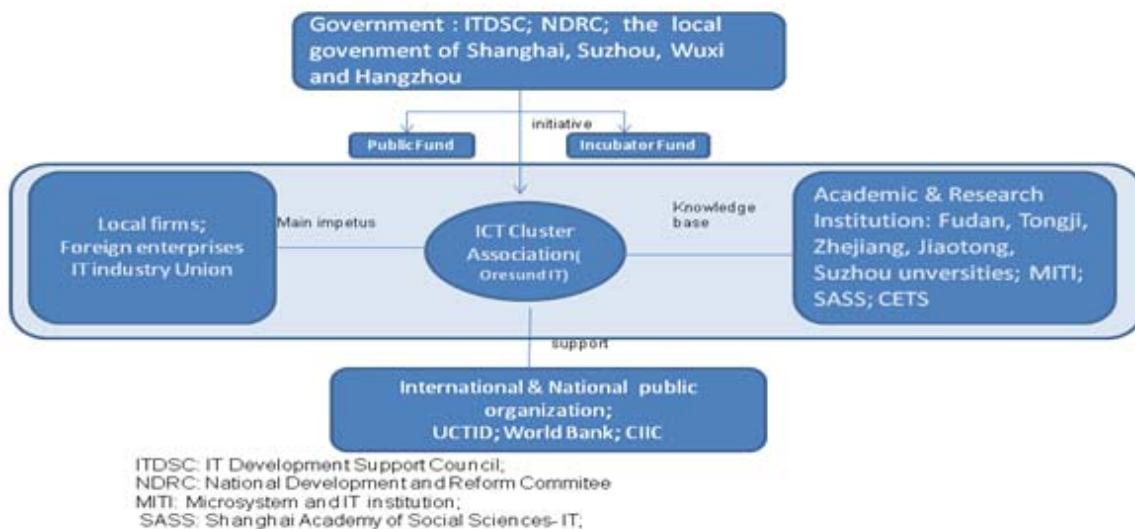


Figure 6.9 the new version of ICT cluster Model

Based on the analysis above, we explore further to find the developing process model of ICT cluster in Shanghai, by combing the lifecycle model and MTH.

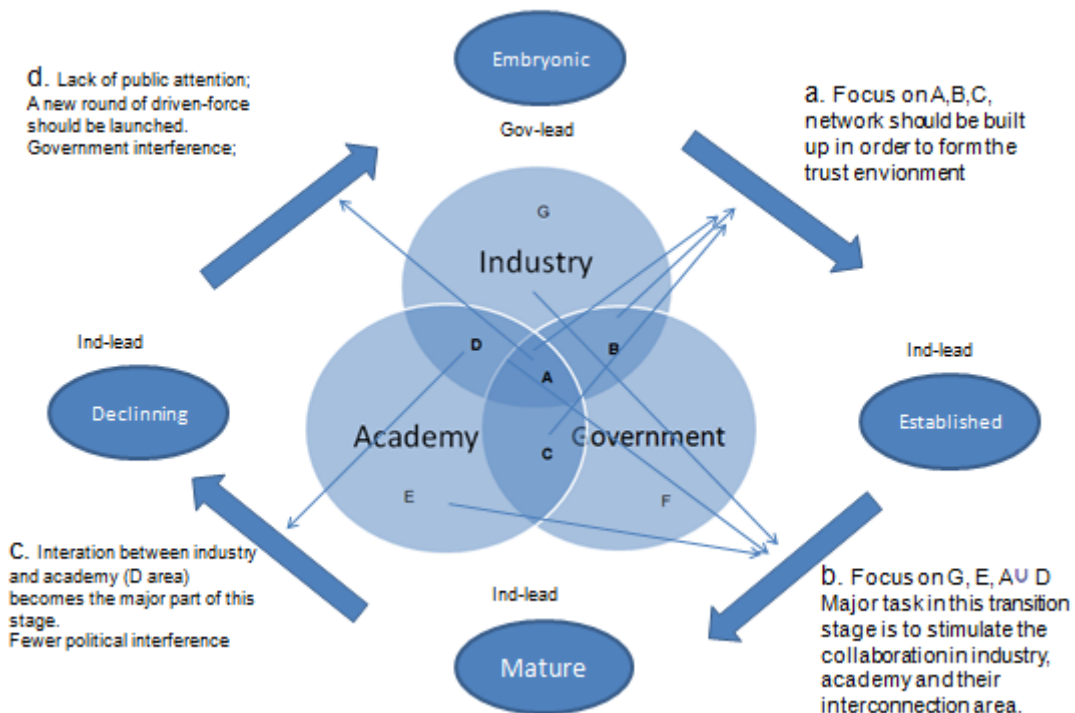


Figure 6.10 Refined Triple Helix Model with lifecycle dimension

Key factors concerning the four transition process of ICT cluster development model.

1. Collaborative area by Triple Helix model:

- **A** stands for the area that all the three stakeholders (government, industry and academy) interact with each other. Usually IFCs or cluster facilitators are located here to match the relationship between them in order to get them involved in the cluster growth.
- **B** is the interactive field between industry and government, mostly economic politics is implemented here to influence the companies' strategy. For example, perhaps central government decides to raise tax rate. In corresponding to this, enterprises would change their business plan against it. Also some big companies may have a talk with politicians, aim to affect their decision. All those activities happen in B area. In the same way, **C** is for academy and government, **D** is for Industry and academy.
- **E** is the area where academy institutions collaborate to achieve the common goals. E is collaborative field among the industrial organization. **F** is for the governments, including the central governments, local and international political organizations.

2. Four transition stages:

- Stage a: the transaction stage from starting to established, more communications should be happening in these three areas (industry, academy and government). Although government plays a role as leader in this process, his major task is to build the relationship network covering companies and universities so that ICT cluster can be initiated in a bottom-up way, instead by political plan. Of course, financial support is mainly from government budget and other public funds.
- Stage b: Major task in this transition stage is to stimulate the collaboration of industry, academy, and their interconnection area. The key issue is that all the three participants

should be involved sufficiently in cluster development, so as to get the rapid growth.

- Stage c: Interaction between industry and academy becomes the major part of this stage and the innovation system is running automatically and steadily. Governmental interference should be declining here. The communication should be happened more in the D area in order to achieve the collaboration effect.
- Stage d: According to Gustafsson's opinion, "the hardest bottleneck often meet in this stage is the declining interests from public." (Gustafsson, 2009-4-27) We expect that one character of Shanghai ICT cluster in this stage will be the loss of public attention. Hence, a new round of driven-force should be needed to support the further development of cluster. More government interference is required to involve in cluster project again which is similar as a stage.

3. Cluster leadership during the lifecycle:

According to the expert opinions from interviewee and survey result, we find the suggestive cluster leadership which would influence the developing process during the lifecycle: in the starting stage, government should definitely play a role as a leader, who set up the major funds and organizations to take responsible for cluster project. That is also a fast way to attract the public attention and get them involved in cluster positively. Afterwards, when the cluster is initiated and growing fast, industry should take a place of government as the main driving force of cluster development. Only by this way can the innovation be carried out and promoted best. Then in the next two stages, industry is always taking the leadership to keep the cluster running in the right direction.

6.3 Recommendations

Based on the analysis above, we summarize the suggestions for Chinese cluster development as follows:

1. Establishing a successful ICT cluster is a long term project, while it also takes a long time to build up the collaborative network and form the database. Oresund ICT cluster takes eight years to reach today's success. The same condition would be happened to Yangtze, which would demand not only sustainable resources and support from outside, but also the patient of public (especially the government).
2. With the aim to bring out the innovation, the ICT cluster should be established by bloom up, rather than by design. Considering the political and economic background of China, such bottom-to-up development style seems be impossible implemented without the trigger by government. Comparing to Swedish and Danish governments in Oresund, the influence of Chinese government is more crucial for CD in both political and financial support, because of socialist system. However such influence should be controlled in the fitness. Thus, our suggestion is that in the starting stage Chinese government still plays a role as a leader. But with the development of cluster, the political influence should be decline and turn over the position to Industry and academy.
3. With the help of government support, it is necessary to set up the IFCs and innovation Funds to support the CD. Then try to initiate a project attracting the ICT companies and researchers.
4. Cluster is a flexible platform, which gives the participants fully freedom to enter or quit the membership. Picking up the members by government is not beneficial for the long term development of cluster. Unfortunately that is usually what Chinese government did

for cluster projects, for instance, Zhangjiang Science Park, Shenzhen ICT region, Zhongguancun and Dalian IT cluster. Almost all the clusters in China have been implemented in this way. This kind of top-down initiative style has been proved to be a wrong way to achieve the innovation effects.

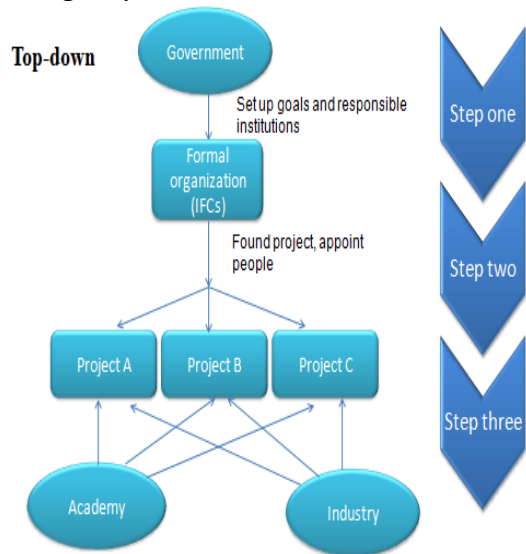


Figure 6. 11 Top-down style of cluster initiative

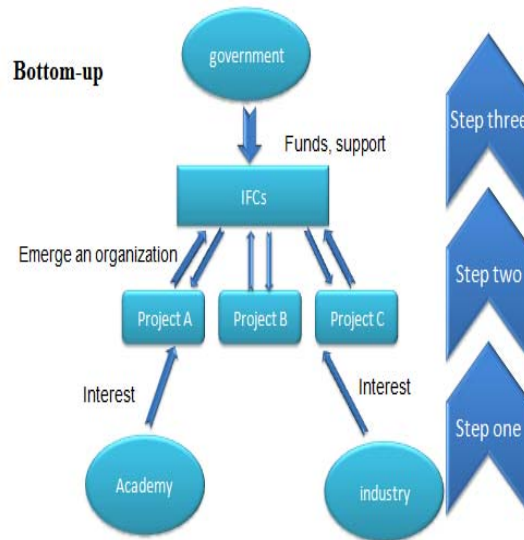


Figure 6. 12 Bottom-up style of cluster initiative

On the other hand, though our study we find that bottom-up initiative style is also unrealistic to Yangtze because government influence is still dominative in the regional development. Thus we design a midway style as a recommendation. Step one: government starts to initiate IFCs to take responsible for cluster and provide the major financial support. Step two: interest is emerged from both academy and industry, communication is happened between the IFCs and cluster participants. Step three: IFCs tries to match the collaborative relations between academy and industry, and start some projects to facilitate the cooperation and innovation.

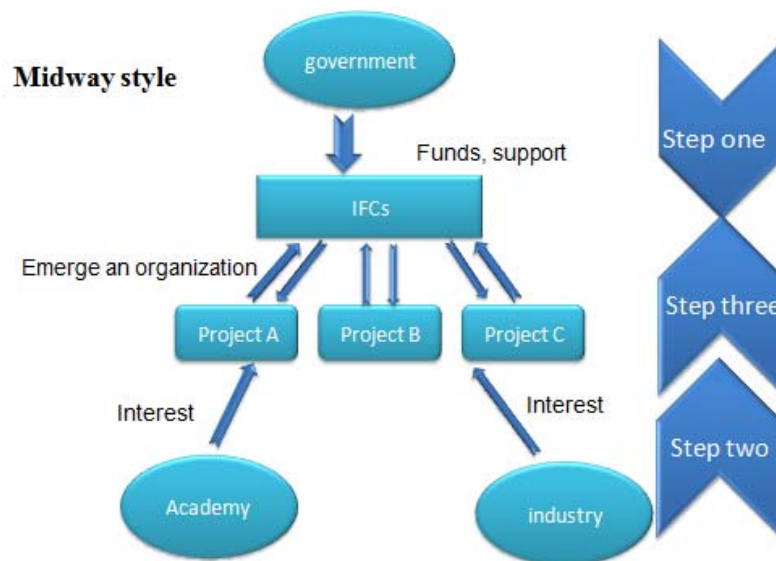


Figure 6. 13 Midway style of cluster initiative

5. Personal network is one factor which would impact the success of cluster implementation. According to Gustafsson's (2009-4-27) opinion, most success cluster is initiated base on the good personal conversation and relationship. ICT cluster in Yangtze Delta should learn from such experience, position the right person in the right place is the key task to build such network, which requires the people in IFCs have good relationships with industry, academy and government.
6. The implementation of ICT cluster requires the fully engagement of various participants, especially ICT companies. Making clear the position of the central networking company is essential part for cluster. Constructing the cluster network around the central company like Lenovo, Inspur and Huawei would stimulate the process of CD. In addition, IFCs should do the best in balance the resources and keep the fair competitive market.
7. The regional research capability should be strengthened, especially in hi-tech field. Certainly the long term and sustainable support is highly required. But we think the most emergency task is to establish the organization for academic collaboration (OFAC), like Oresund University. With the help of OFAC, the communication between academic institutions would be more convenient. Researchers will be easy to be connected together and united for common purpose.
8. Protection of the intellectual property would be a long-term task which needs a wide range of support from publics. Specifically, the ownership of research should be tied to the researchers instead of institutions. Only by this way, the passion of academic research would be aroused.

7. Conclusion

In order to find the validly and sustainable cluster model for Yangtze Delta area, the analysis of both regions above has provided with a very deep understanding. Based on these researches, is that possible for applying Oresund ICT cluster model in Yangtze Delta area, and if it is or not, what should we do will be argued as follow.

7.1 Summarization of research findings

Based on the analysis and discussion in the previous contents, we find that there is no universal cluster model exists because of the distinct characteristics of specific region. Then certainly, the model of Oresund ICT cluster cannot be applied to Yangtze Delta directly. However, some experiences are still valuable for Chinese cluster, such as the intensive human resources, advanced infrastructures, sufficient venture capital, bottom-up initiative style, partners' trust, open- dialogue, and collaborative environment. Almost all of them are involved in our modified triple helix model as the influential factors.

Furthermore, according to SWOT and Diamond analysis, we can conclude that the Yangtze Delta region is a suitable place to implement this kind of knowledge-based innovation system (ICT cluster), because it has been well-equipped with sufficient natural resources and talent labor forces. Also, the current advanced industrial base can provide with facilitated infrastructure, the high level of productivity and venture capital. Moreover, the strong government support will definitely accelerate the development of the ICT cluster.

Then referring to the government influence, we get the conclusion that the position of government should be changed during the building process, since our ICT cluster model is dynamic from the early stage to the advanced, and the strength of interference should be declined from model one to model two. The most important thing in this process can be generalized in the word of Benner (May 7th, 2009), "let the right people in the right position do the right things".

Finally the last question need to be answered is the construction of our MTH model. By combing the triple helix and lifecycle model, we use it to show the general relationship between cluster participants, and position the influential factors in different area. We think it is a better way to analysis the process of cluster development and explore the solutions than the old triple helix model. Through the model analysis, we also find neither bottom-up nor top-down style is perfectly fit to Chinese situation, so we try to think about problem in the midway and finally design a model for ICT cluster initiatives which we think is more close to the situation of Yangtze Delta area.

When we look back over our research, the whole thing is not only about just writing the paper, but also an enjoyable learning and exploring process. We design the models first, and then refine them based on the information we get from others. We also believe our research would be helpful for hi-tech cluster establishment in China, because this is the first effort to investigate the regional innovation system model referring to ICT area in China.

7.2 Further research

The major contribution of our study is concerning the model construction and general suggestions for ICT cluster in Yangtze Delta area. We tried to think about the problems objectively as a neutral, which means our research is not inclined to any cluster section (industry, government, or academy). While it also results in our analysis and suggestions too

general and focus on the macro-level. When we review our study later, some interesting ideas are aroused which we think is worth to study further regarding the Chinese cluster. Firstly, during our study, it is obvious that we did not have sufficient suggestions from the governments' perspectives. Our suggested model was mainly built on the data from both academic experts and business people. However, in the Chinese situation, it is impossible to implement such model without feasibility testing from the government. Therefore, even though we construct the possible model for Yangtze area, it might be not satisfied with the far-reaching policy of the government. Communicating with the government section and getting the valuable opinions from the government, and even analyzing the current or far-reaching policies of local and national government should be some of our researching objects in future.

Secondly, when considering the cluster implementation in China, it is necessary to investigate the participants' behaviors in the viewpoint of specific cluster stakeholders. Because of the limitations of geographical positions, we cannot launch the research directly from each of the three dimensions (academic institutions, government, and companies) of cluster in Yangtze Delta. In our research, we mainly focused on the dimension of academic institutions. For further study it would be necessary to construct the model from the viewpoint of different cluster participants. For instance, if we analyze the ICT cluster from the companies' perspectives, we should consider more about the profits they can get from participating the ICT cluster, and how they should adjust their developing strategies corresponding to the cluster development. Moreover, if we start from the dimension of the government, we should concentrate more on the macroeconomic control and policy makings. The problems about how to balance supporting the local companies and attracting the international investments, how much levels of the intervention the government should play in different stages of the cluster's developing, and how to frame the valid and effective policies according to the circumstances of Yangtze Delta should be considered from this dimension. All in all, in the future study, researching from different dimensions of cluster should be investigated as another aspect.

The third aspect that we should pay more attentions on is about analyzing more specific measurable model in Yangtze Delta area. This issue has been raised since we founded our final model. As we analyzing the circumstances in Yangtze Delta area are mainly from the microscopically perspectives, which are lacking of the details of how to manipulate the real cases, we may meet some inevitable challenges and risks. On the other hand, if we try to penetrate deeply into the details of implementations, we may get the first-hand and updated information, that some unsuited parts can be justified immediately to achieve the optimized entire model. For instance, we can provide the enterprise with a long term tail tracing to measure the changing of their profits in different stage of building up the cluster. As it will be a long term project, it require us the unremitting research in this area in future.

It is true that we still have some other aspects which require us to take deep research in our further studies, such as how to eliminate the gap of trust among the separate firms or the firms and government, how to eliminate the intensive competitions among the potential invaders in Yangtze Delta market to reach win-win collaboration, and how the local government in Yangtze Delta area play the suitable role in the cluster should be also discussed in the further studies.

Appendix

Appendix 1: Interview guide

Our interview has been conducted around some core questions as follows, but not followed the fixed order and expressions. Because we think a good interview is aimed to bring out the ideas and motivations from interviewee, and it should be a open-mind conversation instead of question-answer dialogue.

1. Could you describe your organization, what kind of position it plays in the regional cluster?
2. According to your opinion, what kind of influence the IT cluster plays to the regional development, and to your own organization?
3. Referring to the financial support, which part do you think should play the major part in providing the cluster funds, government, industry or university?
4. In your opinions, which part should take the role as a leader during the development of cluster project?
5. When other organizations have the cooperation with yours, if the government takes a part in this business? Or if the opinions from government influences your decisions?
6. Could you give us an example how your organization collaborate with other institutions within the cluster?
7. Which development style do you think is better for the innovation development?
8. Competition is very important factors for the cluster development. However mostly powerful company can get more resource than small companies, which result the monopolization eventually. So how to handle this problem in your opinion?
9. According to the cluster lifecycle model, which stage your cluster is currently in? Why?
10. As your opinion what is the main obstacle in this stage to further development? And which factors do you think is the biggest challenge to cluster in the beginning stage?
11. What factors do you think is important for the cluster growth; could you give us some cases?
12. For IFCs, what is a part it plays in the cluster, and do you think their work is important for your business?

Questions for academic researchers:

13. Could you talk about the position of university in your regional cluster?
14. What kind of relationship between the university and industry when they cooperate in a project?
15. Knowledge production is an important processes for innovation system, so how to promote it from the academic perspective?
16. As we know that in Sweden research ownership belongs to researchers not any institutions, while it is different from China. Based on your experiences, what are influences due to such differences?

Appendix 2: The transcription of Gustafsson's interview

As we know that Oresund IT is a Non- profit organization, so what is your main financial support coming from?

The financial support mainly comes from the industry about 20% of financing. And the rest come from the university and public sector.

Is that the main part?

No, most part from the industry and university factors. So we are triple Helix organization. And the contribution of the industry is typically from our members. So we are member's organization, and all the members pay members fee which is actually quite low is about 8000-9000 a year.

So the IT Oresund is not built by the government, neither the Swedish nor Danish?

No. originally it was started by a project; it was a cross board project in different countries. We had this cross board money to develop the region when Oresund was built. And then the industry and region get together and picked out some area to focus on, and ICT was one of them. We had already built up very strong ICT industry in the region, and then we built the bridge to try to get the industry together. So actually it is EU money, and EU founded from the beginning. But then after 3 years, the EU founding was over, and we turned the organization into member organization.

Your founding is public?

No. Public founding from the region in Skåne, and the local authority goes up from both Swedish side and Danish side.

So the company needs to send the membership application?

Yes.

How did you select the member from the applications?

Example about PH, which is located in Oresund Region, it is obviously that they wanted to be a member of member network to find new customer and so on. Then of course we have dialogue with them, it can be ok if the purpose is actually start brand show or something. So we have sought of screen process of course, if you want ICT company and situated in this region, you will apply the application, but we have some member from India which actually our members, but that's because they want to start to subsidiary here. That one of our mission which is to attract the company from other parts of world and to get them to start research department or something in our region, so there is no problem. We have a lot of collaboration for ICT cluster; we have the collaboration with HK and so on. So we see there is no problem for us to involve in the company or organizations from the other countries.

Introduce our project. In china, government picked up the companies and formed the regional cluster. Instead, you attract the company. I just wonder how you do that.

Actually, I have very strong opinion about that. There are very clear success factor in cluster building. It is the company who are the driving force in order to build up the cluster not the government or regional authorities. Of course you can make it easier for companies to working in the clusters with different facilities. You can have the cluster organizations. But the force from the cluster must come from the companies themselves. It is very strong. If we look at the history, at least in the Europe, we can see very clear that the cluster were created by some government somewhere don't have the same sustainability as those cluster that grown bottom-up from the industry.

What kind of role the government plays in ICT cluster

Very little. More like we provide sometime the local force with ICT policies, brand nature, local government the knowledge for instance, we can help them if they want to go on ... somewhere 9'17 or use the network or if they want to meet people or within the industries to understand how ICT industry works, we can help them with that. Actually say that they have large influence on what we are doing. Of course we get some money some contribution, from the government. But they didn't underfeed what we are doing. So we general we decided by ourselves, and what we will do, and what is our strategy, in the long term, and what we do are based on the industry.

How about the university part?

University plays more important, because the university is the one institution will provide company with the well educated knowledge both in the present time and in the future. So of course we try to do is connect the demand from the industry with the university. So the university will make the education that the industry wants, which is not always the case, because the university sometime they have another agenda. We try to help the university to get the research out to the industry and help industry to find research in the university. We provide some kind of gateway between the universities, because they don't have the information by themselves. There are also some quite large in Sweden tell the difference about how the university function and how the industry and business works function.

Please talk about the practical Project: how to match the company and universities. You make the decision for them or just link them?

We just link them. We have a critical mass in the network. We are 11 university, 10000 ICT companies, and 5000 researchers in the public sector. We have critical mess, we actually don't need to create research by ourselves or create project by ourselves. What we need to know is to know the person, a lot of researchers in the universities, the managers in the companies or people in the government, and other people in the innovation system, people who works in the venture capitals, the old people who works in the innovation development. We actually try to know a lot of people both in the region and outside the region. If we search here in the university have project, and he needs funding to the project within the ICT sector, we can product good chance to him to call to me or someone else that I have interesting project, do you know some industry may have interests in this project. Then we will try to connect you with the industry partners. Then we can tell him you can connect with SE or TAT... to the people in the company, we will say that we can contact with him, we have research you actually should gain that.

Actually we do that for Free, Mainly for members, who pay member fee. Some time involve in the project. That is another thing. Now we are doing the project about the female leadership within the cluster. Because we are thinking that ICT in the countries, mostly are men, that is a kind of stupid, because women could do that also. Why we don't have female leaders? We are hiring the researcher to do the research leadership in the ICT cluster. That's we get the money from the research administration in Sweden. That is the project we lead and that will give report in the end and present finally. So we can run the projects if we get the funding from those projects, but normal day today work if we talk about the nature work making between industry and university and industries between each other that is something include within our daily work we are founded for that.

The 7th framework is to support small and medium sized enterprises, could you tell us more information about your framework.

It is an EU program, which called framework program. It is a way to support small and medium sized companies in Europe, we in this region not good at seeking the capital. So we try to help especially medium sized in the region that get funding or research or new prototyping or innovation developing through EU funds, because for small companies it is difficult and time consuming to get funding from EU funds, it takes a lot of time, a lot of Need to fill our 1 million companies. Of course the large companies they have the working force to get involved in the project because they have the people specialized in that type of research. Small company with 5 people they cannot spend 3 hundreds of time searching for some EU money in order to bust their innovative speed or build up the prototype or something, so they will typically try to find money in together places, bank loan and venture capital, that also why Sweden and Denmark are not those country may applied or get the EU funding in order to help them to get funding from EU to get the process. We tell them how the process work and how can you get help in writing the propose without taking 3 hundreds hours. So that's actually what we do. We also get sometimes part of EU projects.

How could the small company compete with the large firm?

We try to influence the education system in order to produce more students. That is not always so easy. Because you have limited space in the university, and limited students in the university, if you want educate more people in some faculty or less people in economic or language other faculties. We also have some help to the company with the connection to the company in India for instance. So they could outsource some development work or something to them. The region has some competition on the work force, even though the financial crisis maybe thus they are not fast. And it is a shortage for the ICT cluster. So we try to tell the companies to how to do or how to attract people in the region. We also have some project to attract people from other part of Europe, to move here, to work in the ICT cluster. So there is problem that it will upcoming 1-2 years financial crisis, in 3-4 we will have the problem again where we will lack people again. In Sweden young

people are more willing to choose the non-technical subjects like the media or advertisement rather than science such as engineering. So we have the project to try to make the teenagers to change the mind, and tell them to be participated the project in November. We will bring them to the ICT Company and have an exhibition to tell them the different choices, some company will show some work. Try to engaged the students. And we also work on the branding of the region, because we had the success factor. The ICT cluster here is 10 times bigger than the Cambridge, and 7 times than the Netherlands and also bigger than the Stockholm. So we are one the biggest ICT cluster in Europe. And it is the research heavy, which means we have high level research. The cluster in this region is widespread with very high level research, especially in the mobile communications and ...technology. And we also have a lot of inventions such as Bluetooth technology and something... we have quit well-known invention came from the research. That's may attract people to move here, and we are very happy because we have a lot of space here. I think the competition is good, because then you can do your best all the time. So we are open to that, and we are competing with sociality policy, we are competing with Cambridge, we are competing with Stockholm, and with large ICT cluster with Europe. As we are research driven, we can actually competing with other region on the research level. That's our goal. We are competing with CILLY Coevally. We are doing quite well with... because these cluster are getting little tired to large cluster and lot of people and lot of palpitations and so on. We have already involved in the industry, we know how industry works, we are target oriented and extremely competitive, and so that is the success factors. Competition can drive to watch each other. We are trying to make people like that and trying to make people in the research head and convince this success factors.

Competition is very important factors, but always powerful company can get more resource and small companies are hard to get it. It is very hard to get them. So it is not good for the cluster.

It may create a kind of problem. It is good to have such big international company because a lot of 35'16... around the company, also they are very well on brands, for instant if we talk to people in Europe that we have SE in our region, then everybody may know that. Even though they maybe the fighting company in our cluster, because there are also some other companies are doing some interesting projects right now, but no one know them. So for the branding perspective it is very good to have very large companies, but in long sustainability, it also can be problem that the large company may attract all the engineer and all the best research and everything, and for the small companies they don't have so much possibilities to pay high wages because it is not the same for them to getting the knowledge compared to the large company. But for the financial crisis now, the large company try to cut down so there will be a lot of people getting out of market, then actually I think it will lucky that will good for the whole market than the small company will get access to the researcher or maybe engineers that are highly skilled that they cannot afford before. It is always like the economic go through some recession time then the possibility for the small companies may increased and they can get the access to the great knowledge. I have very personal opinion that we are in some sought of parading change we will go from these very large very industry oriented companies to small faster flexible company. Maybe it will take some time. e.g. Volvo (38'59). It is good for the society to getting down doing something else, then the society have very large responsibility to taking care of these people and encourage them to find new way. There are some good side and bad side. For these I think economic recession is a nature stage within the system before to get innovative and do something new.

How could you solve the problem about the innovation and the investment, if the innovation failed during the process?

We can help these new innovations to try to find some others, because we don't have the venture capital of our own. But if we meet someone who actually has good ideas, we will try to help them to find funding somewhere. Venture capital is very afraid of doing wrong investment.

The organization build up before or after the ICT build?

It is kind of hard to say because when we start the whole theory about the cluster, we have started to discuss the cluster at the beginning here in Sweden. So it is hard to say did it start before the ICT cluster. We didn't know because no one measure that. Of course there are some lose cooperation between different companies within the two nations, in the Swedish side there are lot of ICT companies and a lot of organizations and it is same on the Danish side but when we started we are start to marched D and S with each other to get more positive factors to large region and very high concentration companies within the ICT cluster. You can say the region start with the Oresund IT, but within the country that there are collaborations within companies produce

different things but nobody called it cluster because we didn't know what the cluster was.

Which stage your cluster is currently in?

We are in the mature cluster. It takes 8 years for cluster to get productive and to give some benefits back to the society and companies. We started 2002. What we are trying to do, we of course try to renew all. You need to be patient, because it will take long time before you can see the results. That is the often problem, in S AND D how long the election term we have. We have a 4-years election term. And next year is the selection year, so the politician now is to start up a lot of new clusters. But then after the election maybe they will forget about that, because before that they don't want to lose their election, so you need to be very clear. China has another political election, you also have long term plan. But you need politician like you start a cluster one year than you want it to show what you have done. Because building up the network that we need take a lot of time, such as storing the database. It takes some time to build up network. Before that it is hard to connect the right people. What are doing now to get all the contact we can get, but we also need to build up the team to be more competitive.

What is the main obstacle in this stage to renew?

The biggest problem is that you have been for 8 years, the interests from media and from the public is not as high as beginning, so nobody always see what you are doing. So it is hard to get new funding. It is much easier if you start a new initiative, it always get media coverage and then political show up, then it will be much easier to get funding. So I would say that would be the obstacle. If you have run for a while, you will get tired and so on. But we are trying to competitive and not get to lazy. There are some examples. We are very strong to trying to avoid that.

What could be the problem for the starting stage?

In long term thing, the biggest challenge is to engage the industry in the first stage. If the idea die, we need to start over again, if you want the cluster sustainable and live for long time, you need to build from the button-up. It also about convince the industry to actually open up to other companies, even though they are competitors on the market,, because that is the success factor that everyone told each other if they are competing in the market, they also need to share some idea. If I tell the idea, you may take turn to your company. E.g. BBBQ party. The managers will come. Tell high efficient In Sweden, they didn't tell, because they customers... we also need to be faster. So it is necessary to build up trust. We have today very open up atmosphere for people to telling each other. Take the network for instance; we letting company meet the customers. We have customers want to buy very large information system, and the companies also want to meet the customers, so they work together. So they are all competing. But the company is in order to create better services. That is all to build up the trust. That is needed to build up directly from the beginning. Building the trust is extremely involved.

We have designed some kind of Map or Model, whatever, here, to show the potential relationship of stakeholders in ICT cluster of China. And we want to hear your opinions about that.

The relationship of Stakeholder in ICT cluster



It sounds ok, but if you thinking strategically, I would of course thought here (middle between industry and University). If government gives some money, that is great. But the most important is if I were the managers in this project, the government has to give me the free hand, for example in China. If you (government) provide me some public funding for research that we want to take to the market, that is great. Than I would like to actually place the organization (ICT association, for instance Oresund IT) in the middle of these two Industry and Academy. Try to do to these guys and talk to them. Ok, we have some money here which we actually want

to give to you. But in order to get this money, you have to contribute with some time. And you (university) have also to contribute with some time. Then I would create some match making. While, I would typically invite some researchers from here (university), companies from here who are company's leaders, managers. And try to match and say ok, who of you working with energy for example, we aim to find some solutions here. And who back here (university) do research about this. Why do not you talk together? Then they would come up some ideas. Then, we are willing to create some organizations here (ICT association in the middle of company and academy), and join them together. Ok, we are willing to give 100 hours for this project. Some professors in university agree to give 100 hours as well. Then I have 10 million Euros which used to connect the company and academy. Then I will get some quite first early win. Because by this method, you automatically build trust between them, and if you do this, you are forced to do extremely a lot of visits to researchers and companies so instead of sitting (to do some strategic plan). Because I have seen in Europe, a lot of cluster is started almost like this (map). And they (government) hire managers for ICT organization. Ok, what really managers do, they usually stop talking to them (industry and university) and develop an exact strategy. And they can spend hours and hours, months and months on developing different strategies. But nothing happens of course. Because these (government) are not the guys doing business, these are not the guy doing research. They are politicians. Politicians do not do programs, politicians do not do research. They just talk. But of course you need to be friends with them if you doing the ICT project. I think even in China now, you should have more open climate. If I were the managers there who are required to give the report to the government weekly or monthly, I will not do that job. That is my strong opinion.

Appendix 3: The transcription of Moodysson's interview

It is necessary to listen to business needs and be integrated with its requirements. Please describe your opinion.

Centre for Innovation, Research, and Competence in the Learning Economy of Lund University (CIRCLE) has well established connections with some of the most renowned research environments in the fields of innovation, entrepreneurship, and economic growth. The interviews carried in CIRCLE provided us with the approach to know the way that how clusters within Oresund Region built and how it developed into knowledge based model. Thus it is necessary to get to know and analyze the innovative model which has existed and succeed in Oresund region. The potential needs of the clusters in Chinese market should be listened and integrated.

The theories about the developing process are described by the relevant professional opinions from different areas, such as the CEO of the IT Oresund Cluster, experts from the academic institutions, the leader of Nokia living lab against the practical application. Results of the comparison are presented in the discussion and conclusion parts of the report.

I'm an economic geographer by trade, and a comparative study with the region researching on the Oresund region. I did some studies primarily on the life sciences industry. Two projects, one is more a basic research project financed by Swedish Research Council, not a political organization. Fund projects evaluating innovation support activity.

The Oresund region is based on knowledge?

Historically, this region has been very much focused on, dominated by not high tech but agriculture, heavy industry. During the past couple of decades, it has transformed to more knowledge intensive industries like the ICT, pharmaceutical, life science industry. That has to do with the strong role by Lund University, which serves as a knowledge provider for the industry but also as a very important provider of human capital. It is a strong pool of qualified labor. This is now a knowledge intensive industrial region.

There are researchers at the University that create new knowledge and then identify ideas with commercial potential. University provides both a role for education and innovation.

Besides the university, one should also mention the big companies located here such as Sony Ericsson, which played a very important role in the 1980's which established IDEON Science Park. Other important companies are the pharmaceutical and medical companies. Tetra Pak is a very important packaging firm, Alfa Laval is a big old traditional company that have all transformed into more knowledge intensive companies.

It's a typical case of triple helix, Industry, University and public sector. The public sector has also played an important role. If you look at IDEON Science Park, it is the most visible example of a transformation to a knowledge intensive industry. The formation of the Science Park was triggered by a heavy downturn in the shipping, marine, food industry in the region. The industry and public sector identified the need for a new sector or initiative and it was a triple helix collaborative effort.

For the university, where is the finance from?

The university is a public university financed by the central government in Sweden. Increasingly, there has been a transformation in the university system, leading to the university becoming more dependent on external funding. That's also created a change within the university, from this traditional style university to a more entrepreneurial university. The Lund University has established an organization called Lund University innovation. They have the main responsibility for helping researchers to commercialize their research; their main objective is to turn academia into applicable commercial knowledge. That is an effect in this changed system where the University has become more dependent on external funding.

From the business dimension, some companies will be interested in some projects of the University, is it possible for the companies to invest in the project?

There are examples of such investment in University activities, one way of doing that is that PHD students at the University are employed by the company and are paid while doing their thesis. It is also possible for them to buy research from the University. That attitude has now changed and entrepreneurial academics are more appreciated. LTH that established companies in the 1980's were not accepted by their colleagues.

Through this process, the government will place some rules on the process as it is a directly invested project?

Companies can fund research and allocate resources, I'm not sure if the company owns the results. There is something called the teacher's exception in Sweden, where people working at the university who create their inventions own their own findings. They have intellectual property to that finding. Compared to a company where they own the finding if you work for them. I am not sure how that issue is solved

In China, if a university finds a report on knowledge, they sell the report to the government. If the company wishes to use that knowledge, they will buy it from the government; they cannot purchase it from the university.

That is a guy, at the Research policy institute, working on government policy. He is an expert on such issues.

You mentioned four sectors in the cluster at the beginning stage of building, can which affirm which dimensions we should focus on?

When trying to build a cluster, the most important thing is to draw on existing strengths. We can take the Medico Valley, as an example. There were some factors that allowed us to build in, to support it, driven by the industry. You can promote it and make it better done than elsewhere. It is important to build on existing strengths. Here in this region, we had two big pharmaceutical companies, Farmatia that was acquired and AftaFenika. On the Danish side they had four or five big companies; we also had strong University hospitals like Lund University hospital and Lund University which had strong research in the field of diabetes and cancer. This basis allowed us to further support the development of the life sciences cluster. If we hadn't had those sorts of basic pre conditions, it wouldn't have been possible. If you have to support a cluster in the region, you shouldn't look at what happened in Silicon Valley but base it on the conditions here. Look at the strengths and what can be strengthened further.

That has to do with the dimensions of actors and networks and is it possible to support them, such as promoting networks between them or universities. There are some system failures to be addressed by cluster policy.

The region may be fragmented. If there are strong universities or companies who are not aware of each other, the main policy will be to make them interact and promote each other. The policy needs to target these specific needs.

Another scenario is if we have an organization within the region. Then the system failure is a missing component in the region such as a strong company without a strong university. It's a different situation and requires a different support policy.

A third situation is an internal network, a lot of internal connections between university and industry but it may be too inward looking. This create a locked situation, which focus is only placed on what one is good at and miss out on opportunities in the global arena. Over times, this causes decline. The support policy for this should support on global visibility, and to link up with other regions in the world to attract new knowledge input.

The fourth sort of system failure could be old industrial regions. This is where there is stagnating technology, which will soon be outdated.

It is dangerous to try and copy other regions, because regional policy must be fine tuned. It must be adapted to the specific needs and available resources in the specific region. A region in Skåne cannot be transported to China or Silicon Valley, for example. Try to identify what is similar and what is different to design a more tailored program.

How do small companies fight against the bigger firms in the region with limited resources in the region? How to solve the problems about the small company compete with big company? Limited resources and talent people resource background.

The small companies are hard to compete with the large firms (really dominating company), take Sony E for example; there are maybe 10 telephone companies such as Nokia, Samsung, Moto, and some more. Those companies cannot compete with these companies, but if you look at the region there, they should be more complementary to see whether they can survive in some way.

There is a good example of a company in Malmo, called TAT. They work with digital design, developing graphical interface for hand-in devices, they create what show in the display for Sony Ericsson or some others. They group are 4 or five digital designers who actually made art exhibition, digital art exhibition, and then they

identify what we are doing now . Then they continue to develop computer game software, and then eventually they decided to develop graphic interfaces for mobile phones, now they make their solutions to all majors mobile phone producers globally. So they have grown for a very short time from been artistic industrial based firm to very important ... I think they employ 200 staffs...they grow very quickly. This example show how they can make use of located close to Sony Eriksson. 31'21' if you look at the life science industry, there are several similar examples, ...(name) they used to be a limitedValue chain split up, more involvement of small companies; take care of one small part of value chain. That the strategy for small company to survive.

Big firms design, several companies want the design how TAT could solve the problem

They delivered the design. The way they do I think they sell the technology and they get paid certain percent from every mobile phone companies. They very clever, they haven't only sold technology once, but they managed to sell to competitors.

Is there some monopolized industry in Sweden?

It used to be like that in Sweden till 199~, the telephone system. But they are private now, they open up. Wine shop is another example and public transportation as well. But it is also open up now. They changed, so there is no monopoly any more.

Because in China a lot of industries were controlled by the government, the most important thing we should consider before building up the model. It is not good for building up the cluster.

I agree with you. It has to do with the innovation, monopoly is not good, because competition is the most important the factors to promote the innovation. Competition is very important, but it takes time.

At the beginning stage, it is very fast to build up the cluster just based on the monopolized company.

The problem is if create some kind of sustainable..., I mean can you create something organically, you cannot create some company that has state support forever. In Sweden,, we have a lot of cluster initiative, public initiative clusters aiming to promote cluster, but the main idea with all of those are they should support for certain time, and then they should grow to their own strength. the typical example is Swedish agency innovation system like Nova, they support 10 years project or 5 year project, Invest is the specific program or policy program supporting regional growth, innovation. And then they provide resource to build up cluster organization for 5 year or 10 years, but then the idea is they should leave by it, and they also have the requirement for all Invest project that they should represent these all three parts: universities, companies, and public sector, for instance the regional authority of Skåne. The initiative should focus on the small or medium-size companies and the groups of company because the idea is that collaboration good for innovation.

Life science cluster, they still in the growing stage. But the trick should be like this. Renew life cycle. It is to prolong this stage. The good example is the food sectary in this region. The food had been matured for a very long time, because they cannot face the competition from the... you know the food is very sensitive for price competition, it build on the old technology, it does not have that much value on the productions. It is very sensible for competition from the other region. But they have win-vast program now, they have been able to prolong or renew sector by focusing on increasing innovative capacity within food industry. The example is the function of food a combination of traditional food industry and modern bio-technology. And another example is what they called convenience food, or better food been scaled more process technology oriented innovation to renew the sector, that's one challenge for prolong the life circle, to stop the declining stage to renew.

What were the obstacles at the early stage?

For life science cluster there are several following obstacles: 1: venture capital. If you compare Sweden or Demark with US for instance, we are lacking in this region the early venture capital. As the venture capital or risk capital are really needed in the early stage of innovation process. Before you identify the market, this is might be used for discovering. As the early stage, you don't know whether you can make it, u don't know how long time it will take.

Another challenge I think is that because (specific to life sciences and ICT) is that science based industries are often created by academics. They are very skilled in their specific niche, but are often very bad mentors. They don't have skills to run a company or make a business plan, to make money out of science. That is what needs to be supported, to help scientists run companies. That is what Lund University Innovation is doing. It helps them to patent their findings, how to commercialize them, what skills are needed.

In Sweden we are quite strong in Science, to come up with inventions. We are bad with innovation in many fields, not generally. Many of the more interesting findings are commercialized elsewhere like the US. Most of the star scientists have moved elsewhere, to Stanford, MIT etc. We need to address how to make commercial applications of good research in Sweden.

There are also quite a few advantages that sort of firm these small schemes of companies that highlight some aspects of this region. For example, the living conditions, it is a small region. It is very easy to live here, safe and good infrastructure, half an hour to Copenhagen airport. Direct flights too many cities in the world. Good growing up conditions. One interviewer once mentioned that his colleagues could not believe he could bring his daughter to work on a bicycle as they were so used to commuting by train in Tokyo.

The lack of capital is the bigger obstacle however, than the living conditions. In China, the government selects the companies to build a sort of cluster, such as a Chinese agricultural region. In the Oresund region, it is more of a bottom up process. They set up a network or some sort of organization, a cluster to facilitate engagement from the companies. They don't pick specific companies, and they try to do things that interest the companies so the companies will find it worthwhile to engage in it.

Appendix 4: The transcription of Yu' interview

Chinese version

您对产业集群的了解

我国有一些产业集群类的雏形，但是这些产业集群基本是基于产业制造类，对于创新类的研究比教少，您认为，创新推动的产业集群对当地的发展起到什么样的作用？

创新是信息社会，包括目前各个行业进一步发展的动力。创新是保持持续发展的动力，特别是你所描述的，ICT 产业集群内部正需要的是些高技术的产业，在这些产业当中，创新的要求更高，这些集群内很多的产品，很多的公司经营模式，包括管理，这些都来自于知识的创新。理论创新转化为实践，这样是比较好的模式。

三角结构中，政府部门的干预程度？

政府只能作为服务的角色，我们国内一些，产学研，结构的发展，产业一些理念，学校联系起来。政府部门一些资金，起到引导，促进的作用，但真正在这个过程中，产业还是起主导作用。因为，从创新的角度来说，存在这很多的不确定性，这就意味很多的风险性。

在创新产品的研发过程中，学术机构需要科研的基金，这时，政府就需要扮演一个角色，去提供给科研单位这样一些资金，然后，从政府的角度来说，政府的资金是有限的，这就需要企业从中提供这些资金支持的可能，然而从我们的了解，中国的企业是不可以直接对学术科研机构的项目进行直接投资，企业需要首先得到政府的批准，或者直接把资金提供给政府部门，再由政府部门分拨资金到各个学术单位，请问是不是这样的一个过程？

现在也不完全这样，现在中国的企业和科研机构也有这些合作，只不过是项目的形式从而进行合作，

但这这样的形式的合作以后，得出的研究成果属于学校，还是属于企业或者个人？

现在有这样几种情况，一种是，我们现在的科研项目通过教育部门，教育厅，或者是通过省政府，相当于政府的项目，最后是直接和企业，确定相关的合同。这个过程的所有权，如果说是和企业的合作，双方之间协商，资金上也据此商讨。

这样中国的教育的现状是否有利于创新的环境？因为种种弊端，中国很多研究成果多数基于理论。

环境确实是存在很多弊端，例如学校的评价机制，他们对于科研人员的评价机制不合理，学校会要求老师很快的出一些成果，这些都关系到老师凭职称，或者年终奖，这样使得很多的科研项目有很大的功利性。为了很快的达到一些成果，而实际理论是否可行并不能达到保障，并且这些可行性并不能在评价机制上体现出来。但这些情况在逐渐好转，如知识产权以及产学研的推动，使得这些方面在逐步的被重视起来。对于一些重点名牌高校要好一些，然而，这对普通高校还是受到一些影响，因为地方企业会更重视重点高校，而忽略普通高校，导致项目资源不平衡，重点高校的项目做不完，而普通高校的项目不够做。

中国的科研单位给人的印象是教学多一些，科研多一些，反而和商业机构的合作比较少，您觉得这样会对产业集群的发展带来阻碍

现在这样的情况在改变，另外，现在的情况确实有些不合理，这样确实对创新产品有阻碍，使得科研人员没有太大的积极性去搞科研，所以现在的首要情况是能充分调动科研人员的积极性，这样才能和企业充分结合。

需要科研人员能够更灵活一些。

现在我们发现中国的教育制度没有太有利于人才的流动性，例如，中国的高考制度使得学生考到哪个大学就必须到哪个大学学习，这样，是否也不利于，中国高校是否也有这样的发展趋势

这样的趋势是有的，例如上海，由于高校比较多，因此建立一个大学城机构，在这样一些大学城内，学生可以选择去其他学校听课或者选修课，而这些交换在高校之间也是相互承认的，这样极大的促进了高校之间的交流与合作。所以说也是有这样的趋势的。

在长江三角洲地区是否有这样的一种联盟机构，可以把高校和企业联系起来，起到一个中间纽带，中间桥梁的作用。

这些协会当然是有的，但这些都是属于民间组织，从国家到省到市不同的地区都有。这些协会每年都会进行一些活动，由科研机构举办。但这些还是和协会目标挂钩，有些协会例如一些做兼职的协会，他的资金来源不充足，他的相关活动开展的可能就不太好。所以说是存在这些协会的，但协会的运行效果，大不相同。

这些做的较好的协会是否是主要有政府出资来运行的？或者属于其他范畴，如自行组织，学校导向，企业导向？

经费来源充足，专职人员的参与，另外，从学校到政府到企业都要参与，这样就会比较成功。然而一些协会纯粹是兼职，这样普遍比较运行困难。

对于这类的协会，他们的运行资金来源主要从哪里来？

资金主要从会员费来，另外从理事单位来，再由一些就是赞助，政府必须从中管理，来促进产业和学校的结合，或者开展一些小型项目来吸引投资。

我们有两个模式，一个是政府直接干预模式，一个是非直接干预模式，请问，您觉得哪一种模式，更适合中国的情况？

中国范围内，避开政府是不可能的，政府有直属的协会，因此这些机构是由政府部门操控的，所以避开是不可能的，因此当地政府也是需要高度关注这样的发展，这本身就是政府的职能之一，所以要避开也是不可能的，其实产业集群的模式，中国是存在的，但是做不好的原因就在于，内部运作的机制有问题，包括宏观上的结合，没有真正解决问题，具体的无法深入操作。

中国大学的竞争比较激烈，相同区域内竞争更激烈，因为有限的资源会造成一些激烈的竞争，如何解决这样的问题呢？如果建立一个畅通的交流渠道

竞争是很重要的，因为，没有竞争也不利于发展，大学主要是知识的研究和创新。完全封闭的环境不利于发展。中国的大学竞争总的来看还好，并非非常残酷，主要还是协同竞争，当然竞争也有，如同以地区同专业的竞争。当然竞争不会完全影响合作交流。

在中国背景下那一个方面会成为推动产业集群的住动力？

应该还是政府，因为在中国的环境下，很多事情还是离不开政府的支持，政府要先促成这个事情，开展起来后，进入正式轨道后，政府再会慢慢放手。

Translation in English version

There are some existing rudiments of industrial clusters in Chinese market already, but all of these industrial clusters are based on manufacturing production, which focus less on the innovative research. So what kind of role do you think the innovation played in the process of promoting local development?

Innovation is the Motive force of development for the information society and the each industry. As you said before, innovation is the main force to keep sustainable development, and the high-tech is the exact necessary for the internal ICT industrial cluster which requires higher level of innovation. Most of products, the management modes, and academic researchers are all original from the innovation of knowledge. It is the better mode to transfer the theoretical innovation into practical result.

How much is the level of government tempering within the triple Helix mode?

As so far, the government is playing the role of serving which can help to connect some ideas of triple Helix mode with the academic institutions and industries. Some capital from the government can help to play the functions of guiding and promoting. However, within the real process, the industry part is the leading section. So from the perspective of innovation, it seems to be some no determinacy, which means a lot of risks.

During the process of researching innovative products, the academic institutions need the research funding. At this time, the government should play a supporting role to provide with research institution with sufficient funding. However, the funding from the government is limited which require the extract support from the business. From our perspective, Chinese companies cannot invest in the projects of the academic institutions directly. They must get the permit from the government, or they offer the money to the government, and then the government allocates the money into each department of the academic institutions. Is that true?

It does not wholly like that. There are some certain cooperation among the Chinese companies and academic institutions. However, it is in the form of project to cooperate with each other.

In this form of cooperation, to which the final result belongs, the school, companies, or the individual?

The research projects which are in the form of governmental projects can go through the educational department to the companies to make the relevant contact. The ownership of this process can be negotiated among the companies and the academic institutions, the same to the capital.

Dose it benefit for creating the innovative environment with background of Chinese educational situations? As we know that there are tremendous researching results are based on the theory which are lacking of practices.

It is obvious that the background is not good enough for the innovation, such as the evaluation system. It is unreasonable for the researchers, that the school always push them to bring about the result within short time. All these results are directly related to the professional title, or the year-end bonus, which make the research process become more utilitarian. In order to achieve these certain results, some researcher ignored the validity and reliability of the practicality, because these practicalities cannot be represented by the evaluation system. Of course, the situation is continuously changing all the time, such as the implementation of intellectual property and the combination of school, researching, and industry which had promoted the concentrations of these aspects. The thing is that some well-known universities can get more concentrations from the local companies because of their famous brands, while the normal universities may be neglected at the same time. This made the unbalance among the universities that the well-known universities cannot finish the projects in time while the normal universities cannot get enough projects.

The impression of Chinese academic institutions are mostly like the ones with more teaching and researching, while less cooperation with industries. Do you think it will bring a lot of obstacles to the development of the industrial cluster?

The situation is changing now. Of course, it is unreasonable for the innovations and the development of the industrial cluster, because this causes the researcher are not willing to do the research. So the first problem we should solve is to fully stimulate the enthusiasm of the researchers, which may cause the combination with the industries.

We are finding that the Chinese educational system is not flexible for exchange the talents, such as Chinese college entrance exam which lead to the situation that the examiners should study in the exact school which one made the choice before. This system made the obstacle for the talents exchange. While in Sweden, it is

very easy for the students choosing different course in the same university or the different course in different university. Do you think there are some tendencies in Chinese universities?

Yea, we have some tendencies. Take Shanghai for example. Because of the large amount of the universities, Shanghai's government built up a university cluster, in which the students can choose to study, and the credits of these courses are recognized by each university. These forms are highly promoting the communication and collaborations among the different universities.

Are there some kinds of alliance organization with in the Yangtze Delta area, which can connect the universities and the industries?

Yes. But most of them are in the form of non-government organization in various regions.

These organizations hold some activities every year which are related to the research objects of the academic institutions. But the efficient performances of these are not satisfactory.

What are the reasons for the successful organizations implemented?

They have sufficient funding, and sufficient full time participants. Besides, it requires the participations of universities and the industries. Some of them are part-time organizations which may bring them a lot of obstacles.

For these organization, where their implementing funding comes from?

The funding is mainly from the member fee, the council, and the sponsor which is managed by the government to promote the combination of the industries and the schools, or carrying out some small-size project to attract more investment.

We have two modes which are the direct intervention and undirected intervention. Which one do you think is better suit for the Chinese situation?

In nationwide, it is impossible to keep away from the intervention of the government. Some organizations are subordinate units of the government, so these organizations are controlled by the government. The local government shows great attentions to the development of these organizations, that is one of the main duties and functions of the government. But the reasons for not doing so well are the problem of the internal managing system which include the macroscopically combination, that stop in-deep manipulations.

The competitions among the Chinese universities like a rat race especially in the same area. How to solve the problem of the limitations of resource, and multiply the channels of communications?

The competitions are very necessary for the development and innovations. Totally closed channel may not benefit for the development. So called co-petition (collaboration and competition) can promote the development instead of stopping communication and collaboration.

With the Chinese background, which one do you think can be the leading driven force for the development of industrial cluster?

From my perspective, it should be the government. In China, there are some many affairs which cannot be executed without the support of the government. The government should first precipitate this mode, after developing and going into the formal orbit, then the government can have a free hand.

Appendix 5: the transcription of F Kitagawa's interview

I can talk about the Triple Helix model, and mobile cluster. It is initiatively done by the Skåne region. You know, Ericsson and Sony Ericsson in Lund are working with LTH here, and Vinnova. Vinnova here is a kind of Swedish agency of innovation system. Sony Eriksson and Ericsson and some other companies benefit a lot from working with LTH in Lund University for couple of years and their students. The students did their master thesis project based on Ericsson and Sony Ericsson, as the professor know the people in these companies. So this is a kind of organized between university and company which can bring the advantage in this area. The reason for why they are here, they located here, as they were in Stockholm area, they wanted to the skilled people here. So before the triple Helix, it was more like a personal based relationship, that the professor knows the people in companies.

So at the beginning it was not the officially relationship?

This relationship is historically started for 20 years, and it is getting more formalizing recent years. There is one example called mobile Height. Sony Ericsson and Ericsson said the number of engineering students studying at LTH is declining and they find it is difficult to recruit good student. I think it was because the engineering is not so popular, so LTH can not attract many students they used to do. So they thought that could be a problem, because the firms don't want to work with them as they didn't provide with the good human resources. These companies along with LTH spoke to Vinnova, and Vinnova gave fund to make the Triple Helix. So Vinnova can be treated as a sought of public support organization for innovation use Triple Helix model and innovation system model. So they said they want more support and this is typical triple Helix model. Vinnova really wanted to help them, but they don't have sufficient funding, so they asked more industrial input. There are different program in Vinnova, and the one I think is called Industrial excellent centre. There are different program like been excellent is more like Triple Helix program. Vinnova gives fund University, and it is a part of Triple Helix in a way. They provided money and they support industries and universities transferred knowledge. VILGON Skåne you know the local authority that is a kind of regional body. Author is a kind of cross border, but a lot of things happening within Sweden at local level. VILGON Skåne is working with this called mobile Heights initiative; it is involved in the ICT. This kind of typical Triple Helix model here: LTH companies, Local authority, they come up together and set up this industrial center. This is complex structure.

Where is the money come from?

The money comes from Vinnova, so this is the name of the program. The money comes from Vinnova and then the firm and LTH give kind of search funding. So the universities contribute to the search part. VILGON Skåne is giving some money.

The finical support come from the local government, national government, firms, and university contribute in various ways. Then they made this collaboration happened. This is a kind of development shows this problem off, like the engineering subjects. This is a kind of cluster. Finally the authorities get the concern because they want to get the funding in this area.

This example can give how the triple Helix works in a way.

So this kind of organization was billed by the government.

The government played much more important role in this project?

The university asked from Vinnova, and they were working with VILGON Skåne in various ways for many years. The point is the government money put these bodies together in a formal way. They try to make the thing be more formalized with the support of government agency.

The companies want to invest the money in the project of the university; they must transfer from the government.

Is that possible in China that the universities have some companies?

Yes.

Then they can get the money from the industry.

It is illegal way for the companies invest money directly in the university. This is constraint way.

I also want to ask some situations in Japan?

It is not so simulated to Chinese situations. If there is a lot of industrial money coming in may probably make it

much easier. This has to be more specific in your thesis. Actually there is some informal way that the professor could work with the firms. What is the situation in the University of Beijing?

The situations here are more like the graduate students from these universities, they wanted to open the new companies, and then they tried to get the venture capital from the government. It is not similar with Oresund Region. Because in Oresund, it is more like the companies have been existed for a certain time, and then they tried to get together to build up the cluster. So in China, these companies get the public funding from the government.

Here, it took 30 years. So IDEON is 25 years which is the oldest science park in Sweden or in Scandinavia. I have developed over the time. You can't say it is the normal cluster. Sweden has unique situation as well, because there are more industrial money coming in. but in China, it could be deregulate in a way. What happens here is the university professor could set up their own firm apart from the university. It is difficult to say it is a part of university at all. So it is a kind of strange situation in Sweden, but it might be good for the cluster. It may encourage the knowledge, but from the university point of view, it is not really good, because the professor might be using their own research resources from the university. Such as the software, the professor might use the software from the university. It is normally here in Sweden. If you explore this triple Helix model, you should be aware of this IPR model. But the situation is probably different in China and in Sweden. Sweden is very unique, because Sweden, individual hold IPR right, but in somewhere else, the professor don't want to use the software, but the university says that's all right. So they have to agree with the right. When you talk about the cluster, there are different players, the individual professor; the university department thinks different things. So this is the situation here which is little bit complex. The situation changed in Japan tremendously since 1998. The government decided to change IPR in Japan; it used to be like here in Sweden, because the cultures have the gape. The professor did the academic work, and some professor work with the firms, thus much cooperation happened but not much. Then the law changed, and the IPR used to be individual professors', but now is universities which own the IPR. So lots of TLO (technology life from offices) A lot of university organizations work with technology officers, these people want to encourage university research to be commercialized. So over the last ten years, there are very much colleges try to do these in the local areas. But then the situation here become big similar to China, because there was very much public money with this situation. They are always in industrial money, but company stop in that till they find beneficial, obviously in short term and long term.

Both government ministry developed cluster policy. This ministry in education tries to promote basic research, and another ministry trade industry. They called it collaborate because they need to connect things, but as this case, it is difficult for government to really get active. So it happened after 10 years in LTH, and university changed to legal five years ago in 2004 in April. The national universities are very regent. Probability in Chinese that they are all national, that public body of university. The government thought that in order to make this market transaction, the university should be more privatized. There are seven hundreds national universities in Japan and 89 university are national (they are public), and then the rest are private, so private universities are private, but the national universities' research are more public bodies. The government tries to make the national universities more independent, that they have to do more commercialized activities.

The professor may not be willing to do research if the research will not be belonging to them.

There are some agreements that the professor can get 30% or 40%. It is very hard to do theses, I think in Sweden, a lot of companies support to do this. In Japan, the university helps the professor to do this, because it is very expensive to explore and keep it, and you need a lawyer to support this, to give the card that all these are of your own. So the professor has to consult the legal experts, and it is very expensive that the university has to get the budget to support this in a way. They take their own. The professor can get a lot of public support as well. There are lots of good things that the graduate students can do their research and a lot of experiments. I think there is too much policy expectation before, and it is not as good as they thought.

Are there some other policy support the university in Japan?

There are a lot of program and budges that they could apply for; they could apply the research money for cluster program.

Chinese cluster is still in the starting stage, what kind of policy should be made to support?

The companies which got the support from the government cannot be alone. I think the policy should be attractive, and drop a lot of money as the policy tool. As Oresund region, it is a long term cluster. The

companies here are all more than 10 years old before the cluster was built. So it has to be purchased a long term perspective, and it is not a kind of one-off policy. Oresund region is really good interface mechanism, and coordinating companies and university. But it is a kind of support mechanism. The Oresund can be seen as one entity. The application to Chinese situation is complicated; you have to be carefully prepared.

Appendix 6: the transcription of Benner`s interview

As well know that the government policy in China and Oresund are quite different. When we conducted the interview with Gustafsson who working in Oresund IT, we got his opinions that the IFCs should be located in the middle area between industry and academic institution, instead of directly related to authority office (government). The ICT cluster should be better bloom up, not established by plan.

No, no. The cluster is rather a loose organizational form. It`s more kind of network than an formal organization. They do not have very many recourse from government. They don`t have big program to implemented. Instead, it`s more kind of talking club and maybe you know the project of medicine valley, which is a successful case in Oresund. It`s not like in China. You have a powerful public organization to implement policy. In Scandinavia, this is more a kind of bottom-up network. You never impress when you went to the office of Oresund IT, which looks not formal organization. They (Oresund and Yangtze) would be two quite different models. For example in China and many other countries...The Oresund model is more based on networking, interacting and sharing.

As we know you are conducting a research about government policy. Referring to this topic, could you talk about how Swedish government makes decisions for cluster development? As Gustafsson`s opinion, they do not distribute the position to somebody.

In academic area, actually they support several different universities, which funded by state. For example, we have agency of innovation funded by government, which we call vanova. We have another agency support regional development, call regionskane. Of course, there are others also support the research and academic institutions. It`s not fragment, but very pluralistic. There are many different initiatives coming from many different forms. Otherwise initiatives take part in different sections in this region, one for business, one for government, and one for academy. But in fact the states do not have coordinated that we should have an ICT cluster in Oresund which is the best in the world by the year 2020. That is not kind of policy we expect. What we expect is the coordinating organizations help communication between all of these different participants, instead of those old bureaucracies. They (government) should not decide somebody to do this or that. That is a good point, because it (cluster) is a flexible system. if the cluster is formed by strategy plan, ok, we have a general goal. If we do not reach that goal, we fail. But if we do not have some measurable goals we can`t forever (fail). In Oresund, we do not have such ground goals. However the drawback of Scandinavian policy is that we don`t have goals at all. So that require we must have to coordinate the cluster just like what the people in Oresund IT do. They bring together all of these actors that support innovation and collaboration in ICT sector including companies and universities, but not as a part of state agency or a part of policy makers. They look more like round table. People are talking and talking, everybody tries to make connection between each participant in order to get them involving in ICT field. But we actually do not decide you or you to do something, we are not the king or queen. We always have something to learn about in this field. We are equally strong. University has an interest in ICT because it is important research field and important for education and research. State agency has an interest in ICT, because it helps the economic growth, technology development, creation of job opportunity and increase of the wealth of society. Industry, of course engages in ICT cluster, because of the huge commercial opportunity. However, industry would never accept the condition like this (our old model). If university tells industry what to do, this is unacceptable for industrial company. On the other hand, university would never accept industry`s command, like "you should do this, no more software engineering in Lund university." If you construct some ICT cluster project by certain strategy plan, you would never achieve the collaboration at all. As I said before, we are equally strong, you are strong on production, and you are strong on regulation. I am strong on knowledge generation. Then we can collaborate and get something from that. You can never decide over her , or over me. This is kind of idea behind Oresund IT.

Kitagawa told us that there is a research center in this building, which takes the role as the coordinator who communicates with academy and industry. Could you talk about it?

That`s true. Their job is coaching for academy. Let`s say that you have a brilliant idea, you have come across something in your research. As an academic people, it is difficult to explore it into commercial application. Then they (coordinator) come to help you, it sounds like a bridge in academic environment to market. To be honest, most of academic people do not have good knowledge about market. So it`s very necessary to have such organization assist us to transfer our findings into business.

Can I say that the organization help researchers sell their study to business? This is some kind of innovation. So what about the government aptitude referring to this?

The government aptitude is positive. The government regards it as an important source or wealth to creation.

So the government is very keen on stimulate the innovation by connecting the university and industry. Because it would benefit the whole society by creating more job opportunities, promoting productivity and so on. Thus there are a lot of political supports for cluster and innovation projects, a lot of state money are put into such commercializing.

But this kind of commercializing is based on the ownership of research findings. According to Fumi's opinions, the research outcomes belongs to research themselves not university or research institutions, right. But in china, it is impossible.

Of course, that is typical in Sweden. If I do something, if I come across something in my work, I own is not university or government. Of course when I conducted my research, I use the resource of university or something. But it can't be the reason of erasing my crucial contribution to my research. If I want, I can right it over, I can give the university ownership, but the starting point is I own it. That also means I have to be connected. If I apply it into commerce, it would be hard even impossible for me. They are too different fields to get familiar with, not only for Oresund but also for every part of the world.

I just wonder how to measure such success of the cluster development.

It is really complex. You never know how it works well. There is a project which tries to measure the cluster's success globally. Just like what you do currently. Cluster is loose structured and open mind environment. In Europe, there are two types of cluster development. One is to try to force ICT into traditional business style, business organization style. In the other one, people tend to interact socially. In Sweden, we definitely prefer the latter one. But this kind of organization is hard to measure, because the success is largely related to the cultures, social environment which is too complex to see.

But in China, things are different, most cluster and science park are originated by government or largely dependent on the governmental funds, perhaps you know that. That requires the cluster project must achieve something which can be measured visibly. When we talked with Gustafsson, he looked totally disagree about such kind of cluster style.

Yes, I agree with him. Actually it is constructed cluster in the way. People in Oresund IT reflect the fact that there are so many organization around, but they don't ask for guides. Instead, they of course like some kind of meetings, space...but they can never accept the order from government. And they don't need to do this. I have to say this is very different from China.

While top-down, government is more important than other bottom-up cluster. you need to find the need for collaboration and communication. But you cannot tell...It is impossible to tell you and him to cooperate in that project and get some home work to do. Instead, we put these two (academy and industry) together, we make them together, we put them with food, drinks in the room. So it is more close to a kind of facilitated collaboration than enforcing collaboration. Maybe they just talk and cannot get something in common. But it really doesn't matter for cluster, because building a personal network is one of the key task for our, even the most important one.

You just mentioned Sony Ericson, which is very strong company in this region, like Nokia in Finland and Sony in Japan. Actually they drive some research and ICT project to serve their business.

Of course, Sony Ericson is very big company in Oresund ICT cluster, but in fact it doesn't control ICT cluster. The same thing is for Nokia in Finland. Although almost every important project cannot live without the support from these central firms, it does not mean that cluster is controlled by any participants.

We have read some cluster cases in Europe, most of them have been started with the financial support by government in the beginning stage. Do you agree with that?

Sure, sure, actually in Oresund ICT they get some funds and a lot amount of money from government. I do not know the budget of Oresund IT. It is supposed to cost a large amount of money for Shanghai cluster, I guess. While in Oresund, we only need this start money to facilitate collaboration. Then of course other resource from industry and university would come into the cluster.

Like you said before, cluster is implemented by facilitating not by planning. If it is possible that the running system of cluster is out of control, and cause some trouble for industry and government. Also what is the difference between the bottom-up and top-down style for cluster's innovation system.

I have to say that cluster depends on soft plan instead of traditional plan. Take Oresund ICT cluster as a

example, industry has to find the interests, and academy has to find their interests. Then maybe industrial company comes to university and talk about cooperate something. Then university says fine. This is what we expect, a kind of soft plan. Comparing to this, traditional plan is to set up goals, to see who are available and what is available, and then put them to work. For us, how to make them (industry and academy) talk is the major task. You see the different? Top-down: set up goals, appoint project participants and tell them what to do. While bottom-up: find who are in the fit, think about how to bring them together, and unit them, then support their projects.

Appendix 7: On-line survey and data translation

Our survey was conducted through the website of surveygizmo.com. Before analyzing the dataset, it is necessary to transfer the information which collected by online survey to the data which can be used for SPSS. The transformation system is shown in the questionnaire. For example: question 3: How much do you know about the Science region or cluster? We transfer the information into the numeric data, like A. nothing (-1`), B. a little (1`), C. normal (2`), D expert (3`). The rest details are shown in the every question.



Thank you for agreeing to be part of our online survey. We appreciate your feedback. Please fill out the following form for our records. It will take you about 15 minutes.

Our research is non-profit and groups focused on academic purpose. It's free of commercial interests.

The questions with "*" are required answers to be able to submit your response.

1. Where do you work?

- A. Oresund region (1`)
- B. China (2`)
- C. Other (3`)

2. Please specify your working city:

3. Which organization do you currently work in?

- A. Academic institution (1`)
- B. Government (2`)
- C. Industry (3`)
- D. Cluster-based institutions (cluster association) (4`)
- E. Others (5`)

4. How much do you know about the concepts of a science region or industrial/regional cluster?

- A. Nothing (-1`)

- B. A little (1`)
- C. Normal (2`)
- D. Expert (3`)

5. How much does your current cluster in your region provide an effective platform to promote the regional development of the economy?

- A. Definitely not (-1)
- B. Not so significant (0)
- C. Normal (1)
- D. Very much (2)
- E. No opinion (3)

6. Please identify the influential factors which are important for the success of cluster development in your region, and rank them?

- _____ Government support
- _____ Basic facilities
- _____ Networking partnership
- _____ Innovative Technology
- _____ Involvement of large firms
- _____ Access to finance
- _____ Specialist services
- _____ Access to markets
- _____ Leadership
- _____ External economic impact
- _____ Competition
- _____ Other (to be specified in question 9)

7. According to your opinion, what are the main goals of the cluster in your region? Please choose your preferences and rank them.

Star rating (5 in total)

- Reduce the competition in the cluster _____
- Establish technical standard _____
- Conduct private infrastructure projects _____
- Co-ordinate purchasing _____
- Provide incubator services _____
- Improve regulatory policy _____
- Improve FDI incentives _____
- Lobby government for infrastructure _____
- Enhance production processes _____

- Diffuse technology within the cluster _____
- Provide business assistance _____
- Promote exports from cluster _____
- Create brand for region _____
- Attract new firms and talent to region _____
- Promote innovation, technologies _____
- Promote the communication among firms, government and academic institutions _____
- Other (to be specified in question 9) _____

8. Which should be the main financial resources for the cluster initiative and maintenance in your country?

- A. Government budget (1`)
- B. Member fee (2`)
- C. Investment from industry (3`)
- D. Public Funds (4`)
- E. Other (to be specified in question 9) (5`)

9. This question follows the last three questions. If you have any opinions about the "other" choice of NO.6, NO.7 and NO.8, please specify them here.

- () Question 6
- () Question 7
- () Question 8

10. Which type of cluster initiative do you think is suitable for the current situation of your country?

- A. Government-lead (1`)
- B. Industry-lead (2`)
- C. Academic-lead (3`)
- D. Public association-lead (4`)
- E. Other (5`)

11. In your opinion which part should be responsible for the infrastructure of your cluster? (For instance the ICT infrastructure, buildings and so on)

- A. Industry (1`)
- B. Government (2`)
- C. Academic institution (3`)
- D. Cluster association (4`)
- E. Other (5`)

12. In which type of cluster are you currently involved in?

- ICT
- Life Science
- Production technology
- Environment
- Biopharmaceuticals
- Food
- Other

13. Have you ever participated in the educational and technical training of the cluster institutions provided? If yes, please specify the purpose?

- No, have not such experiences.
- Yes, provide management training
- Yes, facilitate higher innovation
- Yes, promote new innovation and technology
- Yes, analyze technical trends
- Yes, diffuse technology within the cluster enhance production process
- Yes, establish technical industry standards
- Yes, other

14. When your cluster was supposed to be established, which one do you think should have played a role as the leader?

- A. Government (1`)
- B. Industry (2`)
- C. Academic institution (3`)
- D. Cluster-based institution (cluster association) (4`)
- E. others (5`)

15. Do you agree that the local government decision maker is the crucial part for implementing the performance of the cluster?

- A. Totally disagree (-2`)
- B. Disagree (-1`)
- C. Neutral (1`)
- D. Agree (2`)
- E. Extremely agree (3`)
- F. No opinion (0`)

16. How much do you trust the government policy for growth of the cluster?

- A. Strongly (3`)
- B. Partly (2`)

- C. A little (3`)
- D. Not at all (-2`)
- E. Hard to say (-2`)

17. According to the four stages of cluster life cycle as specified, which stage do you think your cluster is at the moment?

- A. Starting - those at the early stages of growth
- B. Growing - those perceived as having room for further growth
- C. Maturing - those that are stable or will find further growth difficult
- D. Recession - those have reached their peak and are failing or declining –clusters at this stage are sometime able to reinvent themselves and enter the cycle again

18. Please point out any aspect of the cluster which is not satisfactory.

- Poor consensus
- Weak framework (structure)
- Poor facilitations
- Lack of financial support
- Too much government interference
- Too little government interference
- Lack of fluent communication among stakeholders
- No idea
- Other

19. What is the situation of your institution`s facilities?

- Have own facilitates
- Share the facilitates with other companies
- Depends on the particular task
- Other

20. How much do you trust your partners (or competitors) who stay in the same cluster?

- A. Strongly (1`)
- B. Partly (2`)
- C. A little (3`)
- D. Not at all (4`)

21. If a company intends to invest into the academic research (University), which type of investment method do you think is the best choice for the company?

- A. Direct investment to university (1`)
- B. Give the funds to government (indirect) (2`)

- C. Give the funds to cluster-based association (indirect) (3)
- D. Other (4`)

22. Do you think it is necessary for a company to keep a long-term intention of investing in academic research?

- A. Yes (2`)
- B. Yes, but not the long-term investment (1`)
- C. No (-1`)
- D. Hard to say (0)

23. According to the current situation of your cluster, do you think the investment channels to academic institutions are convenient?

- A. Yes, the channels of research investment are unblocked and convenient (1`)
- B. Inconvenient, with a lot of interferences from outside. Please specify some (2`)
- C. The channels are not so good, still need some improvement (3`)
- D. Hard to say (4`)

24. What do you believe are the major tasks for your cluster in the near future? (this question comes from the ICT sector survey, 2009)

- () Promoting business industry capabilities outside the region
- () Pursuing a broad business investment strategy
- () Pursuing investment in niche certain areas
- () Encouraging local companies to be more innovative and globally focused
- () Encouraging the local industry to be more collaborative
- () Supporting future infrastructure enhancements
- () Maximizing opportunities for industry engagement with local research institutions
- () Assisting education and training providers to align their courses with industry needs
- () Encouraging business adoption within the general community
- () Encouraging own cluster's adoption within others local businesses
- () Establishing an environment that supports innovation within each industry
- () Developing business center
- () Other

25. If it is possible to renew the cluster in your region, what do you think is the major obstacle which should be resolved firstly?

26. In your opinion, is there any important issue that should be addressed for the cluster development that we haven't already covered in this survey?

27. If you would like to have our summary of report, please give us your email address:

Appendix 8: transfer survey data into SPSS

Variable view

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	ResponseID	Numeric	12	0		None	None	8	Right	Scale
2	Country	Numeric	4	0		{1, Oresund}	None	8	Right	Scale
3	City	String	11	0		None	None	8	Left	Nominal
4	WorkingInst	Numeric	3	0		{1, Academic	None	12	Right	Scale
5	KnowledgeAb	Numeric	4	0		{-1, Nothing}	None	8	Right	Nominal
6	TrainningEx	Numeric	8	0		{0, No}...	None	8	Right	Scale
7	ClusterInfl	Numeric	3	0		{-1, Definite	None	8	Right	Nominal
8	ClusterInit	Numeric	4	0		{1, Governmen	None	15	Right	Nominal
9	MajorFinanc	Numeric	4	0		{1, Governmen	None	6	Right	Nominal
10	Infrastruct	Numeric	4	0		{1, Industry}	None	8	Right	Nominal
11	ClusterLead	Numeric	4	0		{1, Governmen	None	8	Right	Nominal
12	GovernmentI	Numeric	8	0		{-2, Totally	None	8	Right	Scale
13	TrustPolicy	Numeric	8	0		{-2, do not t	None	8	Right	Scale
14	LifeCycle	Numeric	5	0		{1, Starting}	None	8	Right	Nominal
15	Ownershipof	Numeric	8	0		{1, Have own	None	8	Right	Scale
16	TrustParner	Numeric	8	0		{1, not at al	None	8	Right	Scale
17	InvestmentP	Numeric	8	0		{1, Direct in	None	8	Right	Scale
18	Willingness	Numeric	8	0		{-1, No}...	None	8	Right	Scale
19	Conversatio	Numeric	4	0		{-1, Not conv	None	8	Right	Scale

Data view

Country	City	WorkingInstitution	KnowledgeAboutCluster
2	Shanghai	3	1
2	Nanjing	4	1
2	Shanghai	4	2
2	Shanghai	3	2
2	Shanghai	3	2
2	Shanghai	1	2
2	Shanghai	3	-1
2	Nanjing	3	2
2	Wuxi	3	-1
2	Yangzhou	1	2
2	Shanghai	3	2
2	Yangzhou	1	2
2	Yangzhou	1	2
2	Yangzhou	3	2
2	Yangzhou	1	2
2	Yangzhou	1	2
2	Yangzhou	3	2
2	Yangzhou	1	1
2	Yangzhou	1	2
2	Yangzhou	1	2
2	Yangzhou	1	2
2	Yangzhou	1	2
2	Nanjing	3	1
2	Shanghai	3	1
2	Changzhou	3	2
2	Yangzhou	1	2

2	Yangzhou	1	2
1	Lund	1	1
2	Shanghai	1	1
1	Malmo	1	1
1	Lund	1	1
1	Lund	1	1
1	Lund	1	1
1	Lund	1	1
1	Lund	1	3
1	Lund	1	3
1	Lund	1	3
1	Copenhagen	3	3
1	Bangkok	1	3
1	Lund	1	3
1	Lund	3	3
1	Lund	4	3
1	Copenhagen	1	2
1	Copenhagen	1	2
1	Malmo	4	2
1	Copenhagen	3	2
1	Copenhagen	1	2
1	Copenhagen	4	2
1	Copenhagen	1	2
1	Malmo	4	2
1	Copenhagen	1	2
1	Lund	1	2
1	Lund	4	2
1	Malmo	3	2
1	Copenhagen	1	2
1	Copenhagen	1	-1

TrainingExperience	ClusterInfluence	ClusterInitiative
1	2	1
0	3	1
0	-1	2
0	3	1
1	-1	2
1	3	2
0	0	1
0	3	1
0	-1	1
1	2	1
0	2	1
0	3	1
1	3	1
1	2	1
0	2	1
1	2	2
0	0	2
0	2	1
0	2	2

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0	3	1
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0	-1	2
0	-1	2
0	3	2
0	2	2
0	0	2
1	3	2
1	0	2
1	3	4
1	3	2
0	2	2
1	2	2
0	3	2
0	3	2
0	2	2

MajorFinancialResources	InfrastructureResponsibility	ClusterLeadership
2	1	1
3	4	2
3	1	2
3	2	2
3	4	2
2	3	2
3	1	4
2	4	2
3	1	1
3	2	4
3	1	1
1	2	2

3	2	2
1	2	4
1	2	2
3	2	4
3	2	4
3	2	1
1	2	2
3	4	2
2	4	4
3	2	4
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1	2	4
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1	4	4
3	4	4
5	4	4
2	1	2
2	2	2
5	4	4
1	4	1
3	1	1
4	1	2
3	1	3
1	2	1
2	1	3
1	1	1
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3	2	3
3	2	1
2	4	4
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1	2	1
4	2	4
1	1	2
1	1	2
3	2	4
3	4	4
1	1	3
3	2	2
1	1	1
1	1	2
1	1	3
3	1	2
3	2	3

GovernmentInfluence	TrustPolicy	LifeCycle
3	1	2
1	3	3
2	2	2
2	2	3
2	2	2

2	2	3
3	1	4
3	1	2
2	2	2
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2	2	2
2	2	2
2	2	2
2	2	2
2	2	2
3	1	2
0	0	2
1	3	2
2	2	2
3	1	4
2	2	2
2	2	3
3	1	1
3	1	2
2	2	2
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2	3	2
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-1	1	2
1	0	2
-1	1	3
2	2	3
2	2	2
2	2	3
-1	1	2
2	-2	3
1	2	2

OwnershipofFacilitates	TrustParners	InvestmentPreference
3	3	1
3	4	3
3	3	2
3	3	1
3	2	2
3	4	2
3	3	3
3	3	3
3	2	2
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1	3	1
1	4	3
1	4	1

4	2	1
1	4	3
2	2	1
4	3	1
3	2	1

WillingnessofLongtermCooperation	ConversationalChannel
1	0
1	0
2	0
2	0
1	0
0	0
1	0
1	0
2	0
2	0
1	0
2	-1
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2	2
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0	0
-1	0
0	0
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2	0
2	0
2	1
2	1
2	1
2	0
2	2
0	2
2	0
0	1
0	0

Appendix 9: Diamond analysis for Yangtze Delta area

	Strengths	Weaknesses
Factor (Input) conditions	<p>6. Human Capital:</p> <ul style="list-style-type: none"> Attractive area of Human resources: 244 higher educational institutions R&D human resources from national critical universities which had high quality Returnee: the numbers of returnee back from foreign countries is increasing Entrepreneurship: natural drive for entrepreneurial spirit and skills <p>7. Public Infrastructure:</p> <ul style="list-style-type: none"> More than 100 billion RMB budget 'Focus on Zhangjiang' policy Improved traffic facilities Reliable electricity supply <p>8. Education & research infrastructure:</p> <ul style="list-style-type: none"> Yangtze Delta is relevant more advanced than other regions More Chinese students were supported to study abroad: amount of oversea student is up to 118515 <p>9. Information infrastructure:</p> <ul style="list-style-type: none"> Generally ICT infrastructure has been developed <p>10. Venture capital:</p> <ul style="list-style-type: none"> total amount of 1.5 billion RMB are launched in 2009 	<p>1. Human Capital:</p> <ul style="list-style-type: none"> Brain drain: weaker competitive compared to other cosmopolitans <p>2. Public Infrastructure:</p> <ul style="list-style-type: none"> High transportation costs: the ratio value of transportation fee from Shanghai to Suzhou is 0.002 (4 dollars / 2000 dollars), while from Malmo to Copenhagen is 0.00037 <p>3. Education & research infrastructure:</p> <ul style="list-style-type: none"> The sheltered education system Ownership of research findings: Weak academic network <p>4. Information infrastructure:</p> <ul style="list-style-type: none"> Monopolized industry: China Mobile and China Unicom are the typical monopolized industries
Demand conditions	<ul style="list-style-type: none"> Few domestic firms have relevant complex design and manufacture and brand manufacturing activities. ICT products with higher quality can be satisfied with customers more quickly Many firms have inserted into global commodity chains Huge potential of home market 3G technology has fully stimulated the national market: 33000 users have became the TD-SCDMA users 	<ul style="list-style-type: none"> Buyer sophistications are low
Context for firm strategy and rivalry	<ul style="list-style-type: none"> Most IT firms in China are therefore process improvement-oriented firms that offer the value-propositions of 'operation excellence. (Hsien-che Lai,2005) 	<ul style="list-style-type: none"> Most ICT products are purchased by assemblers and sold as a part of a completed system
Government	<ul style="list-style-type: none"> New Five-Year Plan of Chinese government Risk fund from government the local government of Shanghai has set up several IFCs project of ICT cluster 	<ul style="list-style-type: none"> Overload support from government may cause dependences of the firms Too much controlling from government may cause monopolized industry
Related and Supporting Industries	<ul style="list-style-type: none"> Non-profit association government of Shanghai has set up several IFCs project of ICT cluster 	<ul style="list-style-type: none"> Lack of central firm

Bibliography

• Interviewees

Moodysson, J. CIRCLE, Lund University, April 15th, 2009

Kitagawa, F. CIRCLE, Lund University, April 22th, 2009

Gustafson, M. IT-Oresund, April 24th, 2009

Yu, W. Yang Zhou University, April 27th, 2009

Benner, M. CIRCLE, Lund University, May 07th, 2009

• Reference

Aubert (2005). Bounfour & Edvinsson. www.worldbank.org.

Bondesson, A. & Stahl, N. (2008). *Growing up is hard to do, Managing Creativity within the Creative Game Industry*. Master thesis in Informatics, department of Informatics, Lund University.

Cannon, J., Dunn, M., Tompkins, G. & Prasad, S. (2008). Washington, D.C. MSA IT/ tech services cluster. *Microeconomics of Competitiveness* May 2, 2008.

Chen, T.J.(2008). *Industry Cluster's Innovation Network Structure and Competitiveness in Zhejiang Province*. College of Business and Administration, Zhejiang University, 2008.

Christopherson, S., Kitson, M. & Michie, J. (2008). Innovation, networks and knowledge exchange, *Cambridge Journal of Regions. Economy and Society* 1,2008 pg 165–173.

Cooke, P. (2001). Regional Innovation System, Clusters, and the Knowledge Economy. *Industrial and Corporate Change Journal* 10 (4), 2001 pg. 945.

Creswell, J.W. (2007): *Qualitative inquiry and research design: choosing among five traditions*. 2nd ed. Thousand Oaks, Calif. Sage Publications.

Dahlman, C. & Aubert, J.E.(2005). *China's development strategy: the knowledge and innovation perspective*. www.worldbank.org.

Eisner, E. & Peshkin, A. (1990). *Qualitative inquiry in education: the continuing debate*. Teachers College, Columbia University, New York.

ElSayed, A.A., Kulich, R., Lake, L., & Megahed, S. (2006). *The Chinese Apparel Cluster in Guangdong*. Harvard Business School.

Epitemic, L.H. (2005). Communities and Cluster Dynamics: On the Role of Knowledge in Industrial Districts. *The Journal of Industry and Innovation* 12 (4), 2005 pg 433.

England's regional development agency. *A Practical Guide to Cluster Development*.

Finegold, D., Wong, P.K. and Cheah, T.C.(2004). Adapting a Foreign Direct Investment Strategy to the Knowledge Economy: The Case of Singapore's Emerging Biotechnology Cluster. *European Planning Studies journal* 12(7), October 2004.

Furman, J.L., Porter, M.E. & Stern, M.E. (2002). the Determinants of National Innovative Capacity. *Research Policy Journal* 31 (6), 2002 pg 899–933.

Gilgun, J. F. (2005). "Grab" and good science: Writing up the result of qualitative research. *Qualitative Health Research Journal* 15, 2005, page 256-262.

Hansson, P, Littorin, H. & Svensson, F. (2007). *A First Effort to Visualize Knowledge of a Region – A visualization of Öresund & Shenzhen in the perspective of Knowledge Innovation Zones*. Lund University, the School of Economic and Management, Master thesis, June, 2007.

- HsSIEN, C.L. & YI, C.C.D.L. (2005). Innovation Capacity Comparison of China's Information Technology Industrial Clusters: The Case of Shanghai, Kunshan, Shenzhen and Dongguan. *Technology Analysis & Strategic Management Journal* 17 (3), 2005 pg 293–315.
- Israel, M. & Hay, I. (2006): *Research ethics for social scientists: between ethical conduct and regulatory compliance*. Thousand Oaks, Calif., Sage Publications, London.
- Ji, Y & Zhang, Y.(2006). *Comments on a Viewpoint of the Strategy of "Chinese Enterprises' Development in Foreign Countries"*. *Journal of China Institute of Industrial Relations* 7 (4), 2006.
- Ketels, C. (2003). *The Development of the cluster concept – present experiences and further developments*. Harvard Business School, 2003.
- Kvale, S. (1996): *Interviews: an introduction to qualitative research interviewing*. Thousand Oaks, CA, 326pp, sage publications.
- Legendijk, A. & Cornford, J. (2000). *Regional institutions and knowledge - tracking new forms of regional development policy*. Geoforum. Pg.209-218.
- Lai, H.C. & Joseph, Z.S.(2005). A comparison of innovation capacity at science parks across the Taiwan Strait: the case of Zhangjiang High-Tech Park and Hsinchu Science-based Industrial Park, *Technovation Journal* 25, 2005 pg 805–813.
- Lee, C.K. (2009). How does a cluster relocate across the border-The case of information technology cluster in the Taiwan–Suzhou region? *Technological Forecasting & Social Change* 76 (2009). pg. 371–381.
- Lilit, D., Shahnaz, M, Carlos, R.G & Bagrat, T.(2006). *Armenian IT Cluster*, Harvard business school, Master thesis, 5 May, 2006.
- Lundin, N & Serger, S.S. (2007). *Globalization of R&D and China– Empirical observations and policy implications*. IFN Working Paper No. 710, 2007.
- Lord Sainsbury(n.d). *Biotechnology Clusters Report*. Minister for Science.
- Mudd, T. (2001). *Bridge to Bilateralism*. Industry Week Journal, Oct 2001 pg. 69.
- Marilyn, M.H. (1999). How to be successful in China: a SWOT analysis. *Competitiveness Review: an International Business*, 9 (2), 1999 pg 1-10
- Oakes, J.M. (2002) *Risks and wrongs in social science research: an evaluator's guide to IRB*. Evaluation REVIEW Journal, 26 (5) 2002 pg. 443-479.
- Osborne, R.D. (2006). Cross-border Higher Education Collaboration in Europe: lessons for the 'two Irelands'. *European Journal of Education* 41(1), 2006
- Paija,L. (2000). *Industrial network relationships in the Finnish ICT cluster*, The Research Institute of the Finnish Economy, 8 May, 2000.
- Porter, M.E. (1990). *The Competitive Advantage of Nations*. Free Press, New York, 1990.
- Porter, M.E. (1990, 1998) "*The Competitive Advantage of Nations*", Free Press, New York, 1990.
- Porter, M.E. (1998). *On competition*. Thousand Oaks, Calif., Sage Publications, London.2006.
- Seale, C. (1999). *The quality of qualitative research*. Thousand Oaks, Calif., Sage Publications, London.
- Singer, J &Vinson, N.G. (2002). Ethical Issues in Empirical Studies of Software Engineering. *Transactions on software engineering* 28(12), 2002.
- Sölvell, O., Lindqvist, G & Ketels, C.(1990). *The Cluster Initiative Greenbook*. www.cluster-research.org.
- Sigurdson, J.(2004). *Regional innovation system in China*. Working paper No. 195, 2004.
- Strauss, A. & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA. Sage publications.

Uotila, T., Melkas, H. & Harmaakorpi, V (2005). *Incorporating futures research into regional knowledge creation and management*. *Futures Journal*, 37,2005 pg 849–866.

Weis, L. & Fine, M. (2000). *Speed bumps: A student-friendly guide to qualitative research*. Teachers College Press, New York, 2000.

Wolff, M. F. (2003). Biomedical Cluster Blossoms In Scandinavia, News and Views of the Current Research. *Technology Management Scene Journal*. July-August 2003

Wu, X.B., Zhang, W & Qiu, L.P. (2005) *Technology Introduction in China's Industrial Cluster: a Case Study*. School of Management, Zhejiang University, 2005.

Yao, W. & Chen, J.(2008) *Knowledge Spillover from Universities to University Science parks: Evidence from Chinese Park-level Data*. School of Management, Zhejiang University, 2008.

Yin, R.K. (2003): *Case study research: design and methods*, 3rd ed., Thousand Oaks, CA, 181 pp, Sage Publications.

Zeng, S.X., Liu, H.C., Tam, C.M. & Shao, Y.K. (2008). Cluster analysis for studying industrial sustainability: an empirical study in Shanghai. *Journal of Cleaner Production* 16, 2008.

Zhan, Y. Z., Chen, L.F., Chen, H.B. (2008). Analysis of IC industrial cluster competitiveness in Shanghai based on the diamond model. *Analyst Journal*, 8, 2008, pg. 270-271.

Zhu, D. & Tann, J. (2005). A Regional Innovation System in a Small-sized Region: A Clustering Model in Zhongguancun Science Park. *Technology Analysis & Strategic Management* 17(3), 2005 pg.375–390.

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CIRCLE <http://www.circle.lu.se/>

IT-Oresund <http://www.Oresundit.org/>

YZU <http://www.yzu.edu.cn>

The University of North Carolina http://www.unc.edu/depts/wcweb/handouts/literature_review.html

Wikipedia http://en.wikipedia.org/wiki/Literature_review

Swot-wikipedia http://en.wikipedia.org/wiki/Strategic_planning#Elements

ICT sector survey http://www.ballaratict.com.au/bict_2030/cb_pages/ICTSectorSurvey.php