Gown and Town: University Spatial Development and Urban Transformation in the Knowledge Society ---- The Case of Shanghai

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Abstract

In the past few decades, we have seen an increasing and even the leading role of universities in urban development. Universities are involved actively in providing public service besides their traditional activities in teaching and research. The cities, as the hosting place of universities, are gradually transformed by the increasing engagement of universities in territorial adjustment, economic restructuring, and institutional improvement. The relationship between the university and the city has great influence on the space of university and is vividly reflected in the process of university spatial development – the spatial practices of universities that embrace the particular locations and spatial sets characteristic of the social formation, the representations of space that are tied to the relations of production and to the order those relations impose, the representational spaces that are linked to the clandestine or underground side of social life.

This research will examine the changing town-gown relations in the knowledge society by exploring the dynamic between university spatial development and urban transformation. The research is focused on the global scenario about university engagement and takes into consideration theories and discourses about the production of space, the knowledge society, global cities, state-market dialectics, and urbanization. Cognition about the university is approached from both a socio-spatial perspective and a spatio-temporal perspective. The socio-spatial interpretation is focused on the role of universities in the knowledge society while the spatio-temporal interpretation examines the evolution of universities in the Chinese history. Analysis in the research is carried out at three scales – global, national and local – which are related, interpenetrating, and frequently influencing each other. Analysis at each scale is guided by a coding paradigm: the conditions of university spatial development, the actions/interactions of related actors in the development process, and the consequences of university spatial development. The research chooses China’s leading metropolis – Shanghai – as an empirical focus, with two university sites as sub-units: Tongji Creative Cluster and Songjiang University Town, which manifest two different typical modes of university spatial development in China.

The research concludes that the university is relevant to the city by shaping urban morphology through new knowledge-intensive spaces, changing urban governance through the interaction with public authorities, and promoting urban competitiveness through intangible capital accumulation. University spatial development is both influencing and influenced by urban transformation. Conditions of university spatial development include the rise of the knowledge society, the balance between the state and the market in higher education provision, knowledge-driven urban socio-economic restructuring and so on. The space of universities is developed by building extensive networks among themselves as well as with governments, industries, and other urban actors on the one side, and on the other side by selecting favorite places, either global or native, for strategic localization. It is developed beyond the harness of intellectual properties and incorporating broader activities, such as university real estate development and reorganization of university governance modes. It can be developed in a top-down or bottom-up way, or mixed with both. University spatial development contributes to urban transformation in geographical, economic, political, and cultural dimensions, to different extents and in different historical and social conditions.
By exploring the dynamic between university spatial development and urban transformation, the research recognizes the tensions in the university-city interaction and proposes spatial strategies for mutually beneficial town-gown relations. Considering the levels of the social formation of the space of university, both the tensions and the strategies are recognized from three aspects: the urban universities’ spatial orientation and practices, the relations and orders established in the process, and the underpinning culturally embedded symbols and values. Tensions and barriers exist in the paradigm of the so-called ‘urban’ university along with ‘de-urban’ trends, the misalignment between university plans and urban strategies, the conflicts among stakeholders nestled in the space of university, the confusion about the role of university and the effectiveness of its engagement in local development. Spatial strategies are proposed to align university spatial development with the changing social environment through appropriate university networks and incremental planning, to establish long-term partnerships among stakeholders in the process of university spatial development by introducing a cultural approach and institutionalizing successful experiences, to keep a systematic perspective on the role of university in local development by placing university spatial development in an innovation system and contributing university spatial development to the third mission (social engagement) as well as to the first (education) and second missions (research).

**Key Words**

University-City Relations, Space, Knowledge Society
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List of Abbreviations

BCPC: Beijing City Planning Commission
CAIE: China Association for International Education
CCCP: Central Committee of the Communist Party of China
CCRTVU: China Central Radio and Television University
CEC: Commission of the European Communities
CERI: Center for Educational Research and Innovation
GAC: Global Academic Centers
GDP: Gross Domestic Product
HEI: Higher Education Institutions
IANIT: Institute of Architecture at Nanjing Institute of Technology
ICEM: Information Centre for Educational Management
MDE: Modern Distance Education
MOE: Ministry of Education
MOST: Ministry of Science and Technology
NBSC: National Bureau of Statistics of China
OECD: Organization for Economic Cooperation and Development
OEU: Observatory of the European University
OSLH: Office of Shanghai Local History
PKU: Peking University
R&D: Research and Development
RTVU: Radio and Television University
S&T: Science and Technology
SAEC: Shanghai Academy of Educational Sciences
SC: State Council
SCCGCG: Shanghai Career Guidance Center for Graduates
SEC: State Education Commission
SHMG: Shanghai Municipal Government
SHUFE: Shanghai University of Finance and Economics
SJDG: Songjiang District Government
SJDSB: Songjiang District Statistics Bureau
SJDCTC: Songjiang District Construction and Transportation Commission
SMEC: Shanghai Municipal Education Commission
SMSB: Shanghai Municipal Statistics Bureau
STDCMOE: Science and Technology Development Center of Ministry of Education
STVU: Shanghai Television University
SUPA: Shanghai Urban Planning Administration
TJPB: Tongji University Photo Bank
UIS: UNESCO Institute for Statistics
UNESCO: United Nations Educational, Scientific and Cultural Organization
YPDG: Yangpu District Government
YPDSB: Yangpu District Statistics Bureau
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Chapter 1. Introduction

1.1 Background

Today it’s taken for granted that knowledge is the real and valuable resource that can change the world day by day (Drucker, 1993; Lundvall and Johnson, 1994; Nonaka, 1991; Powell and Snellman, 2004). The growth of the knowledge economy has prompted the expansion of universities, increased their local influence, and brought attention to their ability of raising regional competitiveness. Universities are expected not only to cultivate intellectuals through the education of students as well as training activities for people already in work, but also perform as a knowledge-producing and disseminating institution that will directly lead to innovative production (Etzkowitz, 2000; Charles, 2006; Lundvall, 2002; Rutten, Boekema and Kuijpers, 2003; Slaughter and Rhoades, 2004). Furthermore, universities are expected to play a civic role in nation building by promoting a positive and progressive public culture (Chatterton, 2000; Florida, 2002; Readings, 1996). Universities are increasingly playing an important and even a leading role in urban development.

As the hosting place of universities, the cities are gradually transformed by the increasing calls for accountability and engagement of universities in bringing their intellectual and institutional resources to bear on their immediate environment (Balducci, Cognetti and Fedeli, 2010; Florax, 1992; Perry and Wiewel, 2005; Wiewel and Perry, 2008; van der Wusten, 1998). The prospering of universities changes the territorial organization of land uses and the linkage between them. It also has direct influence on the local land market and housing market, and provides a potential for labor reallocation. In addition, the university-led innovation helps to technology transfer and promotes the industrial restructuring based on knowledge creation. Moreover, deeply rooted in the place, the development of the university involves various actors with diverse interests, thus becoming a staging area for power contesting. Besides, the massification of higher education also sheds light on the university’s role in nurturing the civic community and promoting a shared public culture. The engagement of universities in urban transformation becomes a solid factor of competitive advantage for cities.

The relationship between the university and the city is a long-standing matter of mutual concern, which has been captured in the phase of town-gown relations. The enduring town-gown relations consist of not only the extensive physical fabric of the university with its facilities, premises and public spaces; but also the people who populate it including students, faculties and host communities; and also the activities that such groups undertake and the associated economic and social impacts. It is vividly reflected in the space of universities (Figure 1) – their spatial orientation and practices, the relations and orders established in spatial development, and the underpinning culturally embedded assumptions and symbolism (Lefebvre, 1991). University spatial development shows the role of the university in the context of dynamic urban transformation, and it also explains well the process of urban transformation in the knowledge society. The space of university is an active field to examine the interaction between the university and the city.
1.2 Research Questions

The research is going to explore the changing town-gown relations in the knowledge society from a spatial perspective. The main research question is: What are the dynamics between university spatial development and urban transformation in the knowledge society (taking the city of Shanghai as an example)?

It is guided by the following sub research questions:

- What are the social and urban contexts for university spatial development?
- How is the space of university developed and how do the university and the city interact with each other in this process?
- How is the city transformed and how is the town-gown relation changed due to university spatial development?

The research aims to evaluate the relevance of universities to cities in the knowledge society, to explore the dynamics between university spatial development and urban transformation, to identify tensions and barriers in the interaction between universities and cities, and to propose spatial strategies for mutually beneficial town-gown relations.

1.3 Methodology

Interpretive-Analytical-Empirical Trialectics

There are three steps in this research to investigate the dynamics between university spatial development and urban transformation. First, interpretive study provides a theoretical and historical understanding about the space of university from a general perspective. At the same time
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it sets up the social background – the knowledge society and the Chinese context – for the research. Second, analytical study approaches to the research theme through argument and reasoning. It provides a systematic understanding about the logic and mechanism of university spatial development. Third, empirical study tries to reflect on the research question in a specific context and in the practical field and to reinforce the analytical framework as a complementary. The interpretive, analytical and empirical epistemologies provide distinct but complementary information about the phenomena of interest, and all of them can be further developed upon the strengths of the others.

Cross Dimensional Interpretation
Cognition on the space of university is interpreted from two sets of dimensions: socio-spatial and spatio-temporal. The socio-spatial perspective focuses on the interrelationship between space and society. It is guided by theories about the production of space and is set in the global background along with the rise of the knowledge economy. It discusses the concrete, abstract and instrument role of the university in the society. The spatio-temporal perspective is embedded in the Chinese context. By examining the evolution of Chinese universities, especially the changing social values of the university and related changes in space, it provides some hints to understand contemporary spatial practices in China. The socio-spatial and spatio-temporal interpretation provides an overall and basic understanding about the role of university in the knowledge society and in contemporary urban china.

Multi-Scale Coding Matrix
Analysis in this research is carried out at three scales – the global, the national and the local\textsuperscript{1}. The production of scale is implied in the production of space (Cox, 1998). It’s clear to see the university as a point situated in the space defined by both the local and the global axes – a spatial sphere where localized social relations depend and where global knowledge producers engage. The research also introduces the national scale in China as an intermediary between the global and the local. It doesn’t select the regional or super-national scale because scale is both the result and the outcome of social struggle for power and control (Swyngedouw, 1997) and the national scale of China reflects this process most obviously. The analytical framework extends from the abstract social process in globalization, through the institutional restructuring in China’s national reform, to the urban socio-economic restructuring in the city of Shanghai. The global, national and local scales are related, interpenetrating, and frequently influence each other. Analysis at any single scale could not explain the overall complexity of university spatial development. They are separated in the research just to facilitate the analytical expression not to mean their absolute distinction in nature.

Because the answers to the main research question may be very subtle and implicit, the research uses a coding paradigm to sort out and organize the emerging connections. The basic components of the paradigm include conditions, actions/interactions, and consequences (Strauss and Corbin, 1998). Conditions form the structure, or set of circumstances or situations, in which phenomena

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\textsuperscript{1} The local scale here refers to the level of city. In China, there are three formal levels of administrative division together with two informal levels below the central national level: province, (prefecture), county, township, (village). A city can be one of the levels of a province, prefecture, or county. Most cities are at the prefecture level, while important cities, such as Shanghai, Beijing, Tiqnajin, Chongqing, are at the province level.
are embedded. It is a conceptual way of grouping answers to the sub research question ‘what are the social and urban contexts for university spatial development’. Actions/interactions are strategic or routine responses made by individuals or groups to issues, problems, happenings, or events that arise under those conditions. They are represented by the sub research question ‘how is the space of university developed and how do the university and the city interact with each other in this process’. Consequences are outcomes of actions/interactions. They are represented by the sub research question ‘how is the city transformed and how is the town-gown relation changed due to university spatial development’.

The coding paradigm is aimed to capture the dynamic flow of events and the complex nature of relationships. It is not for terms such as conditions, actions/interactions and consequences by placing data into discrete boxes. In fact, the paradigm is nothing more than a perspective taken toward data and an analytical stance that helps to systematically gather and order data in such a way that structure and process are integrated. Neither is the coding paradigm a language of cause and effect. Identifying, sifting through, and sorting through all of the possible factors showing the nature of the relationships does not result in a simple ‘if … then’ statement. The result is much more likely to be a discussion that takes readers along a complex path of interrelationships, each in its own patterned way that explains what is going on. The multi-scale modeling together with the coding paradigm constitutes the analytical matrix of the research (Table 1).

<table>
<thead>
<tr>
<th>Table 1: Analytical Matrix</th>
<th>Source: made by author</th>
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<tbody>
<tr>
<td><strong>What are the dynamics between university spatial development and urban transformation in the knowledge society?</strong></td>
<td><strong>Global</strong></td>
</tr>
<tr>
<td><strong>Conditions</strong></td>
<td></td>
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<tr>
<td>What are the social and urban contexts for university spatial development?</td>
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<tr>
<td><strong>Actions/Interactions</strong></td>
<td></td>
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<tr>
<td>How is the space of university developed and how do the university and the city interact with each other in this process?</td>
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<td><strong>Consequences</strong></td>
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<td>How is the city transformed and how is the town-gown relation changed due to university spatial development?</td>
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**Embedded Single-Case Study**

An embedded case study is a case study containing more than one unit of analysis (Yin, 1984). This research is embedded in the Chinese context and adopts the city of Shanghai as a single case with two sites as sub-units – Tongji Creative Cluster and Songjiang University Town (Figure 2). Analysis includes outcomes at the city level as well as from selected projects within the city. This provides two levels of entry to the urban issues: the main unit is the city of Shanghai as a whole, and the smaller unit is the two individual university sites².

² The research includes the two sites as sub-units of the city level instead of a downward scale because the sub-units do not enjoy much autonomy in decision-making, especially in the city of Shanghai, a municipality at the
The research is focusing on the city of Shanghai mainly for three reasons. First, there is a common understanding that China is now fast involved in the new global space of higher education, not only in terms of the large quantity of students abroad, but also regarding the frequent collaboration with foreign universities as well as active involvement in the international academic fields (Altbach and Umakoshi, 2004; Breton and Lambert, 2004; Lambert and Butler, 2006). However, there is still less research on Chinese universities per se, especially from a global point of view. Second, Shanghai is the second top city in China to concentrate more leading universities and to attract more students, only inferior to Beijing (NETBIG, 2011). As China’s largest metropolis, Shanghai is the most obvious contesting place of various driving forces in urban transformation, including the momentum of universities in the knowledge-based global economy. Third, by focusing on the city of Shanghai provides a comparative and revelatory case for other global cities on how to better incorporate universities into urban development strategy to promote urban competitiveness in the knowledge society.

The research is focusing on two university sites—Tongji Creative Cluster and Songjiang University Town—because they manifest two different typical modes of university spatial development, at least in China. Tongji Creative Cluster, located in a consolidated part of the inner city, is originated spontaneously from university spill-over effect. It is based on the existing strong networks around Tongji University. Therefore, its spatial practices focus mainly on the integration provincial level. The development of the sub-units is generally specific manifestation of the municipal policies and decisions.
and synergy of various advantages and aim to make use of university resources to promote urban transformation from a traditional industry base to a creative center. At the same time, it also involves the manipulation of existing urban resources to make them better used in the city. Songjiang University Town is a top-down strategy to promote urbanization on the occasion of university town set-up and at the same time a new urban settlement foundation. It is also an alternative to meet the requirement of campus expansion and to facilitate resource sharing and cooperation among universities. It is developed with the introduction of market mechanism – local government providing the land, banks providing loans, and various universities renting the campus.

**Triangulation of Data Collection**
Triangulation is used to facilitate data validation through mutual complement and cross verification from several sources. Data collection techniques in this research consist of literature review, interviews, and participant observation.

Literature review provides the necessary background and sets the context for this research. It’s carried out with the focus on the nature of the knowledge society, the issue of space production, the politics of China’s planning system, the characteristics of Shanghai’s urban transformation, and the role of universities in the aforementioned fields. The first set of literature includes books, journals, and other academic publications both in English and in Chinese. The second set of literature includes laws, official policies, planning documents and statistics in China and Shanghai obtained from official websites, relevant newspapers and other reliable sources such as internal circulations. The third set of literature is PhD and master thesis on various topics about Chinese universities, which provide detailed information on the phenomena.

Interviews are conducted with government officials, planners, university leaders, project managers, local inhabitants, teachers and students. Personal connections and public resources are first used to contact potential interviewees, and then the existing interviewees recruit future interview subjects from among their acquaintances. Some interviewees are asked the same questions to compare and analyze their varying roles and relations. There are also questions closely related with the specific role of the interviewees. The interviews are usually conducted at interviewees’ working place, and the length of each varies from thirty minutes to one hour. Besides official channels, the potential interviewees are also approached randomly in different occasions. Most of the informal talks are short, but they complement and balance the data collected through formal interviews.

Participant observation involves both observing and participating (Jorgensen, 1989). The previous interviews provide an in-depth observation of the actors’ point of view, attitude, and their hidden meaning. And because the author has been directly involved in some of the events in the case, a role within the group is assumed to participate in some manner instead of as an ‘outsider observer’. Participant observation is a direct way of collecting first hand data, especially the most detailed and vivid data. It’s also useful for measuring concepts, testing hypotheses, and constructing causal

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3 For example, the author has been involved as a planner in an urban renewal project on upgrading the environment and infrastructures around Tongji Creative Cluster. At the same time, as an urban residents living around Tongji University, the author shares some experiences and opinions of the neighboring community whose life is directly influenced by the spatial projects of the university.
explanations. However, there are also disadvantages in participant observation mainly because there might be potential bias on observation data in the researcher’s point of view. But it can be overcome by utilizing other methods of data collection.

1.4 Impact Statement
First, the research contributes to three theoretical discourses – the production of space, the knowledge economy, and university engagement in local development. The research tests these theories in the Chinese context and further identifies part of the theories that are applicable in the Chinese context. Second, the research provides an analytical framework for understanding the mechanism of university spatial development in China and for understanding other similar practices. The analytical framework cannot represent or cover the dynamic reality as a whole, but this simplified structure will help researchers to identify some major forces and relationships in order to understand a rough picture of the complexity. Third, the practical goal of the research is to explore mutually beneficial town-gown relations in global cities. It extracts instrumental rationality to guide future university planning and urban planning in China, and provides references for other global cities.

1.5 Chapter Outline
This research consists of nine chapters and is divided into three major parts besides the opening and the ending chapters (Figure 3). To begin, Chapter 1 introduces the research context, proposes the research questions, illustrates the methodology, and states the expected impacts.

Chapter 2 and 3 are the first major part of the research, exploring the dynamics between university spatial development and urban transformation at the global scale. Chapter 2 provides a socio-spatial perspective on the role of the university in the knowledge society. It approaches to the concrete aspect of the space of university – university as knowledge infrastructure in the knowledge society, the abstract aspect – university as the contesting stage of social relations, and the instrumental aspect – university engagement in local development. Chapter 3 analyzes the mechanism of university spatial development in the globalizing world. It examines the changing global space of urban universities by exploring the key factors of global urban competitiveness in the knowledge society, the urban strategies to promote urban competitiveness, the requirements on and the responses of universities, the changing geography of global university networks, and the strategic importance of global universities to global cities.

Chapter 4 and 5 are the second major parts of the research, discussing town-gown interactions at the national scale of China. Chapter 4 provides a spatio-temporal review on the evolution of universities in the Chinese history. It discusses different university models at various historical periods, explores the embedding ideologies and social values, and recognizes the spatial characteristics of different types of universities. Chapter 5 analyzes the interaction between universities and cities in the process of Chinese reform. It first discusses the changing state governance in China characterized by decentralization and marketization; then examines the related influence on urban development strategies and practices; next, it focuses on the urban needs on higher education and the restructuring of university governance into local plans; after that, it explores the role of universities in the Chinese innovation system; finally, it analyzes the
changing town-gown relations and the underpinning values.

Chapter 6, 7 and 8 are the third major parts of the research, approaching to the mechanism of university spatial development at the local scale of Shanghai. Chapter 6 explores the changing town-gown relations in the process of Shanghai’s urban social-economic restructuring and urban spatial restructuring. It discusses the urban development patterns of Shanghai in the post-reform era, the increasing importance of higher education in the urban socio-economic restructuring, the measures of university expansion along with massification of higher education, the involvement of universities in urban spatial restructuring, and the challenges to the concept of urban university. Chapter 7 and 8 are two case studies. Chapter 7 is about the case of Tongji Creative Cluster as an economic actor in urban renewal. It discusses the evolution of the cluster, the mechanism in producing the cluster, the participation of main actors, the driving forces, and the intertwined urban transformation. Chapter 8 is about the case of Songjiang University Town as a spatial actor in urbanization. It begins with the urban strategy on the satellite city and the promotion of university town as catalyst project; then it discusses the governance coalitions, the changes of the ideal plan in the implementation process; after that it specifies the influence brought about by the university town – the real estate boom, the industrialization, and the urbanization.

Chapter 9 is the concluding part. It discusses the relevance of university from the aspects of urban morphology, urban governance, and urban competitiveness. It makes a summary of the findings in response to the research questions and explores the mechanism between university spatial development and urban transformation. It also discusses the tensions and barriers in the town-gown relations, and proposes spatial strategies for mutually beneficial town-gown relations.

Figure 3: Thesis structure. Source: drawn by author
Chapter 2. The Role of Universities in the Knowledge Society: Socio-Spatial Perspectives

There is no ‘natural’ way of talking about the space of the university since it’s closely related with the social environment. This research is set up in the general background of the knowledge society in which the space of the university has become a strategic field to promote social progress. To better understand the social attributes of the space of university, this chapter provides a socio-spatial review on the role of the university in the knowledge society. It is focused on the nature of space as material product of the society (the concrete), the manifestation of social relations (the abstract) and a means of social production (the instrumental) (Lefebvre, 1991). It first explains the characteristics of knowledge production in the knowledge society and the related spatial requirements on the university; then explores the relationship between the university and other institutions, especially the interaction among the university, the government, and the industry, in the process of university spatial development; finally it discusses the engagement activities of the university in local development and their spatial manifestations.

2.1 University as Knowledge Infrastructures in the Knowledge Society

Space does not exist in itself; it is never primordially given or permanently fixed. Social space is a social product. Every society – more precisely every mode of production with its sub-variants – produces a space, its own space (Lefebvre, 1991). The concept of spatiality is itself imbued with a transformative dynamic: spatiality exists ontologically as a product of a transformation process, and always remains open to further transformation in the contexts of material life (Soja, 1989). Hence there is no ‘natural’ way to conceptualize space because it is produced in the context of social action (Harvey, 1989). Social structure remains the primacy in explaining spatial forms. Theories about space are generally deployment and specification of theories about social structure which account for the characteristics of the particular social form, space, and of its articulation with other historically given forces and processes (Castells, 1977).

Understanding the space of university in the global era cannot be separated from the knowledge society. Over the past few decades, there have been a number of scholars arguing the change of the world economy. Although they use differentiated terms to illustrate this process, such as the learning economy (Lundvall and Johnson 1994; Lundvall 1996), the knowledge economy (Drucker, 1993; Nonaka, 1991; Powell and Snellman, 2004), the global economy (Grossman and Helpman, 1991; Dunning and Lundan, 2008), the world economy (Sassen, 1994) et al, there is one similarity, that is, knowledge has become the driving force of economic development. Advanced services, such as finance, consulting, design and scientific innovation, which are at the core of all global economic processes, all can be reduced to knowledge generation and information flows (Castells, 2000, P409). Modes of organization of production in apparently low-tech sectors, as will be shown in the case of Shanghai, have also been transformed, or are in the course of transformation, with the new use of knowledge bases. Knowledge is now fast becoming the basic means of production, sideling capital, natural resources, and labor. The central wealth-creating activities in the global system are now being shifted from the allocation of capital and labor for productive uses to ‘productivity’ and ‘innovation’ through applications of knowledge (Drucker,
In the knowledge-based society, there are knowledge infrastructures. Infrastructure is distinguished from other components of the capital stock and from other widely used inputs primarily because of their attributes of indivisibility (as a complete system or set of systems), multi-user (there are many users of the same supply system), and generic (a core requirement for many or all activities) (Smith, 2005). Knowledge infrastructures possess technical and economic characteristics that are similar to those of physical infrastructure such as roads, harbors, electricity production and distribution systems, telecommunications networks, etc. They are a complex of public and private organizations and institutions whose role is the production, maintenance, distribution, management, and protection of knowledge. Typical knowledge infrastructures include universities, research labs, training systems, organizations related to standardization and intellectual property right protection, libraries and databases, etc.

Knowledge production in the global era is not the same as the traditional manner in which certain universities preserve their hierarchical position at the top of the ‘knowledge pyramid’. Lundvall and Johnson’s distinction of different kinds of knowledge may lead us to an initiative understanding about the production of knowledge. They propose a taxonomy including four kinds of knowledge: know-what, know-why, know-how, know-who (Lundvall and Johnson, 1994). Know-what refers to knowledge about facts and information, which can be broken into bits. Know-why refers to knowledge about principles and laws of motion in nature, in the human and in society. Know-what and know-why can be obtained through formal learning in school and universities in the normal channel, and can more easily be codified and transferred as information, some of which may even be sold in the market. Know-how refers to skills and the capability to do something. It is basically tacit knowledge through practical experience – through learning-by-doing and through interacting with other experts active in the same field. Know-who involves information about who knows what and who knows to do what. It is rooted in social interacting and depends on the social capability to establish relationships to specialized groups in order to draw upon their expertise.

The production of knowledge embraces a social perspective on learning which focuses on ‘the way people make sense of their experiences at work’ (Easterby-Smith, Araujo and Burgoyne, 1999, P4). The social perspective argues that learning is socially constructed and knowledge emerges from social interaction. The experiences people get through social interaction may derive from either explicit sources (codified scientific or engineering knowledge) or tacit sources (embodied in skilled personnel and/or technical routines) that are embedded in knowledge infrastructures. The explicit information involves a joint process of make sense of data, of the technical knowledge. It can be easily communicated and shared, in product specifications or a scientific formula or a computer program. Instead, the tacit knowledge is rather highly personal, deeply rooted in action and in an individual’s commitment to a specific context (Nonaka, 1991). It can be learned through situated practices, observation and emulation of skilled practitioners and socialization into a community of practice (Easterby-Smith, Araujo and Burgoyne, 1999, P4-5).

The social interactive process in knowledge production goes beyond the particular business and
management strategies of individual firms and incorporated the cooperation and interaction among multiple knowledge producers and users. Innovation no longer proceeds sequentially from research to marketing. It’s not a linear pathway from university research to commercial innovation to an ever-expanding network of newly formed companies. Instead, it’s an interactive process in which a wide array of institutions can play a multiple role. Universities are no longer the sole providers of knowledge; firms and organizations draw knowledge in a variety of sources and they are also encouraged to adopt new organizational and management systems which can support knowledge-based production by themselves (Lundvall, 2002). Traditional modes of organization in the university, characterized by rigid borders and isolation from the society, are being challenged as well. Knowledge production is melding among various knowledge infrastructures. Their spaces are more closely linked with each other and are embedded with functions of the others. Universities have to reposition themselves as players within a multi-pole network of knowledge producers and users and to build networks with other actors to facilitate the flow of knowledge, ideas and learning.

2.2 University as the Contesting Space of Social Relations

It is not the work of a moment for a society to generate (produce) an appropriated social space in which it can achieve a form by means of self-presentation and self-representation (Lefebvre, 1991). This act of creation is, in fact, a process. In the process, there is a dual relationship between people and space (Gottdiener and Hutchison, 2010). On the one hand, human beings act according to social factors such as gender, class, race, age, and status within and in reaction to a given space. On the other hand, people create and alter space to express their own needs and desires. In addition to being a product of social relations, space is also a manifestation of social relations, and hence a manifestation of control, of domination, and of power. Space is fundamental in any form of communal life; space is fundamental in any exercise of power (Foucault, 1984). There is a politics of space because space is political (Lefebvre, 1979). The political economy and the role of culture should be paid same, if not higher, emphasis in urban development and the production of space compared with technological factors. Spatial politics shifts the research perspective from space to processes of its production, embraces the multiplicity of space that are socially produced and made productive in social practices, and focuses on the contradictory, conflictual, and, ultimately, political character of the processes of production of space (Stanek, 2011).

The space of university is nestled with interests of many groups – students and academicians, companies and institutions, the neighborhood, government, developers etc. They all have a stake, something to gain or lose as a result of any change in the space of university. The role of university to affect local development depends crucially on its ability to balance the multiple relationships established between the place in question and its stakeholders (Russo, van den Berg and Lavanga, 2007). And there are even more subtle and complicate relationships among stakeholders themselves, affected in various ways by actions, decisions, policies, practices, or goals both in and beyond the process of university spatial development. The specific interests that different stakeholders have may be partially contrasting and they may be not static but changing over time. The university thus often finds itself in the middle of political controversy when its physical development programs begin.
To smooth the process of university spatial development, it’s encouraged to build partnerships between universities and community organizations. The related planning process is described in four stages (Wiewel and Lieber, 1998, P292):

- The first stage is the very decision to form any kind of a planning partnership at all in a situation where neither party is required or forced to do so.
- Second, since there is no clear authority, the partnership has to develop some level of trust in order to proceed. Alternatively, the partnership would develop some set of procedures that allows the partners to gain mutual benefit.
- Third, the partners need to decide what to do, how resources are acquired, who has responsibility, and how activities are evaluated.
- Fourth, each of the partners may need to make internal changes in order to accommodate the partnership and its activities. This also encompasses the notion of enforcement of norms and accountability. Through internal institutional changes, new normative structures can be created that legitimate the partnership.

The model of a harmonious relationship among main actors is described as Triple Helix of university-government-industry, in which each institutional sphere maintaining its special features and unique identity while also taking the role of the other (Etzkowitz, 2003). In the Triple Helix model, industry operates as the locus of production; government as the source of contractual relations that guarantee stable interactions and exchange; the university as a source of new knowledge and technology, the generative principle of knowledge-based economies. When fulfilling a particular purpose in society, university, industry and government are conceptualized as intertwined spirals in Triple Helix with different relations to each other. A primary institution is one that fulfills a central purpose in society; other institutions depend on it to fulfill their missions. The institution that acts as the core force changes over time as one replaces the other as the driving forces.

Figure 4: From Statist Model (left) and Laissez-Faire Model (middle) to Triple Helix (right)
Source: Etzkowitz, 2003

The Triple Helix denotes a transformation in the relationship among university, government and industry as well as within each of these spheres. As institutions increasingly take the role of the
other, the traditional match of institution to function is superseded. The Triple Helix model of simultaneously competing and cooperating institutional spheres differs from situations in which the state encompasses industry and the university, for example, the former Soviet Union, pre-reform China, and some European and Latin American countries, in the era when state-owned industries were predominant. It is also different from separate institutional spheres, for example, the way the US is supposed to operate, at least in theory, according to laissez-faire principles (Etzkowitz, 2003). From either of these starting-points, there is a movement toward a new global model for analysis of the dynamic of university-government-industry interaction (Figure 4). The university is elevated to an equivalent status as government and industry, in contrast to previous institutional configurations in which government and industry have always been major institutions and university occupied a secondary status.

As this research will argue, in China, the university-government-industry relations are in the transition from a Statist Model to the Triple Helix. Before Chinese reform, a large number of ministries were established to maintain specialized economic management on behalf of the central government. They administered their own universities to train professional manpower for specific industries. The majority of regular HEIs were directly under different central ministries while others were managed by MOE. The central government coordinated the relationships between industry and academia in their intra and extra institutional spheres, which moves beyond a more traditional model in which government coordinated each sphere separately to promote technology development (Dos Santos and Fracasso, 2000). As what happened later in Chinese reform, the first step toward change in the statist format is the loosening of top-down control. Unable to rely upon the state’s financial support, universities can and have to decide what research projects to take and how to raise funds for projects and salaries. When applying for research projects and funding from the government, they have to compete with other competitors on an equal footing. Therefore universities have become more independent of and gained more autonomy from the government (Liu and Jiang, 2001). They are encouraged to collaborate with the industry in a variety of ways. The university-government-industry relationship began to take on a new meaning as each institutional sphere intertwine, cooperating from a position of relative autonomy to enhance each other’s performance of their traditional role. The increased interaction among university, government, and industry as relatively equal partners, and the new developments in innovation strategies and practices that arise from this cooperation, are the core of the Triple Helix model of economic and social development.

2.3 University Engagement in Local Development

Space is more than the solely passive locus of social relations, the milieu in which their combination takes on body, or the aggregate of the procedures employed in their removal. It has an active role in the existing mode of social production. Space is permeated with social relations: it is not only supported and produced by social relations, but is also producing social relations (Lefebvre, 1979). Space occurs as a tool of power operation rather than merely an object (Foucault, 1984). There is a close and direct linkage between time-space relations and the generation of power as well as the reproduction of class structure (Giddens, 1981; Harvey, 1989). Power, the transformative capacity of people to change the social and material world, is closely shaped by knowledge and space-time (Harvey, 1989). In reality, social space ‘incorporates’ social actions, the
actions of both individual and collective. The society is transformed through the production of space; the space is a means of social production.

The space of university incorporates the engagement activities of universities with respect to their roles as economic entities, commodified knowledge producers, shapers of human capital, and institutional actors in networks. The universities’ engagement activities include (Boucher, 2003):

- combining measures of the university as an employer, payer of wages and salaries, buyer of products and services from local firms, and attractor of students who spend money in the urban economy;
- the commodification of knowledge produced in the university through intellectual property rights, technology transfer, science parks and spin-off firms;
- as an attractor, educator and retainer of students, shaping them into knowledge based graduates for firms in the city;
- formal and informal participation as an institutional actor with other urban actors in linkages and networks of learning, innovation and governance.

The first two focus on the universities direct economic contribution while the latter two include non-economic socio-cultural factors.

In the economic dimension, university spatial development is manipulated for the emergence and maintenance of an academic capitalist ‘regime’. By regime, it means that there lies (Rhoads and Slaughter, 2004, P37-38):

- a systematic revision and creation of policies to make the involvement of colleges and faculty in market-like behaviors possible;
- a functional change in the interconnections between states, their higher education institutions and private-sector organizations to support such activities, blurring the boundaries between the for-profit and not-for-profit sectors;
- a basic change in academy practices – changes that prioritize potential revenue generation, rather than the unfettered expansion of knowledge, in policy negotiation and in strategic and academic decision making.

Within such a regime, the university has increasingly become involved in the formation of firms and science parks, often on the basis of new technologies originating in academic research, and has gradually transformed from the research university to the entrepreneurial university. It has led to more active financial management strategies of university resources, extending beyond its intellectual properties and penetrating into real estate development.

In the socio-cultural dimension, university spatial development helps to establish the broader quality of place in which they are located. In service and symbol, today’s universities are the contemporary equivalent of cathedral precincts in medieval life, palaces and civic centers in the Renaissance, and railroad stations and central business districts in the age of commerce and urbanization (Dober, 2000). University engagement moves away from previous approaches driven largely by a ‘deficit model’, in which urban communities were viewed merely as possessing needs, and universities were seen as the expert to meet those needs (Altman, 2006). Today universities also play the roles of facilitator and action partner besides the role of technical resource provider (Mullins, 1996). When taking on the role of facilitator, universities are called on, largely because
of their perceived position as an unbiased and independent party, to facilitate the projects that are affected by internal conflicts and political struggles among different community partners. When serving as action partner, universities contribute resources and finances to the projects such as the development of non-profit corporations, affordable housing, community schools, and health centers et al.

University engagement is largely considered as the third distinct role that universities can play in serving society beyond merely teaching and research (Boyer, 1990; CERI, 1982). The third mission strongly relates to the first (teaching) and the second missions (research); it has transformed the university’s teaching and research missions by shifting the focus, comment and evaluation of teaching and research activities. However it also goes beyond teaching and research; it penetrates into the organizational structure and institutional arrangement of university and brings about new incentives and rewards. University engagement has great influence both on the out-reach activities and the in-reach activities of the university and tells something about how university capabilities are integrated into the economy and into the society (OEU, 2006).

Conclusion
The university does not exist in itself; it is the product of society. The rise of the knowledge society, more precisely the status of knowledge as the basic means of production, has elevated the role of university as an important knowledge infrastructure. Knowledge production in the global era is not a linear process in which each knowledge infrastructure assumes a relatively independent role in the sequential dissemination of knowledge. Instead, it is in a social interactive way with increasing interaction and melding boundaries among various knowledge infrastructures and with each institution playing multiple roles. This has figured out the appropriated space of universities in the knowledge society: the university has to reposition itself in the multi-pole networks of knowledge producers and users and to reconsider its relationship with other urban actors.

The role of universities to affect local development depends crucially on their ability to interact with the various interest groups. The interaction between the universities and other urban actors in the process of university spatial development is often full of conflicts which have downgraded the contribution of universities in promoting local development. Therefore it’s more encouraged to build partnership between universities and their surroundings. A typical model incorporating the interaction of the university, the government, and the industry in the knowledge society is Triple Helix, in which each institutional sphere maintains its special features and unique identity while also taking the role of the other. In the Triple Helix model, the university is elevated to an equal status as the government and the industry to engage in local development.

University engagement includes not only direct economic contribution but also non-economic socio-cultural factors. In the economic dimension, an academic capitalist regime has emerged to encourage the involvement of colleges and faculty in market-like behaviors, which has led to more financial oriented strategies in university spatial development, such as the set-up of science parks and university real estate development. In the socio-cultural dimension, university spatial development is manipulated to promote the broader quality of place, which promotes the role of
university as a facilitator and action partner besides the role of technical resource provider. These modes of engagement have exerted great influence on the out-reach activities and in-reach activities of the university and have brought large awareness on the role of universities in the knowledge-based global society.
Chapter 3. Urban Universities in the Globalizing World

A wide range of scholars hold the opinion that today’s world is transformed dramatically by globalization, which is strengthening the dominance of a world economy through capital control, challenging the governance of nation-state with numerous international corporations and organizations, integrating the characteristic local traditions into a uniformed global culture. Dependence on the global network rather than on the servicing of an environing region or a wider hinterland existed only for a few exceptional cities in the past, but now it has become the general rule for the majority of substantial cities anywhere (Taylor, 2004). The linkages binding a city have a direct and tangible effect on global affairs by all means. In the global context of higher education, as perceived by Perry and Wiewel (2008), there is a transformation from the primacy of the American university mode to a more worldwide accession of universities in increasingly important global cities. It is identified as the third academic revolution, which incorporates the ‘multiversity’ (Kerr, 2001) with much more mobility, more cross-national interaction, and more global mechanisms.

This chapter will analyze the interaction between universities and cities in the globalizing world and examine the changing global space of urban universities by exploring the key factors of global urban competitiveness in the knowledge society, the urban strategies to promote urban competitiveness, the requirements on and the responses of universities, the changing geography of global university networks, and the strategic importance of global universities to global cities.

3.1 Assessing Global Urban Competitiveness in the Knowledge Society

Within the global networks, cities are rarely equal. There is a sharply defined hierarchy of dominance within a tier of the most important world cities, and there is also a distinction of tiers (Smith and Timberlake, 2002). Cities may rise into the tier of world cities, they may drop from the order, and they may rise or fall in rank (Table 2). Competition for dominance is always severe among cities. In 2011-2012, New York ranked first concerning the global urban competitiveness. The top 10 of world’s most competitive cities were New York, London, Tokyo, Paris, San Francisco, Chicago, Los Angeles, Singapore, Hong Kong, and Seoul. It was also found that competitiveness of the European and American cities hit an absolute decline (Ni and Kresl, 2012). For example, although New York ranked first, its index also fell by the largest. ‘World city’ have experienced absolute competitive advantages decrease, but still remain top four places. Meanwhile, the emerging economies is very active, the decline in the competitiveness is not significant, even some continue to rise. The top 10 fastest growing cities are San Jose (USA), Hong Kong (China), Suzhou (China), Changsha (China), Lagos (Nigeria), Georgetown (Guyana), Palo Alto (USA), Kingston (Jamaica), Xi’an (China), and Mannheim (Germany). The global urban competitiveness gap is inclined to be narrow.

Based on the different functions of the 500 cities around the world, ‘Global Urban Competitiveness Report 2011-2012’ (Ni and Kresl, 2012) divided cities into seven groups of functional centers, and found that the competitiveness index of technology centers improved dramatically while those of financial centers and manufacturing centers fell sharply. Compared with index in 2009-2010, the top ten fastest growing technology centers are: San Jose, Hong Kong,
Taipei, Taichung, Madrid, Moscow, Daegu, Tunisia, Singapore, and Bangalore. Among them, San Jose, the core area of Silicon Valley in the United States, though suffering a lot from global economy downturn and consumer environment recession, is still able to substantially enhance their competitiveness index, which can be a great guide. The top ten largest dropping financial centers are: New York, Houston, Tokyo, Toronto, London, Milan, Yokohama, Birmingham, Osaka, Munich. New York and Houston suffered big losses in the financial crisis storm, and both ranked the top two largest drops. Tokyo and London as the world’s famous financial center were also doomed to decline in the top five. The top ten fast dropping manufacturing centers are Houston, Quebec, Milan, Yokohama, Dusseldorf, Birmingham, Osaka, Manchester, Munich, Atlanta. From the ranking it can be perceived that the traditional manufacturing centers of developed countries in Europe and the United States are dropping significantly and that the impact of the economic downturn on the manufacturing centers in developed countries is much severe than in developing countries.

Through the analysis of industrial compositeness, the ‘Global Urban Competitiveness Report 2011-2012’ found that North American and European cities show strong overall industrial competitiveness with high index scores in both industrial structure and industrial sectors, among which the high-tech industry is an important backbone. The Asian cities get lowest scores in the industrial sectors, and their industrial structure is just on an average level. This shows that the industrial development of Asian cities is still at the bottom of industrial chain so that industrial upgrading should be promoted and the adjusting paces of the industrial structure should be accelerated. At present, since the emerging economies like Shanghai have entered the period of the industrial structure transformation, it is quite necessary to seize the opportunity to rapidly promote the industrial competitiveness of these cities.

Global urban competitiveness comprises a variety of indices, some of which may have great disparity from each other, representing the advantage of the cities in various aspects. For example, Shanghai has risen from No. 41 in 2007-2008 to No. 37 in 2009-2010 and now to No. 36 in 2011-2012 in terms of comprehensive global urban competitiveness (Ni and Kresl, 2008, 2010, 2012). But a detailed examination revealed that indices in terms of internal and external connection, economic scale, industrial chain, and elemental environment ranked ahead of the comprehensive index, while those indices about patent application, development level, economic aggregation, and public institution ranked relatively behind (Figure 5). In particular, public institution ranked beyond the world top 500 (Ni and Kresl, 2010). This shows that while economic structure and territorial endowment of Shanghai has risen to a higher level, human resources and institutional milieu of Shanghai is still at the bottom of development level.

In a service and knowledge based society, human resource and institutional milieu parameters are the most important in terms of urban competitiveness (Webster and Muller, 2000). Human resources determine the extent to which activities in cities can move up value chains. There are also enormous differences in returns to human resources depending on the institutional milieu and place where they work. Both human resources and institutional quality are grouped as intangible

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4 Webster and Muller (2000) have proposed four assessment categories to measure urban competitiveness: economic structure, territorial endowment, human resources, and institutional milieu. If an urban region rates high in any of these categories, then that category is an asset of the urban region.
capital in the wealth estimates by the World Bank. It recognizes three types of wealth – natural capital, produced capital, and intangible capital\(^5\) (World Bank, 2006). The preponderant form of wealth worldwide is intangible capital – human capital and the quality of formal and informal institutions (Figure 6). Moreover, the share of produced assets in total wealth is virtually constant across income groups, with a moderate increase in produced capital intensiveness in middle-income countries (cities). The share of natural capital in total wealth tends to fall with income, while the share of intangible capital rises. The latter point makes perfect sense – rich counties (cities) are largely rich because of the skills of their populations and the quality of the institutions supporting economic activity.

Table 2: Global Urban Comprehensive Competitiveness Index Ranking, Top 10


<table>
<thead>
<tr>
<th></th>
<th>2007-2008</th>
<th>2009-2010</th>
<th>2011-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New York</td>
<td>New York</td>
<td>New York</td>
</tr>
<tr>
<td>2</td>
<td>Tokyo</td>
<td>London</td>
<td>London</td>
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<tr>
<td>3</td>
<td>London</td>
<td>Tokyo</td>
<td>Tokyo</td>
</tr>
<tr>
<td>4</td>
<td>Paris</td>
<td>Paris</td>
<td>Paris</td>
</tr>
<tr>
<td>5</td>
<td>Los Angeles</td>
<td>Chicago</td>
<td>San Francisco</td>
</tr>
<tr>
<td>6</td>
<td>San Francisco</td>
<td>San Francisco</td>
<td>Chicago</td>
</tr>
<tr>
<td>7</td>
<td>Chicago</td>
<td>Los Angeles</td>
<td>Los Angeles</td>
</tr>
<tr>
<td>8</td>
<td>Washington D.C.</td>
<td>Singapore</td>
<td>Singapore</td>
</tr>
<tr>
<td>9</td>
<td>Singapore</td>
<td>Seoul</td>
<td>Hong Kong</td>
</tr>
<tr>
<td>10</td>
<td>Seoul</td>
<td>Hong Kong</td>
<td>Seoul</td>
</tr>
</tbody>
</table>

Figure 5: Global Urban Competitiveness Ranking of Shanghai, 2009-2010

Source: Ni and Kresl, 2010

\(^5\) Natural capital: exhaustible resources, renewable resources, and agricultural land. Produced capital: buildings, machines, equipment, and infrastructure. Intangible capital: raw labor, human capital, social capital, and the quality of institutions.
3.2 Learning as the Strategy to Promote Urban Competitiveness

As the dynamic of human capital and the institutional context differ from one city to another, there is no single model about competitive cities. What successful cities have in common is their ability to mobilize and to harness knowledge and ideas, which may encompass the following (Hassink, 2001, P226, translated by Rutten, Boekema and Kuijpers, 2003a, P7):

- Carefully coordinating supply and demand for skilled individuals;
- Developing a framework for organizational learning;
- Carefully identifying resources in the city;
- Developing mechanisms for coordinating both across departmental and governance responsibilities;
- Developing an educational and research infrastructure for knowledge society.

To be competitive in the global urban networks, it is especially valued for the cities to facilitate the flow of knowledge and ideas. This poses requirement for a new kind of city to be effective in the global economy: learning cities.

Learning cities function as a collector and repository of knowledge and ideas, and provide the underlying environment or infrastructures which facilitates the flow of knowledge, ideas and learning. These infrastructures include (Florida, 1995):

- a manufacturing infrastructure of interconnected vendors and suppliers;
- a human infrastructure that can produce knowledge workers, facilitate the development of a team orientation, and which is organized around life-long learning;
- a physical and communication infrastructure which facilitates and supports constant sharing of information, electronic exchange of data and information, just-in-time delivery of goods and services, and integration into the global economy;
- and capital allocation and industrial governance systems attuned to the needs of knowledge-intensive organization.

The notion of learning not only focus on what our society is becoming, but also underline how we
should and can do in response to the new situations. It reintroduces a critical dimension, allowing cities to face the possibility of assimilating the incredible amount of new knowledge that they regularly produce and of making full use of the networked relations that are dominant in the society. Learning is the chief means by which cities can become more vibrant, healthier, safer, more inclusive and more sustainable. Learning is largely intangible and it cannot be arranged by fiat. What’s important is therefore to concentrate on the conditions that favor the emergence of the process of learning since they constitute the only factor that it is in our power to affect. Technological progress facilitates the frequent exchange among cities and individuals and is helpful to the flow of knowledge. Institutional efforts also make contribution by encouraging the set-up of lifelong learning system and the development of learning communities.

The year 1996 – the European Year of Lifelong Learning – was a watershed in global thought. That year, both the Organization for Economic Cooperation and Development (OECD) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) released their major reports on lifelong learning; and a growing number of European nations launched learning city and regional initiatives. Both reports illuminated the importance of community-based learning and the understanding that learning is embedded in our everyday community settings – the family, the neighborhood, the school and the workplace. Such a concern of learning illustrates a paradigm shift. Learning can no longer be confined to a set and settled space-time, but may develop across multiple places and over a lifetime. The ‘learning’ model has spread far beyond the world of education and into every cranny of economic and social life. It is now increasingly accepted that any organization, profit-making or not, needs to strengthen its educational, ‘learning’ side. Learning as a phenomenon may generalize at all levels of our societies and may offer a model for organizing the space, time, work and lives of our institutions.

The first years of learning city development in most nations appear to have focused on practical issues of learning how to build a process or structural model relevant to their community. Later, there has been rapidly increased interest in investigating the differences a learning city can make at both the macro and the micro levels (Faris, 2006). For example, the United Kingdom government has supported several seminal guides, reports and initiatives to assess learning community processes and outcomes. ‘A Guide to Assessing Practice and Progress: Learning Communities’, field-tested in 1998/99 was followed by an analytical survey of learning cities in 2000, and then by a learning community test-bed initiative in 28 sites. In Australia, the launch of the Victorian State Learning Towns Program in 2000 was followed a year later by a state-wide evaluation. Evaluation tools and reports have also been developed over the past two years at the local level in Hume city and Mt Evelyn, for instance.

Transformation in learning cities is only possible if the transformative learning of individuals and groups is systematically fostered. Social learning groups may differentiate from those of smallest scale (learning circles) through to those of largest or global scale (virtual global learning communities) (Table 3). A new paradigm that focuses on suffusing learning strategies in the policy, planning and programs of all five sectors – civic, economic, educational, public and voluntary – increases the probability of achieving a triple bottom line of sustainable economic, environmental and social conditions (Faris, 2006). The degree to which organizations within each sector become
learning organizations – investing in the learning of all their members and strategically leveraging the organizations’ human and social capital – is one measure for the transformative power of a learning city.

Table 3: A Nested Concept of Expanding Scale and Cascade of Social Learning Environments

<table>
<thead>
<tr>
<th>Type</th>
<th>Scale (Smallest to Largest Scale)</th>
<th>Example(s)</th>
<th>Unique Features or Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Global Learning</td>
<td>Largest: World Wide Web Networks of Shared Interest or Purpose</td>
<td>*CISCO Academy of Learning</td>
<td>Solely dependent upon Information and communications technologies (ICT) e.g., Electronic Learning Communities</td>
</tr>
<tr>
<td>Communities</td>
<td></td>
<td>*Commonwealth of Learning</td>
<td></td>
</tr>
<tr>
<td>Learning Communities of Place</td>
<td>Civic Entities: Neighborhoods, Villages, Towns, Cities or Regions</td>
<td>*Kent Learning Region</td>
<td>Place-Based Settings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Victoria Learning City</td>
<td>*Places that explicitly use life-long learning as an organizing principle and social/cultural goal</td>
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<tr>
<td></td>
<td></td>
<td>*Finnish Learning Villages</td>
<td>*Political jurisdictions</td>
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<td></td>
<td></td>
<td></td>
<td>*Residents define operational boundaries</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* ICT used to network within and among learning communities of place</td>
</tr>
<tr>
<td>Learning Organizations</td>
<td>Corporations/Bureaucracies through to Small and Medium-Sized Enterprises</td>
<td>*IKEA Natural Step Eco-Economic Model</td>
<td>Private, Social or Public Enterprises that Foster Learning as a Strategic Objective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*UK Investors in People Scheme</td>
<td>* Shared Vision</td>
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<td></td>
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<td></td>
<td>* Systems Thinking</td>
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<td></td>
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<td>* Mental Models</td>
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<td></td>
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<td></td>
<td>* Personal Mastery</td>
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<td></td>
<td></td>
<td></td>
<td>*Team Learning</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Peter Senge, chief exponent</td>
</tr>
<tr>
<td>Academic Learning</td>
<td>Educational Institutions: Colleges/Classrooms</td>
<td>*Evergreen College</td>
<td>Formal Education Settings</td>
</tr>
<tr>
<td>Communities</td>
<td></td>
<td>*Community Schools</td>
<td>*Team Teaching</td>
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<td></td>
<td></td>
<td></td>
<td>* Interdisciplinary Approaches</td>
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<td></td>
<td></td>
<td></td>
<td>*Co-operative Learning</td>
</tr>
<tr>
<td>Communities of Practice</td>
<td>Communities of Interest: Professions, Trades, Avocations, etc.</td>
<td>*Artists’ Workshop</td>
<td>Initially Solely Face-to-Face</td>
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<td></td>
<td></td>
<td>*Legal Assistants’ Network</td>
<td>*Often Theme-Based</td>
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<td></td>
<td></td>
<td></td>
<td>*Members are Practitioners</td>
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<td></td>
<td></td>
<td></td>
<td>*Members Learn from One Another</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Etienne Wenger, chief exponent</td>
</tr>
<tr>
<td>Learning Circles</td>
<td>Smallest: Small Groups Engaged in Learning Activities of Mutual Interest</td>
<td>*Swedish Study Circle Movement</td>
<td>Initially Solely Face-to-Face</td>
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<tr>
<td></td>
<td></td>
<td>*Small Group Discussions</td>
<td>*Small Group Dynamics</td>
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<td></td>
<td></td>
<td></td>
<td>*Optimum Size: 8-12 Persons</td>
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<td></td>
<td></td>
<td></td>
<td>- Kurt Lewin and Myles</td>
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<td></td>
<td></td>
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<td>Horton, chief exponents</td>
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</table>
Chapter 3. Urban Universities in the Globalizing World

3.3 Diversified Organization of Universities for Learning Cities

Universities are destined to play a fundamental role in global cities given the requirement on learning in every corner of the city. And the role of universities in this aspect is likely to further increase. Subsequently, a remarkable diversified organization of universities – such as virtual universities, franchise universities, corporate universities, mobile universities, and academic brokers – has emerged to create new opportunities to meet the growing social demand. They transcend the conceptual, institutional, and geographical boundaries of traditional universities.

Virtual University

The elimination of the physical distance barrier as a result of the information and communications technology (ICT) revolution makes it possible to provide higher education programs through electronic media, typically the Internet. Virtual universities share a borderless nature which connects the universities and participants into a network system. Virtual universities have been widely hailed as the way of the future for distance higher education, with their cost-effectiveness, economies of scale, state-of-the-art delivery methods and ability to reach out to a wide international clientele. However, there are also drawbacks of the virtual universities as compared to the traditional campus-based institutions, such as lack of face-to-face contact between student and teacher, erosion of traditional academic values, loss of a sense of community and shared tradition, technological development at the expense of pedagogical standards, a tendency towards cultural homogenization, and an emphasis on quantity over quality.

The growth of virtual universities is popular in many countries across the world. An estimate made in early 2000 suggested that there were already more than 3,000 specialized institutions dedicated to online training in the United States alone. Thirty-three U.S. states have a statewide virtual university; and 85 percent of all community colleges are expected to offer online distance education courses by 2002 (Olsen, 2000). The Virtual University of Monterrey, Mexico, offers 15 master’s degree programs using teleconferencing and the Internet to reach 50,000 students in 1,450 learning centers throughout Mexico and 116 other centers all over Latin America. Tun Abdul Razak University, the first online institution in Malaysia, has started to extend its reach to neighboring Asian countries. The African Virtual University and the Francophone Virtual University are pioneering virtual education in Sub-Saharan Africa. As of 2002, there are 15 virtual universities in Korea, offering 66 B.A. degree programs that reach 14,550 students (World Bank, 2002).

By the end of 2003, MOE in China had issued modern distance education (MDE) licenses to 67 pilot campus-based universities and the China Central Radio and Television University (CCRTVU). There are 2347 study centers distributed all over the country covering 153 specialties from 10 study fields for 67 pilot universities (Ding, Gu and Zhu, 2005). Since 1999, the CCRTVU has been providing modern distance education (MDE) through 44 provincial Radio and Television Universities (RTVs), 930 city branches and 2021 county-level sites and 22,237 study centers (ICEM of CCRTVU, 2003). By the end of 2003, there were 2.3 million enrolments registered for MDE programs in 68 pilot universities in total and 90% of them were in-service adult employees (Zhang, 2004). In 2008, Shanghai Television University (STVU), a branch of CCRTVU, was
named as a laureate for the UNESCO King Hamad Bin Isa Al Khalifa Prize for the Use of Information and Communication and Technologies in Education.

**Franchise Universities**

In many parts of the world, predominantly in South and Southeast Asia and the formerly socialist countries of Eastern Europe, there has been a proliferation of overseas ‘validated courses’ offered by franchise institutions operating on behalf of British, American, Australian and other universities. The cost of attending these franchise institutions is much less, usually one-fourth to one-third what it would cost to enroll in the mother institution (World Bank, 2002). It was estimated that one-fifth of the 80,000 foreign students enrolled in Australian universities are studying at offshore campuses, mainly in Malaysia and Singapore (Bennell and Pearce, 1998).

In China, franchise universities are still at the primary stage of development, but there is a trend of growing. The University of Nottingham Ningbo China (UNNC) is the first Sino-Foreign cooperative university with independent legal entity in China, with the full approval of the Chinese Ministry of Education in 2004. The University offers British degree programs from The University of Nottingham, UK. Xi’an Jiaotong – Liverpool University (XJTLU) is another international university jointly founded by Xi’an Jiaotong University China and the University of Liverpool UK in May 2006 in Suzhou as a joint venture. As an independent Sino-Foreign cooperative university, it offers undergraduate degree programmes in the fields of science, engineering and management, and awards both its own Chinese degree and a degree from the University of Liverpool. New York University Shanghai, cooperatively established by New York University and East China Normal University, is the first American university with independent legal status approved by the Ministry of Education. Its first class of undergraduate students will enter in September 2013. It will be the first university in China to consider a broader set of admissions criteria than the Gaokao national higher education entrance examination.

**Corporate Universities**

A corporate university is an educational entity that is a strategic tool designed to assist its parent organization in achieving its mission by conducting activities that cultivate individual and organizational learning, knowledge, and wisdom (Allen, 2002). It is a powerful rival to traditional university in the area of continuing education. Corporate universities are most commonly found in the United States, a nation which has more leading corporations. In 1993, there were only 400 companies owning corporate universities in the United States. By 2001, this number had increased to 2,000 (Hearn, 2001). Corporate universitites may operate through their own network of physical campuses (examples are Disney, Toyota, and Motorola); as virtual universities (e.g., IBM and Dow Chemical); or through an alliance with existing tertiary education institutions (as do Bell Atlantic, United HealthCare, and United Technologies) (UNESCO, 2005). Some corporate universities have already been accredited formally to grant college degrees, such as McDonald’s, Bell Telephone and The Ford Motor Company.

The concept of ‘corporate university’ was brought to China by several foreign companies. Motorola opened its corporate university in China in 1993 at first; later, Siemens Management Institute and Ericsson China Academy was established in 1997. In 1998, the first Chinese
corporate university – Chunlan College – was set up by Chunlan Group with an investment of 60 million yuan. Soon, Haier opened Haier University in 1999 to cultivate high-level managers. Then HP Business School was set up in 2001 and UF University in 2008. The prospering of corporate universities shows that these corporations have recognized their responsibility to provide employees education that can evolve with changing business needs in order to foster the business’ sustained success. Many corporations believe that through continued employee education, they can achieve strategic goals and performance improvement (Meister, 1998).

**Mobile University**

With the cross-border flows of knowledge and ideas, more and more students and scholars are being assimilated into international organizations and are losing their university identities or national characters. Knowledge is expanding and diversifying rapidly through networks around international symposia and specialized research journals. The development of ‘summer universities’ operating at the frontier between research and teaching enables researchers to disseminate new knowledge more efficiently and rapidly even than through traditional symposia and congresses. These activities show strong features of ‘de-territorialization’: the events organized by these networks are deserting university campuses for large hotels; scholars meet regularly at itinerant congresses and seminars; the funding of meetings becomes increasingly independent of academic institutions, and is covered for the most part by extra-academic institutions or participants themselves.

**Academic Brokers**

There are also some virtual, often web-based, entrepreneurs specialized in bringing together suppliers and consumers of educational services in many different areas, such as Connect Education Inc and Electric University Network that provide brokering services and virtual counseling. A growing virtual real estate market which builds, leases, and manages virtual campuses is also emerging (Abeles, 1998). For example, IBM and others are working with traditional physical campuses to create ‘Thinkpad U’ where all students and faculty are equipped with portable computers and the campus is wired into the internet. Multimedia educational software is produced to serve the training needs of educational clients as well. Dozens of Web-based companies act as clearinghouses between schools and prospective students, offering information about academic and financial resources.

**3.4 The Changing Global Geography of Urban Universities**

The diversified and flexible forms in the organization of university, coupled with the frequent interaction and complex networks between universities and cities, have transformed the global geography of urban universities. The space of universities is flowing across the urban and national boundaries as promoted by cross-border mobility and the set-up of branch campuses. There is no longer a simple centrality of the global university system as dominated by those in developed countries in the past. Rather, it assumes several new geographical forms including international cooperation and alliances that incorporate universities in countries at various development levels, as well as a grid of nodes of higher education and research activities caused by the strategic localization of global universities in global cities.
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The Flowing Space
As world economies become increasingly interconnected, the international skills needed to operate on a global scale have become increasingly important. Globally oriented firms seek internationally-competent workers who speak foreign languages and have the intercultural skills needed to successfully interact with international partners. Governments aim to improve academic standards and enhance the quality of education and research in light of those international standards now achieved in the advanced countries. Individuals are looking to higher education to broaden students’ horizons and help them to better understand the world’s languages, cultures and business methods. The borderless nature in the organization of knowledge and in the creation of intangible capital, coupled with the growing demand for international sharing of education and training, has translated into the general trend towards the flowing space of global universities.

Cross-Border Mobility
The proportion of international students in tertiary enrolments provides a good indication of the magnitude of student mobility across the world. Over the past three decades, the number of students enrolled outside their country of citizenship had risen from 0.8 million worldwide in 1975 to 3.3 million in 2008, a more than fourfold increase (Figure 7). Since 2000, the number of foreign tertiary students enrolled worldwide had increased by 70% until 2008, for an average annual increase of 9 percentage points (OECD, 2010). Growth in the internationalization of tertiary education has accelerated, mirroring the globalization of economies and societies. The United States, The United Kingdom, Germany, France, and Australia received more than 50% of all foreign students worldwide (Figure 8). Since 2005 the rate of growth in non-OECD destinations is higher than in OECD member countries, which reflects the increasing preference to study in emerging countries. In absolute terms, the largest numbers of international students are from China and India (Figure 9), holding 17.1% (not including an additional 1.4% from Hong Kong, China) and 6.8% in the total OECD destinations respectively, and 15.7% and 5.7% in the total reported destinations around the world (OECD, 2010).

As the largest foreign student output country, the number of Chinese student studying abroad was up to 1.27 million at the end of 2010 (NBSC, 2011). Their destination of choice was first the United States, followed closely by Japan (Figure 12), with 21.6% and 15.3% respectively of all international Chinese students studying abroad (OECD, 2010). The enrollment of foreign students in China began in 1950, with 33 students from five countries in Eastern Europe. In 2011, the number of foreign students in China had increased to 292611, from 194 countries and regions (Figure 10), in 660 Chinese HEIs (CAIE, 2011). The top ten countries of origin were Korea (62422), the United States (23292), Japan (17961), Thailand (14145), Vietnam (13549), Russia (13340), Indonesia (10957), India (9371), Pakistan (8516), Kazakhstan (8287). Besides, France (7592), Mongolia (7112), Germany (5451) were also listed in the countries of origin with over 5000 students in China (Figure 11).
Figure 7: Number of Students Enrolled in Tertiary Education outside Their Country of Citizenship, 1975-2008, in millions
Source: OECD, 2010, P313

Figure 8: Distribution of Foreign Students in Tertiary Education by Country of Destination, 2008
Source: OECD, 2010, P314
Note: Data only include those countries reported to OECD

Figure 9: Distribution of Foreign Students in Tertiary Education by Country of Origin, 2008
Source: OECD, 2010, P329
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Figure 10: Foreign Students in China, 2000-2011
Source: CAIE, 2000-2011

Figure 11: Distribution of Foreign Students in Tertiary Education in China by Country of Origin, 2011
Source: CAIE, 2011

Figure 12: Distribution of International Chinese Students in Tertiary Education by Country of Destination, 2008
Source: OECD, 2010, P330-331
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**Branch Campus**

Global networks are absorbing universities into a distributed global system. Universities seem increasingly aware that the costs of not developing global networks may be rising. These include losing market share to foreign organizations and declining intellectual capital. Therefore universities are developing new sites, sometimes overseas, to build up new core markets and generate resources to cross-subsidize less profitable but important campuses. For example, New York University (NYU) has a host of foreign facilities used for study abroad programs, referred to as Global Academic Centers. As of 2012, NYU operates 14 academic sites – both degree-granting research university campuses and study abroad sites – in Africa, Asia, Australia, Europe, the Middle East, and North and South America, including undergraduate academic-year and summer study abroad programs in Abu Dhabi, Accra, Berlin, Buenos Aires, Florence, London, Madrid, New York, Paris, Prague, Shanghai, Sydney, Tel Aviv and Washington DC (GAC, 2012). One of the most noteworthy is the 57-acre (230,000 m2) campus of NYU Florence Villa LaPietra in Italy, bequeathed by the Sir Harold Acton to NYU in 1994.

The number of international branch campuses worldwide grew from 35 in 1999 to 162 in 2009, including 78 branches operated by United States universities (Becker, 2009). In addition to the United States, the home countries of institutions with international branches included Australia (14), the United Kingdom (13), France (11) and India (11) (Figure 13). As of 2009, the top host country for branch campuses was the United Arab Emirates (UAE), concentrated 40 branch campuses, about one fourth of the total. Other leading host countries include China (15), Singapore (12), Qatar (9) and Canada (6) (Figure 14). The UAE has been able to attract more campuses than any other countries primarily because of its high student demand for tertiary education, a need to build a knowledge society and economy to reduce its dependence on the export of oil, attractive funding and support ‘packages’ (such as tax free trade zones) for foreign institutions that establish a campus there, and more importantly, the UAE government is considered stable and more ‘pro-Western’ than many others in the region (Becker, 2009).

A key shift in the set-up of branch campuses is about who is setting up where. Traditionally, it is ‘North to South’, i.e. colleges and universities in developed nations creating campuses in the developing world. This model is still the most prevalent, describing 51% of the branch campuses (Becker, 2009). But as the slim majority suggests, other models are now reaching critical mass as well. 30% of branch campuses are now considered ‘North to North’, with both home and host nations being the developed. Much of this kind of growth has taken place with branches in Singapore and Australia. ‘South-to-South’ branch campuses are also on the rise. In 2006 there were only 5 such examples, but in 2009 the number rose to 26, with source countries including Chile, Iran, Lebanon, Malaysia, Mexico, the Philippines and Sri Lanka. The key host country is the UAE.
The New Centrality

Cross-border development of global universities does not mean that the education and research activities are proceeding in a mere borderless space of flows. Rather, the centrality still exists in the global university system, but assumes different forms. On the one hand, international cooperation and university alliances are established to deal with emerging issues that single universities can’t fulfill. On the other hand, cross-border development of global universities is developed strategically for particular interest, with global cities as the prior consideration in the choice of places, thus contributing to the concentration of global universities in global cities. All these work as a counterpart in the global university networks in which space of flows and space of centrality coexist.

International Cooperation and Alliances

While developing global solidarity is undoubtedly more difficult than developing national or regional practices of solidarity, it is nevertheless still possible. By building global networks to exchange information and provide material aid, universities in different parts of the globe have, in fact, been successful in challenging the attempts of mobility to play them against each other. The much greater availability of information and ease of communications resulting from innovations in computer technology have, paradoxically, facilitated increased university contacts around the globe. Frequent exchange among universities contributed to the formation of university alliances and international cooperation, which are modeled through pooling of resources and some coordinated budgeting.
For example, the Worldwide Universities Network (WUN), an invitation-only, nonprofit group of 18 universities from Australia (2), Canada (1), China (3), New Zealand (1), Norway (1), South Africa (1), Brazil (1), the United Kingdom (4), and the United States (4), was founded in 2000 to provide financial and infrastructural support to member universities to allow student and staff exchanges, development of international training programs and collaborative research work. All the members have agreed to carry out research and training on a collaborative basis, principally by organizing online, interactive video-seminars (although traditional conferences are also organized) and by financing exchanges of research students and staff. It has also developed research-based degree programs as well as other online training courses. These courses are written jointly by academic staff from several of the participating universities.

In the follow-up to the 1991 World Conference on Higher Education, UNESCO developed the UNITWIN program (abbreviation for the university education twinning and networking scheme) to facilitate the networking of higher education and research. The Program operates through the establishment of UNESCO chairs, and UNESCO networks which are also designated as UNITWIN projects. UNITWIN/UNESCO Chairs projects deal with training and research activities and cover all major fields of knowledge within UNESCO’s competence such as Education, Human Rights, Cultural Development, Environment, Basic and Engineering Sciences, Communication, etc. The principal beneficiaries of this program are institutions of higher learning in developing countries and countries in transition. The program serves as a prime means of capacity building through the exchange of knowledge and sharing in a spirit of solidarity. Thus it promotes north-south and south-south cooperation as a strategy to enrich institutions.

**Concentration of Global Universities in Global Cities**

Global universities do not develop space of flows in a mere natural and borderless way. There is a tendency for the creation of transnational university along the lines of transnational corporations, considering the many cross-border branch campuses that global universities have open to seek broader educational market. Such universities, operating to maximum benefit in outlets around the world, have taken their advantages from their corporate organizational form. This enables them to internalize the international exploitation of their assets, in the context of locational risk and opportunity, generated by differences in urban/national forms of regulation and gaps in international regulatory coordination. Competition between urban/national regulatory and institutional systems is happening, with transnational universities picking and choosing their preferred regulator. At this point the historic alignment between the city and the university is giving way to one based more on global frameworks and corporate interest.

The global universities are shifting activities between locations, sites and even cities to maximize their benefit, with profound consequences for their host cities. The university is looking for an attractive city to locate itself or the new campus in order to attract more talents. At the same time, the city is also looking for competitive universities to promote its competence by virtue of university resources. Thus there is reciprocal attraction and mutual selection between the university and the city. Top universities seek top cities, and vice versa. Some cities have succeeded in attracting the universities while some have failed. This has contributed to the concentration of
global universities in global cities. The development of international branch campuses, such as the fourteen branch campuses of New York University as introduced in the previous section, has happened first in the top global cities. The national wave of branch campus development in China has also shown similar trend about the strategic localization of key universities in key cities. Typical cases include Weihai campuses of Shandong University and Haerbin Institute of Technology; Shenzhen campuses of Beijing University, Tsinghua University, Haerbin Institute of Technology and Nankai University; Suzhou campuses of University of Science and Technology of China and Renmin University of China; Zhuhai Campus of Sun Yat-Sen University; Changzhou Campus of Hohai University et al. All these universities are listed in the Chinese ‘211’ project, a national project to develop key research universities; and all these cities are the fastest growing cities, some of which are special economic zones enjoying favorable national policies.

### 3.5 Strategic Importance of Global Universities in Global Cities

Global universities stand at the intersection of knowledge economy and network society. They are of strategic importance in the globalizing world. The flexible organization and flowing space of universities have contributed to broader access to higher education and promoted the accumulation of human capital for urban development. Networks among universities generates an entry for cities into the global circuits and are relevant to the trade dimension of international higher education services as well as other related interests. Moreover, rather than being passive followers of urban strategies, global universities have often inventively transformed the urban development trajectory.

Figure 15: Gross Enrollment Ratios in Tertiary Education (ISCED Levels 5+6) by Country, 2002-2003

Source: UIS, 2005.

Over the past decades, universities across the world have experienced an explosive growth in student numbers, described by some as a ‘massification’ of higher education (Figure 15). Enrolments in higher education in the world almost doubled between the early 1970s and 1990, the estimated number of students rising from 28 to 69 million, and reaching the figure of 122 million in 2002 (UIS, 2005). According to certain projections, the student population could reach
This trend is not confined to the wealthy countries. In Africa, Asia and Latin America, strong population growth has helped to swell numbers at the primary and secondary levels, thereby boosting enrolments in higher education, although to a lesser extent than in Europe or North America. Thus, while enrolment ratios in the wealthy countries rose from 2.2% in the 1960s to 59% in 2002 in Europe and from 7.2% to 55% in North America, rates in the least developed countries barely increased from 1.3% to 4% (UIS, 2005). With a marked disparity between rich and poor countries, the participation in higher education has increased dramatically in general.

Education and training is the most important investment to promote human capital. The massification of higher education has enhanced the role of universities in cultivating human capital. Human capital is a means of production, into which additional investment yields additional output. Different from monetary capital that grows at relatively higher or lower rate depending on the period of prosperity or the period of recession and depression, human capital has uniformly rising rate of growth over a long period of time (Becker, 1993). That is to say, the current generation is qualitatively developed by the effective inputs of education, and the future generation is more benefited by the advanced research undertaken by the current generation (Hansen, 1970). This is the cumulative growth of human capital formation. In this sense, educational investment is more promising and profitable compared with the investment in other durable goods. Therefore, the problem of scarcity of tangible capital in the labor surplus cities can be resolved by accelerating the rate of human capital formation with both private and public investment in education sectors.

The rapid expansion of higher education has intensified the financial pressures on universities and led to greater interest in recruiting foreign students whose tuition fees are often higher than for local students (UNESCO, 2005). Therefore, global universities are increasingly relying on revenues from foreign markets. The long-term trend towards a greater internationalization of higher education is likely to have a growing impact on the local balance of payments in services as a result of revenue from tuition fees and domestic consumption by international students. Along with student mobility, the cross-border electronic delivery of flexible educational programs as well as campuses abroad are also relevant to the trade dimension of international higher education, although comparable data do not yet exist. From a macroeconomic perspective, international negotiations on the liberalization of trade in services highlight the trade implications of the internationalization of education services (UNESCO, 2005). Moreover, the value of global universities also lies in the long-term guarantee of the national interests in foreign countries through the control of education and intellectuals.

The predictable emergence of global networks implies that the decentralized structures organized along network lines could be a valuable supplement to the permanent sources of funding and hierarchical organizational patterns. For the cities, this is means of building a network of academic excellence rather than building a single world-class academic institution. For those cities/countries that have invested insufficiently in university-type institutions, they could and – above all should – think of investing in network organizations that anticipate the foreseeable development of academic institutions. This is all the more advisable since the economic costs of academic
networks are much less than those involved in the creation of large university establishments (UNESCO, 2005). Networking enables cities to establish a higher education system or to improve its quality without having to wait to secure large investments or to be in a position to make long-term commitments. It is easier for these cities to link up to network structures that are themselves linked to other institutions or existing networks within the framework of regional or international cooperation – public or private.

Furthermore, the development of global university networks is more than a simple case of ‘fitting in’ to existing environment of their hosting cities/counties, whether market, infrastructure, or culture/society. It is also in a way that is consistent with the university’s strategy and operations in other places of the world. Local environment may have to be inventively molded if the university organization and strategy in one city are not to become inconsistent with those in other cities. Hence, in China, for example, when foreign universities first settled in, they altered particular strategies in terms of admission criteria (taking the GaoKao national higher education entrance examination as a standard, such as the University of Nottingham Ningbo), in terms of tuitions fees and expenses (much cheaper than in the mother institutions), in terms of courses arrangement (including language and curriculum design), in terms of cultural and social expectations for terms of employment (such as the legal status of working unions). But as more and more foreign universities move in, the educational environment in China is being transformed with the acceptance and appreciation of the standards and norms that are popular and dominant in other places of the world, such as granting universities with certain autonomy in deciding the admission criteria. Global universities have contributed to the restructuring of local institutions.

**Conclusion**

Cities today are caught up in a globalizing urban world. In the global urban networks, there is a sharply defined hierarchy of dominance for cities. What most important in determining this ranking is intangible capital, which includes raw labor, human capital, social capital and the quality of institutions. To be successful in the global competition, cities have to incorporate learning as an urban strategy to mobilize and to harness knowledge and ideas. Learning is largely intangible and it cannot be arranged by fiat. What’s important is therefore to concentrate on the conditions that favor the emergence of the process of learning since they constitute the only factor that it is in our power to affect. This creates opportunity for the development of universities as basic learning units.

Universities play a strategic role in urban development given their concentration of knowledge and intellectuals. Diversified and flexible organization of universities has emerged. Virtual universities, franchise universities, corporate universities, mobile universities, academic brokers constitute the complementary forms of traditional campus-based universities. These have strengthened the role of universities as knowledge infrastructures in learning cities. The borderless nature in the creation of knowledge, coupled with the demand for international sharing of knowledge, are absorbing universities out of urban boundaries and into a corresponding global network. Cross-border mobility has become more frequent due to the advancement of technology. Branch campuses are developed with the facilitation of national policies which see an opportunity to enter the global markets. International cooperation and strategic alliances has come into being
to do things that they cannot do individually. Global universities are increasingly concentrated in global cities along with the mutual selection between universities and cities.

Therefore although universities are closely related with cities, they are not fixed in particular cities. The universities are becoming global universities in the globalizing urban world. If cities are to win in the global competition, support global development of universities is indispensable. Education and training provided by the universities are key measures to cultivate human capital which can enhance the competences of labors. Social networks established through global universities are valuable assets for future career development of individuals and are shortcuts for cities to achieve academic excellence along the line of network rather than to build a single world class university with dramatic investment. Rather than necessarily structural followers of globalization to fit in existing urban environment, the universities have often triggered changes to make the city be consistent with the university’s strategy and operations in other places of the world.
Chapter 4. The Evolution of Universities in the Chinese History: Spatio-Temporal Perspectives

The university is not a new-born thing. It has a history of over 3000 years in China. The space of university is diversified across time and place guided by a wide variety of social values. There were practices to revive traditional shu-yuan, to establish western missionary universities, to orient university for productive use, to blend the university into everyday life, to mobilize the university for social revolution and so on. With the arrival of the modern era, the indigenous tradition of higher education in China was mixed with various exotic academic models, including the European, American, Soviet models. Those at the present time might be of different order from those of the earlier period. However, it can be considered to a certain degree that the space of university today is influenced and governed by its historical links. History gives us some hints on the evolution of the space of university and about how to make the space of university a productive one. This chapter will examine the features of the space of university, their interaction with the city and the society, and their underlying social values in different historical periods of China.

4.1 Indigenous Scholarly Institutions

Chinese higher education originated as early as 1100 B.C. during the Zhou dynasty and was called pi-yong. During the Han dynasty (206 B.C. – A.D. 220), higher education institutions (HEIs) were called tai-xue, which means ‘institutions of higher learning’, and were attended by more than thirty thousand students during the dynasty’s most prosperous time at its main campus in Chang’an, the capital city (Wang et al, 2007). During the Tang dynasty (A.D. 618-907) and afterward, Chinese universities were called guo-zi-jian, a type of HEI established for the children of royal families and senior officials. The content of learning was drawn from the classical texts of Confucian teachings, which were also the dominant contents of the imperial examinations for senior civil service positions.

In addition to these ancient universities established by the Chinese state, which continued to exist until the late nineteenth century, private universities also flourished in ancient China. Confucius (551-479 B.C.) introduced private higher education in China during the Eastern Zhou dynasty, at a time when state institutions were becoming weaker (Min, 2004). It was recorded that Confucius had more than three thousand students. It became fashionable to run private learning institutions during that time, and many leading scholars at different schools operated their own institutions. There were also professional schools for law, medicine, mathematics, literature and calligraphy studies.

When speaking of ancient scholarly institutions of higher learning, one must mention shu-yuan. These institutions started to appear during the Tang dynasty (A.D 618-907), when they were first established in both the state and private sectors as places for collecting books. Shu-yuan were not places for teaching and learning initially but gradually developed into private academies or scholarly societies, as alternatives to official HEIs. Their studies were not limited to the orthodox definition of knowledge institutionalized in the imperial examinations, but introduced new
currents of thought drawn from Buddhism, Daoism and other sources. Influenced by liberalism embedded in Buddhism and Daoism, shu-yuan were usually built away from cities or towns, providing a quiet environment where scholars could engage in studies and contemplation without restrictions and worldly distractions. Closely combined with the charming scenery in the natural environment, shu-yuan became a special cultural landscape, with flexible and idyllic spatial patterns.

While largely independent and often financed by private endowments of land, shu-yuan tended to rise and decline in accordance with the quality and vision of the great scholars who singly headed them up (Hayhoe, 1989), and they were constantly under threat from the imperial bureaucracy which sought to co-opt them to the service of the examination system in some periods, to destroy them in others. In the Song dynasty (960-1279 A.D), the Confucian classics were reordered to form a knowledge system that had to be mastered by all aspiring to become scholar-officials in the imperial civil service. Hanlin Academy, an official institute of the state, regulated the interpretation and application of the classical texts, the basis of all true knowledge, and controlled the precedent-setting historical record. The imperial examination system thus dominated traditional higher education, creating a class of intellectuals who climbed the ladder from local to provincial and finally capital and palace examinations (Miyazaki, 1971).

Figure 16: Jishan Shu-yuan. Source: Yang, 2001, P59

Therefore, shu-yuan were gradually moved from the suburb to the city with the control of the government to serve for the imperial dominance. After Jiading period (1208-1225), large numbers of shu-yuan were established in the central cities such as those in Nanchang, Hangzhou, and Ganzhou. Worship, a traditional ceremony in the Chinese imperial system, became a constant activity in shu-yuan besides its traditional functions in collecting books and teaching. The spatial patterns of formalized shu-yuan in the imperial examination system were changed accordingly (Figure 16). The previous relatively free organization of buildings was replaced by formalized and

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6 Jishan Shu-yuan was first established in the 11th Century of Song Dynasty and underwent destruction and reconstruction several times in the following periods. The figure showed its appearance in the 17th century of Qing Dynasty.
ritual rules, although the idyllic ideal was still preserved in the layout of landscape. Palaces and temples appeared in shu-yuan for worship; examination halls and shooting gardens were established to select both civil and military elites. The donation and funding of the government became the main financial sources for shu-yuan. The bestowal of a calligraphic signboard by the Emperor became an extremely important symbol of an academy’s status.

In fact, shu-yuan of traditional China may have been a closer parallel to the medieval universities in Europe. Both of them were originated in the feudal society and held the educational philosophy of elitism. Their campuses were enclosed in a courtyard integrating the activities of teaching, research and daily life altogether. However, the different history and culture generated different value system. Traditional universities in China never had the kind of statutory group autonomy enjoyed by the medieval universities through their papal charters and the *ius ubique docendi* (Hayhoe, 1989). The Chinese imperial bureaucracy enjoyed a scholarly monopoly and authority over the intellectual community, which was never effectively challenged until the Empire itself began to crumble.

**4.2 Universities in Search of Modernity**

Although the indigenous tradition had a significant impact on Chinese higher education, modern Chinese universities developed from the European model, with a wistful longing for the shu-yuan tradition from time to time. This process involved a long and even painful interaction with the West after the Opium War in 1840 which made Chinese intellectuals aware of Western advancements in science and technology (S&T) and of the backwardness of China. This period was the most active and fertile stage in the Chinese history to explore university development patterns.

**Western Missionary Universities**

When Western missionaries, both Catholic and Protestant, first found themselves able to operate with considerable freedom on Chinese soil, their primary concern was direct evangelism. They were never concerned about civil activities such as education. But since Christian and traditional Chinese culture held different cultural values, the missionaries met great opposition in their religious mission. After years of struggle, the missionaries realized that people’s resistance could only be devolved through a compromise with the Confucian ideology, a feasible way of which was to call on the upper ruling strata and the intelligentsia to influence ordinary people. Therefore, some missionaries began to pay attention to the interrelation between the civilization of Chinese society and the spread of the Gospel.

A gradual thought in their minds was the introduction of Western university models. Many foreign groups tried to create HEIs in China, including French Jesuit missionaries, American Protestants with the cooperation of British and Canadian colleagues, and German industrialists. Catholics began to focus on developing parochial education to teach new converts basic religious and liturgical knowledge which reinforced subordination to Chinese imperial authority. Protestant missionaries turned to medical and educational work as they faced difficulties and discouragement in their evangelical efforts. By 1949, there were twenty-one universities run or subsidized by foreigners (Min, 2004), including such influential institutions as Yenching University in Beijing.
(the later Peking University) and St. Johns University in Shanghai (the later Tongji University). Among the total of 205 HEIs in the country, foreign universities accounted for about 10% and enrolled about ten thousand students (Wang et al, 2007).

Missionary universities at the early stage adopted the western planning concepts and patterns such as zoning in the organization of space. They didn’t consider at all the Chinese philosophy in university and urban planning, namely, the search for harmony between doctrine and arts. What they referred to at most is the obvious symbol of traditional Chinese architecture – the large roof, which was added directly to the modern style. Such absurd hybridization was of course not accepted by the society. The localization of western missionary universities in China had to find something more fundamental. An excellent contribution was made by the American architect, Murphy, who successfully combined the western planning approach with Chinese style in his works. Typical examples include Jinling Women University (1919) (Figure 17) and Yenching University (1921-1926) (Figure 18). The campus was zoned according to functions in western principles, with traditional Chinese gardens going across and connecting them into an integral whole. The planning thought of Murphy has deeply influenced urban planning at that time, including the Capital Plan of Nationalist Party in Nanjing.

Figure 17: Plan of Jinling Women University
Source: Chen, 2008 (left); Murphy, 1921 (right).

Figure 18: Plan of Yenching University
Source: Chen, 2008 (left); PKU, 2012 (right).
The introduction of western university models into China by missionaries was embedded with great ambitions. The mission of these colleges was an economic and cultural rather than a religious one. It was not only an economic and effective missionary instrument. Most importantly, its value lied in the long-term guarantee of foreign interests in China through the control of education and intellectuals, which is the rather reason why western countries supported missionary universities in China. These institutions became attractive to young Chinese intellectuals after the abolition of the imperial examination system in 1905. Its graduates contributed to modernization in all of the areas such as law, engineering and medicine in ways that were limited by the inherent conservatism and respect for authority of the Jesuit order. For example, law graduates from l’Université l’Aurore7 advised the Nationalist government on legal reforms along French lines, supporting French imperialist insistence that France’s extra-territorial privileges should not be revoked until an ‘acceptable’ modern Chinese legal system had been established (Hayhoe, 1987).

The vision to create a modern university which could enable China’s scholars to keep up with European and American universities was never that of the missionaries. Neither is their concern to promote social civilization. For instance, students were strictly forbidden to participate in any of the radical political movements from May 4th onward in l’Université l’Aurore. The core of the educational philosophy in missionary university was to Christianize individual personality and then the whole society. The presence of these missionary institutions and the foreign models that they represented on Chinese soil were more symbolic of the threat of foreign domination than truly coordinated with forces of external economic and political exploitation. Therefore, although the higher education models introduced by the missionaries and other foreign groups influenced the development of modern higher education in China, they were largely peripheral to the mainstream education reforms being engineered by a modernizing Chinese leadership.

**Conservative Modernization Efforts**

For Chinese modernizers of the late Qing dynasty and early republican periods, the missionary institutions were minor irritants in a situation where their own conception of higher education reform clearly reflected the political vision of each period. They did not look to missionary efforts for inspiration in their reforms, but visited or sent delegations to the nations whose educational institutions were of interest and modeled their reforms directly on foreign experience (Hayhoe, 1989). In 1847, three young students went to the United States for university studies, the first Chinese to do so. In 1872, the Chinese government decided to send a group of 120 students to the United States, initiating the country’s first official study-abroad programs. This was followed by programs that sent students to the United Kingdom and continental European countries. In the wake of increased Japanese influence in China, many Chinese scholars and students went to Japan, where they experienced the European university model with a Japanese imprint (Min, 2004). A large proportion of the returned students worked in the Chinese higher education system as teachers, researchers, and administrators, becoming a driving force in the development of Chinese universities.

One of the modernization efforts introduced in China after the Opium War was the movement to adapt the Western university model and to promote the learning of Western S&T as a response to

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7 A French Catholic university established by French Jesuits in 1903 in Shanghai.
foreign aggression. From the 1860s to the 1880s, Western-style military and naval academies and foreign-language institutions were established by powerful scholar-officials in China, to train young people capable of dealing with the barbarians at both a diplomatic and military level. These institutions were strictly subordinate to the traditional institutions of the imperial examination system and the shu-yuan, which continued to focus on the classical knowledge tradition. And they were confident that western techniques could be absorbed into a revitalized Confucian empire enabling it to deal effectively with foreign incursions. These thoughts were evident in the fact that such western missionaries as W.A.P. Martin and John Fryer were appointed to leadership positions within government foreign language institutions and were trusted to develop western studies which would contribute to China’s self-strengthening (Hayhoe, 1989).

Therefore, universities at this time did not get rid of the pursuit of scholarly officials in traditional shu-yuan and did not understand the spirit of freedom and democracy in European universities, but were still official HEIs. The space of university followed the typical organization of shu-yuan, making minor changes to adapt to the educational and social requirement. For example, the morphology of formalized shu-yuan that is characterized by ritualized building groups and artistic natural landscape was reserved for teaching some traditional courses; physical environment as required by modern higher education was organized along a sub-axis parallel to the main ritual axis. Moreover, the spatial organization was no longer following the model of courtyard, but a western model of squares with relatively open borders enclosed by buildings.

However, it was not anticipated that most students abroad got access to radical and revolutionary currents of thought rather than those supportive of the gradualist reform envisaged by their mentors in China. Neither was it expected that the translation of scientific and social materials by the liberally minded missionaries was a powerful source of new ideas for Chinese reformers who became more and more radical in their demands. Likewise in China itself, the real educational progress of the period was achieved less by official institutions than by energetic gentry who set up their own modern schools (Hayhoe, 1989). By 1910 there were only three government universities – the Imperial University which was still oriented towards the classics, and the two technological universities, Beiyang and Nanyang. Most part of modern higher education was carried out in gentry-supported colleges, provincial higher institutions and missionary colleges.

**Radical Education Reform**

With the Revolution of 1911, the provisional government established by Sun Yat Sen in Nanjing appointed Cai Yuanpei as Minister of Education. In the higher education legislation of 1912, he introduced a European model derived largely from his experience of the German universities of Berlin and Leipzig where he had studied between 1908 and 1911. The aims of education formulated by Cai and expressed in the 1912 legislation had been five-fold: utilitarian, moral, military, aesthetic, and a world view. Cai saw the first three as essential to republican political and economic development, while the latter two rose above politics and were to foster a modern Chinese spirit that would replace Confucianism. While higher professional institutions were to be largely committed to utilitarian, moral and, in some cases, military education, Cai felt that universities had a special responsibility for aesthetic education as a bridge to building a modern Chinese world view. By emulating the German model with its central values of autonomy,
professorial self-government and academic freedom, he succeeded in creating what was probably the first truly modern Chinese university, which provided the context for the May 4th movement in 1919, a movement whose cultural and political implications constituted an important turning point for modern China.

The space of university under such influences showed typical features of openness, freedom, and diversity. The university shared its educational and cultural resources with the city while the city assumed certain social functions of the university. University planning didn’t restrict to the western style or Chinese character, neither was it aimed to build a totally new world as pursued by western missionaries. What took into consideration by modern reformers was just actual needs and social reality. It followed the economic principles. The university encouraged free interaction between students and teachers as well as between the university and the community and provided space to facilitate such activities. For example, campus walls in some universities, such as Nankai University, were abandoned in order to open the university to the society; campus buildings were organized in courtyards to form some small venues; the residence of the students and teachers were located near to each other. Modern educationists paid high value to traditional Chinese culture and made flexible combination between the shu-yuan tradition and western academic models. Not only the ritual layout of buildings but also the idyllic ideal in organizing the landscape was kept in campus design.

**Universities with Nationalistic Spirits**

With the accession of the Nationalist Party to power in 1927, China finally had a clearly focused modern ideology in Sun Yat-sen’s Three Principles of the People: nationalism, people’s livelihood and people’s rights. The tutelage of the Party was regarded as essential before full people’s rights could be implemented, and the focus was on the service of education to economic development and nationalistic unity. Cai’s ideal about the university as an autonomous, self-government and free scholarly institution was interrupted. But he still strived to add the French pattern of a university council to the German model that he previously introduced. The council was composed of the heads of a series of university districts, each of which would have a supervisory role over all lower educational institutions in the district. It was envisaged by Cai to provide intellectuals the needed context for disinterested scholarly research under the umbrella of the council.

In 1927, a National University Council was organized to take the lead in a geographical and curricular rationalization of higher education which would ensure one major university institution for each region with supportive higher professional institutions. These regional universities, in turn, would supervise all other levels of education in the district. But unfortunately the National University Council was not aimed for Cai’s vision of a modern Chinese university standing above politics, instead, it was actually manipulated to better supervise the regional universities and all other levels of education in the district so that to harness them to economic and nationalistic purposes. Meanwhile, attempts to implement the university district scheme in many provinces met with fierce opposition both from universities determined to maintain their independent identity and from lower echelons of education whose leaders did not see a scholarly control of education as supportive of their interests. Cai’s ideal of the university was finally frustrated.
The Nationalist government imposed order on higher education by new legislation and hierarchical bureaucracy. National universities were administered and funded by the central Ministry of Education (MOE) in Nanjing, while provincial-level institutions were responsible to provincial higher education bureaus. Clear regulations were given for the control of private institutions through an external board of governors whose organization and powers were overseen by the MOE (MOE, 1947). By June of 1931 there were 39 universities (13 national, 12 provincial and 14 private), 17 colleges (2 national, 6 provincial and 9 private) and 23 professional schools (3 national, 15 provincial and 5 private) in China (Zhou, 2007). Although the National University Council was aimed for the geographical rationalization of higher education, the distribution of HEIs was largely uneven, partly due to the influence of war and partly by the uneven national development. Of the 15 national universities and colleges, 9 were found in three East Coast cities (Beijing, Nanjing and Shanghai), which also had 19 of the 27 private universities and colleges; Three other cities (Tianjin, Chengdu and Taiyuan) had 9 of the 18 provincial universities and colleges (Hayhoe, 1989).

During the period of Chiang Kai-shek (1928-1949), education was promoted to restore classic culture and to consolidate the one-party dictatorship. Confucian morality and norms were worshiped again. The indigenous Chinese tradition was popular correspondingly, most explicitly represented in the planning of Sichuan University. Different from most universities at that time, Sichuan Universities was not established in the urban fringe, but located in the urban center and developed on the basis of the ruined imperial palace which was considered to symbolize the Chinese traditional culture most distinctively (Chen, 2008). The axis and layout of the imperial palace was inherited in the new campus (Figure 19, Figure 20): main public buildings of the university, including the auditorium, the library, the teaching buildings and the staff club, were arranged in the foreside of the main axis; on either side of it were buildings of each department; the living areas of the students and staffs were located in the rear of the campus. It was consistent with the spatial principle of imperial palace, namely, the Outer Court or Front Court is used for ceremonial purposes while the Inner Court or Back Palace is the residence of the Emperor and his family and for day-to-day affairs of state. Numbers of courtyards were connected with each other along the vertical axis in the Front Court while in the Back Palace the courtyard system extended horizontally.

While Chinese tradition was inherited well in the university planning, western influence was also obvious, especially for those planners and architects among the first batch of study-abroad program. Yang Tingbao, the planner of Sichuan University, for example, was deeply influenced by neoclassicism in his works. In the planning of Northeastern University, it was clear to see geometric, asymmetric, repetitive, and decorative patterns in the organization of space (Figure 21). Universities with nationalistic spirits had similar morphology like western missionary universities in introducing western concepts and representing Chinese tradition. But they were embedded in different socio-cultural background and held different social values. The missionary universities were controlled by foreign ecclesiastic institutions which aimed for cultural colonialism based on elite education. Instead, universities supported by Nationalist Party were regarded as an instrument to promote economic development and consolidate nationalistic unity. It was on the principle of pragmatism.
Figure 19: Plan of Sichuan University, 1936
Source: IANIT, 1983

Figure 20: Plan of the Forbidden City
Source: The Palace Museum

Figure 21: Plan of Northeastern University, 1929
Source: IANIT, 1983
**Communist Revolutionary Universities**

The revolutionary institutions created by the Chinese Communist Party are perhaps the only modern higher institutions in China which were created in conscious rejection of all foreign models, Soviet as well as Western (Huang, Shi and Zhang, 1984). Shanghai University, the earliest institution belonging to the Communist Party, provided programs in fine arts, literature and social science for Shanghai workers and students between 1922 and 1928 before it was forcibly closed by the Nationalist government. Its scholars scorned the empty theorizing of many universities and condemned them for their aping without grasping the substance of Western ideas. Qu Qiubai, an early and distinguished Communist thinker and leader of the university’s sociology department, promoted a Chinese sociology which should arise from the active theoretical and practical involvement of Chinese scholars in the revolutionary transformation of China’s patriarchal societal patterns.

With the move from a worker based to a peasant based revolutionary movement, a different type of higher institution was created by Chinese Communist Party first in Jiangxi soviet region, later in Yan’an and other border regions. They were set up in a studied independence from Soviet models which were thought unsuited to the conditions of the Chinese Revolution. Anti-Japanese Resistance University (Kangda) was, above all, a short-term training school for military cadres. It won some of its reputation from the fact that major revolutionary figures from Mao Zedong down lectured there and in the course of their lectures hammered out some of the applied social science that contributed to revolutionary success. This gave it a special prestige and probably led to its revival as a model of educational reform during the Cultural Revolution period (1966-1976). In the informal approach to teaching and learning and strong student involvement in administration and self-government, this university reflected some of the values of the Chinese shu-yuan tradition. In other ways, most notably its integration into the Border Region bureaucracy and an increasingly strident authoritarianism in the Party’s cultural and literary policies, aspects of the Confucian tradition had reappeared under a new guise.

Every society, and hence every mode of production with its sub-variants, produces a space, its own space (Lefebvre, 1991). While universities with nationalistic spirits were products of the industrial capitalist civilization, communist revolutionary universities were produced by the agricultural civilization based on Chinese reality. In the latter, working people were regarded as primary educators as well as the main educational objects. There was a close link between education and labor with the aim to serve the revolution and class struggle. The university was that of the society. They discarded the disciplinary organization in modern universities and highlighted open, informal and practical principles in education. Students and teachers were in public spotlight while the campus was just auxiliary and blended with the urban, more exactly, the rural environment. The courses were mainly about political thought and military techniques with the aim to cultivate cadres for the communist government. Moreover, there were explicit administrative hierarchies in the organization of universities. The communist universities were more like political institutions rather than academic institutions.

**4.3 Soviet Academic Influence**

With their access to power, the Chinese Communist Party differed little from the Nationalists in
viewing higher education entirely within the new political vision they had for China. All the educational institutions were nationalized and became state-run institutions (Tsang, 2000). It was totally different from the higher education system before 1949 in which the development of public, private and missionary universities were independent from each other. The planning and financing of education was controlled by the central government. In order to train professional manpower for the specific industries, most non-educational central ministries established and administered their own universities. The majority of regular HEIs at that time were directly under different central ministries. It was believed that such a state control model could best serve the centrally planned manpower needs. After all HEIs were nationalized and taken over by the central government, they were then reorganized and restructured according to the Soviet model which viewed higher education as one part of the superstructure and be integrated with the economic base of the society. The aims of higher education, laid down in the first national conference held in 1950, were: to educate workers for national construction who will have a high cultural level, will possess modern scientific and technical accomplishments and will serve wholeheartedly the people by means of the teaching method known as ‘the unity of theory and practice’.

The state first adjusted university disciplines according to the local industrial development plan to improve the uneven geographical distribution of industry and university. A newly established MOE directly administered 14 comprehensive universities of which there was only one or two in each major region. The basic arts and science departments of all the old institutions had been amalgamated in these institutions to produce strong departments able to take the lead in advancing these disciplines. MOE also administered the six major normal universities which had departments of education and fine arts in addition to basic arts and science departments, and were responsible for higher teacher training in China’s six major administrative regions. Another 25 normal universities were administered by provincial higher education bureaus and intended to lead teacher training efforts for each province. Of the 38 engineering universities, about ten of the most distinguished polytechnic ones were administered by the MOE, while the rest belonged to other central ministries such as metallurgy and machine building. The 26 agricultural institutions and 29 medical institutions were administered by respective central ministries and directly geared to national and provincial level development plans. Four institutes of political science and law under the Ministry of Justice trained legal-political cadres for broad regional needs and six institutes of finance and economics under the Ministry of Finance served the six administrative regions. In addition there was a small number of foreign language, fine arts and physical education institutes.

Chinese Communist Party was developed and rooted in the rural; they had no experience in planning an urban university. The integration of the university into the city also followed the Soviet model. Universities were concentrated in the strictly zoned educational district in the urban fringe, performing as a ‘green factory’ cultivating intellectuals. The well-known university agglomerate, such as Yangpu District in Shanghai and Haidian District in Beijing, all came into being at that time. During the period of 1949-1957, most Chinese universities were restructured according to the urban plan and were located to the urban fringe, developed jointly with urban greenbelt and scenic areas. The most typical case following the Soviet model was the development of eight universities in the academic zone of north-west Beijing (Figure 22). With the

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8 The eight universities were Beijing Political College, Beijing Aviation Institute, Beijing Institute of Geology and
establishment of the eight universities, the city of Beijing expanded toward the north accordingly. An urban road named Academic Road was constructed across the academic zone, along which aligned the eight universities from south to north. All universities had similar rectangle campus, similar areas and similar campus borders. The unified plan concealed the personality of each university, but highlighted the integrity of the academic zone and even of the whole city. The socialist state power was vividly manifested in university planning and campus design.

Figure 22: Master Plan of Beijing, 1954. Source: BCPC, 1953.
Note: The dashed circle shows the location of the academic zone.

Planning principles with emphasis on the transition from a consumptive city to productive city required all the state-owned enterprises and institutions to be self-sufficient units, to be responsible for the daily-life of their workers. That is to say, each unit was a micro society providing services in various aspects. A self-sufficient unit was also regarded as a planning measure to reduce traffic burdens and increase working efficiency. This phenomenon was particularly prominent in the universities that had to keep the image of an ivory tower. Universities remained self-sufficient and kept distance away from the society, producing the only social product – intellectuals – that had already been regulated by the national distribution regime. Staff housing and auxiliary facilities such as markets, shops, hospitals were all basic components in self-sufficient universities, which continued to exits until 1990s and even now. Guided by such a planning principle, different functional areas in the city had similar urban fabric. Take Beijing Iron and Steel Institute and Beijing Textile Factory as an example (Figure 23), similar grid road system divided the area into similar rectangle blocks which were relatively independent from each other. Buildings of different size were located in corresponding blocks. Public facilities were arranged along the main axis and were distinct from the surrounding homogeneous space. The only recognizable difference between the university and the factory was the entrance square and tall teaching buildings in the campus.

Mining Institute in Beijing, the road east side followed by the Beijing Medical College, Beijing University of Iron and Steel Technology (Beijing University of Science and Technology), Beijing Petroleum Institute and the Beijing Agricultural and Mechanical College.
4.4 Universities after 1978 Open-Up

In the thirty-year period from 1949 to 1978, higher education in China was forced to undergo dramatic changes along a tortuous and circuitous path of development. The period included the takeover from the previous authority, nationwide adoption of the Soviet model in the early 1950s; the Great Leap Forward and the educational revolution from 1958 to 1960; retrenchment, readjustment, reorganization, and consolidation from 1961 to 1963; and steady improvement of the system from 1963 to 1965. Finally, this period also included the unprecedented destruction and serious shrinking in size of the higher education system during the so-called Cultural Revolution from 1966 to 1976 and gradual recovery from 1976 to 1978. It is important to note, however, that the overall operational framework of Chinese higher education as of 1979 was still characterized by the central planning model that had been adopted from the Soviets in the early 1950s. This is the key to understanding the contemporary realities of the reform process that started in the early 1980s.

The economic transition in China that began in the 1980s coincided with rapid advancements in S&T, especially the revolution in information and communications technology, that have led the world into a new age of the knowledge-based economy. As knowledge-based institutions, universities have been called on to play a central role in economic development. Furthermore, the knowledge-based economy is international by nature. Capital, production, management, market, labor, information, and technology are organized across national boundaries, which has resulted in a strong tendency toward globalization. Cross-cultural interactions, exchange of students and faculty members, joint teaching and research programs, and academic communication, especially over the Internet, have formed an ongoing and irreversible internationalizing trend in higher education, providing impetus from the outside world toward Chinese higher education reform.

The economic transition, the fast-growing market economy, the rapid development of S&T, and the increase in individual income levels and living standards stimulated increasing demands for higher education. Education was considered the strategic foundation for economic success given the growing recognition of the need for well-educated manpower, especially high-level specialized personnel. Priority was given to university development, and the Chinese higher education system
has expanded quickly over the past twenty years. Total enrollments at HEIs in China rose from about 1 million in the early 1980s to about 13 million in 2001 (Min, 2004). Obviously, the structure of the old higher education system based on a centrally planned economy could no longer fit in with the new reality. Dramatic changes took place in the higher education sector.

From the 1980s up to the beginning of the twenty-first century, Chinese higher education has been characterized by a series of reforms. Chinese universities were endowed autonomy and the same legal status as enterprises in 1992. In 1993, according to policies about educational industrialization, higher education was classified into the tertiary sector, which has completely eliminated the feature of university as political institution and reduced its dependence on government decision. Homogeneity and monotony in the planned economy were replaced by heterogeneity and diversity, which was reflected not only in the internal organization of the university but also in the whole higher education system. For example, East China Normal University, in collaboration with Shanghai Putuo District Government, established Private Huaxia College; it also cooperated with the neighboring Private Zhongqiao College for joint programs. The various measures of higher education reform, such as university merger, central-local joint development, public-private cooperation, non-state colleges, university towns, off-site campuses, were all towards comprehensive and large-scale development which is exactly the reverse direction of the soviet model.

Local governments got more authority in decision-making through the reform and they can establish their own universities according to local economic and social development plans. For example, Ningbo University in Zhejiang Province was developed according to the urban strategy of a harbor city. It not only took into consideration the urban industrial structure in the educational goals and curriculum design, but also located in the particular area among Ningbo City, Beilun Harbor, and Zhenhai District to accelerate the rate of local urbanization. The value of university was considered to be in its combination of education and research with public service. In particular, the credit loan, state capital and enterprise funds all flew into the university in the occasion of new campus set-up and expansion. These enabled universities to be an attractive pole in urban and regional development – industrial clusters emerged around the university searching for technological and intellectual support; service facilities such as restaurants and shops concentrated there as well. The university began to assume the role of an urban institution, extending the influence into the city and at the same time influenced by the city.

However, the over-emphasis on the service of the university has induced benefit-centered and project-oriented planning: local government expected to accelerate Gross Domestic Product (GDP) growth and urbanization process through university planning, enterprises tried to get much more profit through investment in university development, universities hoped to realize a great leap forward by virtue of all kinds of opportunities. Spatial differentiation and commercialization appeared in the university. In February 2006, MOE explicitly opposed the industrialization of education and it was proposed to make university spatial development in an economic way and with a long-term view. The development of university towns was strictly audited by the central government. All these efforts have demonstrated that Chinese universities began to think about the relationship with the market and the enterprises, the boundary with the government and the
political regime, and the ideal of free knowledge production.

Conclusion
Chinese universities have combined different missions and incorporated various even opposing forces throughout the long history of evolution (Table 4). They keep on devising new combinatory models and strategies, changing the inner culture, and renovating the external mission. Some spatial forms emerged from time to time and were predominant in different historical periods, such as the combination of ritual orders with natural landscape by imperial bureaucracy, western missionaries, conservative modernizers, and Nationalist government. But the social values beneath similar spatial forms differentiated a lot from each other. For example, the original introduction of ritual orders into the picturesque space of university in ancient China was a simultaneous process along with the officialization of scholarly institutions which was aimed to harness the intellectuals for imperial civil service. In the western missionary universities, however, the revival of the indigenous tradition was a measure to make them better situated in the Chinese culture so as to reduce the resistance in protesting western interests. For the conservative modernizers, although they turned to western universities for S&T, they were not able to and would not like to revolutionize the imperial educational system, therefore they kept the traditional scholarly institutions as a reminiscence of past imperial privilege. Instead, Nationalist government rejected thoroughly the feudal and imperial ideology, but the spatial organization of traditional scholarly institutions characterized by hierarchy and order met their requirement in consolidating one-party dictatorship.

Sometimes, even though the universities were embedded with same social values, their spatial outcomes may also be different. Comparing the universities with nationalist spirits, Soviet influence and those after open-up, all of them were mobilized for economic development and national prosperity. But the nationalist government promoted indigenous renewal, accentuating order and hierarchy in spatial organization; the soviet model performed as self-sufficient working unit concentrating various functions altogether and followed strictly zoning approach; the universities after open-up, however, have built extensive networks with academic and non-academic institutions both internationally and domestically: spatial commercialization and differentiation has become its typical characteristics. It indicates that the space of university is influenced by multiple factors in the society rather than the product of a solely object.

Looking through the development process, it is perceived that when there is consolidated national control and political power, the space of university tends to be harnessed by the gerontocratic for particular social uses, such as for civil service and economic growth. When the central dominance is loosened or more preferably no official bureaucracy, diversified university spatial patterns will appear, as what happened in China when universities were in search of modernity. As the world entering the global era and knowledge becoming an important means of social production, there is a convergence that universities across the world are increasingly involved in social development and they are more connected with and influenced by other social actors, including those out of their geographical boundaries. The secret of the enduring vitality of university is that it never stops to find new ways of reinventing itself. Just as in the history where there were a range of possibilities, the university now stands at the gateway of a range of futures, which are being
shaped by a number of trends and emergent issues. To make a productive turn in the future, it’s necessary to be aware of the situation, to understand the mechanism, and to grasp what’s behind it.

Table 4: Comparison of Historical Universities
Source: made by author

<table>
<thead>
<tr>
<th>Category</th>
<th>Social Values</th>
<th>Sponsor</th>
<th>Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous Scholarly Institutions</td>
<td>Spontaneous HEIs</td>
<td>great scholars, private endowment</td>
<td>countryside, far away from cities or towns</td>
</tr>
<tr>
<td></td>
<td>Officialized HEIs</td>
<td>imperial bureaucracy</td>
<td>move into the city</td>
</tr>
<tr>
<td>Universities in Search of Modernity</td>
<td>Western Missionary Universities</td>
<td>western missionaries</td>
<td>combining western planning concepts (eg. zoning)</td>
</tr>
<tr>
<td></td>
<td>Conservative Modernization Efforts</td>
<td>learning Western S&amp;T to confront</td>
<td>renewal of officialized indigenous tradition, with</td>
</tr>
<tr>
<td></td>
<td>Radial Education Reform</td>
<td>foreign aggression</td>
<td>minor changes for adaptation</td>
</tr>
<tr>
<td></td>
<td>Universities with Nationalistic Spirits</td>
<td>modern Chinese reformers</td>
<td>openness, freedom, diversity, urban integration</td>
</tr>
<tr>
<td></td>
<td>Communist Revolutionary Universities</td>
<td>Nationalist Party</td>
<td>combining western planning concepts (eg. zoning)</td>
</tr>
<tr>
<td></td>
<td>Soviet Academic Influence</td>
<td>communist central government,</td>
<td>improving geographical imbalance of industry and</td>
</tr>
<tr>
<td></td>
<td>Universities after 1978 Open-Up</td>
<td>central ministries</td>
<td>university self-sufficient work unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cross-border and cross-sector interaction</td>
</tr>
</tbody>
</table>

Note: HEI = Higher Education Institution
Chapter 5. Town-Gown between the State and the Market in the Process of China’s Reform

One of the major impacts of globalization is related to the fundamental change in the philosophy of governance and the way public sector is managed (Flynn 1997; Hood 1991). The shift from ‘government’ to ‘governance’ has been widely debated (Kooiman, 1993; Peters and Pierre, 1998; Rhodes, 1997; Rosenau and Czempiel, 1992). Inherited geographies of state power are being fundamentally rescaled through the relationship on the supranational (transnational) and subnational (cities or regions) (Brenner, 2004). Since economic reforms, the Chinese state apparatus has abandoned direct allocation of production materials, capital, land, and workforce while consolidating its regulatory power at the local level along with the decentralization of economic power and authority. Cities get more power of decision making and become strategic arenas of state governance. The broader economic reforms of the 1970s in China have also led to the conscious retreat of the state from being the sole provider of social services (Hawkins, 2000; Mok, 1997, 2000). Urban governments are conceived as ‘facilitators’ instead of ‘service providers’. Both state and non-state actors are involved in the funding, regulation and provision/delivery of higher education. The orientation of teaching, research, and service activities at universities is being transformed, and so is the relation between the university and the city.

This chapter will analyze town-gown interactions and their corresponding spatial changes in the process of Chinese reform which was characterized by a series of measures redefining the relationship between the state and the market. First, how was the state governance changed in the Chinese market-oriented reform? Then, what are the influences on urban development strategies and practices? Third, what are the influences on the higher education system? How did the higher education reform proceed? Next, what are the roles of universities in the Chinese innovation system? Finally, how have these changed the town-gown relations and what are the underpinning values?

5.1 The Devolved State Power in China through Market-Oriented Reform

Chinese economic reforms taking advantage of market principles began in 1978 and were carried out in two stages. The first stage, in the late 1970s and early 1980s, involved the decollectivization of agriculture, the opening up of the country to foreign investment, and permission for entrepreneurs to start up businesses. However, most industry remained state-owned. The second stage of reform, in the late 1980s and 1990s, involved the privatization and contracting out of much state-owned industry and the lifting of price controls, protectionist policies, and regulations, although state monopolies in sectors such as banking and petroleum remained. The private sector grew remarkably, accounting for over two thirds of China GDP by 2011 (Yang, 2011), a figure larger in comparison to many Western countries. From 1979 to 2007, unprecedented growth occurred, with the economy increasing by 9.8% annually on average (Liu and Zhou, 2008). China’s economy became the second largest after the United States.

The Chinese reforms were accompanied by the so-called ‘four modernization’ of agriculture, industry, science and technology, and defense. A new ‘socialist market economy’ was to replace
the previous ‘centrally-planned economy’. The mode of governance associated with classic ideal type of bureaucracy is in the process of being deconstructed. In its place are emerging forms of governance that bring both state and non-state actors into the policy process, and transfer control to bodies operating either on the margins of the state or outside its boundaries altogether. Decentralization and marketization are perceived as the two major distinguishing features of the Chinese reform (Morris, Hassard and Sheehan, 2002). Decentralization has shifted the power from the central government to the regional/urban levels while marketization has introduced non-state actors in the provision of public service. All these measures have been taken under the strict control of the Community Party of China (CPC) and in a much more pragmatic, gradual process based on trial and error, which has resulted in a mixed transitional economy in China characterized by the co-existence of new and old institutions.

Decentralization: Rescaling State Power from the Central to the Local

Fiscal reform is generally identified as a milestone in China’s reform because it has redefined the financial responsibility of central and local (provincial and municipal) government to allow the latter greater financial flexibility and legitimacy in managing local development (Lin and Liu, 2000; Montinola, Qian and Weingast, 1996; Jin, Qian and Weingast, 2005; Oi, 1992; Tong, 1989; Wong, 1991; Zhang and Zou, 1998). The fiscal system in China was highly centralized before the reforms. It was consistent with China’s centralized production and resource allocation system that had been adopted during the pre-reform era. In the centralized fiscal system, local governments could rely on state budgetary allocation for capital investment on the maintenance and improvement of urban infrastructure. The city was established, financed and managed by the central state essentially as a functional node of the centrally planned economic system that is linked together through vertical linkages (McGee et al, 2007). There was, however, little incentive for local fiscal responsibility and effort. In addition, there was a lot of dissatisfaction in terms of the excessive budgetary control over local services, discouragement of local planning, and disregard of regional difference by a uniform system.

With the objective to make localities fiscally self-sufficient, to reduce the central state’s own fiscal burden, and to provide incentives for local authorities to promote economic development, China has gone through several rounds of fiscal reforms in an effort to decentralize its fiscal system and fiscal management since the late 1970s (SC, 1980, 1985, 1988; CCCPC, 1993a, 2003). The decentralized fiscal arrangement has enacted revenue-sharing arrangements under the principle of dividing revenues and expenditures with each level of government responsible for balancing its own budget. Although state budgetary allocation of funds for local avenues has been reduced, local governments are given greater autonomy in financing local development, particularly in the use of surplus revenues after agreed quota of remittance to the central government has been met. By introducing schemes that allow both the central state and local government to share above-target revenues, these reforms have changed the zero-sum character in central-local relations in the central fiscal system, where one side only gains what the other loses (Tong, 1989).

The structural changes in the fiscal system are designed to steer central-local relations towards a system of mutual benefits and shared risks, away from the subordination that had characterized central-local relations in the pre-reform era.
Marketization: Reducing the Role of the State in the Public Domain

Marketization, i.e. the development of market mechanisms and adoption of market criteria within the public sector, is a major feature in Chinese reform. Before the reform, everyone in China belonged to a certain work unit. Once assigned work by labor bureaus, workers enjoyed life tenure and generous perks given by work units. Work unit acted as the first step of the multi-tier hierarchy within the centrally-planned system. Through work units, the state provided all kinds of social services. The state was responsible for full employment, income equalization, controlled pricing, social security, occupational benefits, health services, housing, and all manner of subsidies. Private ownership was regarded as an evil. This was considered as the superiority of socialism to reduce disparities in living standards and consumption.

After the reform, much of the work unit’s power has been removed, although the term is still sometimes used in the context of state-owned enterprises and institutions. The new course was founded on a different interpretation of socialist construction – the key task was to resolve the conflict between people's rising material aspirations and the backwardness of productive forces. Economic growth was put to the first place while equity was considered secondary. It was explicitly agreed that it is good if a few get rich first. Private enterprises, particularly foreign direct investment (FDI), were substantially encouraged. As the social services were considered not directly related to economic growth, the state has therefore set lower priority for investment and encouraged joint responsibility and diversification in the provision, funding, and regulation of social welfares. In an effort to make its state-owned enterprises more economically efficient and competitive, Chinese leaders have taken significant steps to open them up, to a certain degree, to market forces, with a view to more capitalist-style organizational forms and enabling them to be more market-responsive.

The reduction of the state’s role in the public domain, therefore, can be viewed as a transfer of social responsibility, including production and financing, from the government to the non-state sector, namely, the market, the family, the informal sector and individuals. The implementation of marketization in the public sector leads to negotiation between the state and society over their shares of social responsibilities, and eventually to a new definition of the relationship between the state and society, and between public and private domains. Therefore, the state is transformed from resource distribution to regulator and increasingly to market actor (Wu, Xu and Yeh, 2007). In other words, the state becomes a developmental state while legitimizing itself by prioritizing development – the combination of steady high rates of economic growth and structural change in the productive system, both domestically and in its relationship to the international economy (Castells, 2000, P276).

5.2 Local Autonomy, Place Promotion, and Urban Incentives in Chinese Cities

Along with the retreat of the state in the provision of capital for local development, alternative sources such as foreign investment and the domestic private sector became the major means to support local economic development. To attract non-state capital, place promotion was carried out first at the national scale through the open-up of cities economically and institutionally. In the early stages of reform, Special Economic Zones (SEZs), such as Shenzhen, Zhuhai, Xiamen and
Shantou in 1979 and Hainan in 1988, were established to allow special economic policies, new systems of management, and experiments on land markets that encouraged and attracted non-state investment, especially foreign capital. Then the policy was expanded in 1984 to 14 ‘open coastal cities’ that were endowed great autonomy in fiscal and management affairs.

These cities were selected as the first bunch in place promotion because the contribution of these far coastal areas to China’s treasury was much less at that time⁹, thus any failure on their part would not greatly upset the national budget (Tian, 1996) and would not undermine the political authority in Beijing. In contrast, it was considered too great a risk to allow experiments to take place in cities like Shanghai that were dominant in the urban economic hierarchy. Besides, the reform initiative in southeastern coastal provinces was also believed to benefit from their proximity to Hong Kong, Macau, and Taiwan (Gu and Tang, 2002).

The place promotion of these cities proved to be a great success. They perform as catalysts for active trade and investment that could expand their vigor and influence into the surrounding regions. Therefore, the national strategy of place promotion was soon implemented in the inland areas and followed the same principle as was applied to the general economic reform program, i.e. gradualism. Open Economic Regions were established later with similar incentives in the Yangzi River Delta, Pearl River Delta, and coastal Fujian, and soon included other parts of the coastal zone such as parts of Shandong and Liaoning provinces. In the early 1990s, Pudong New Area was created in metropolitan Shanghai and became the new focus of major national and municipal initiatives and investment. At the same time many provincial capital cities and five cities along the Yangzi River were granted open city status. A national urban landscape including various tiers of cities came into being gradually (Figure 24).

The various levels of development priority in the set-up of SEZs and the open-up of cities have contributed to greater variations among various localities in terms of the level of fiscal effort, degree of economic advancement, and provision of social services (Tong, 1989; Zhang and Zou, 1998). This has brought about unbalance and larger gap among cities as well as between cities and countryside, which has given rise to strong competition among cities. Unlike the inter-city relations in the centrally-planned system, competition among cities and between cities and the rural economy today are no longer internalized and controlled by the central state as the vertical linkages are loosened. It is up to the local governments to smooth the horizontal linkages and interaction among cities as well as between cities and countryside.

With this pressure, the local governments must endeavor to create a more competitive transactional environment and a more favorable place to win in the competition with other cities in attracting foreign investors and the private sectors. This competition is also intensified by the government and party structures because in a non-elected government system, leaders were judged for promotion according to the development success of their current localities (Gu and Tang, 2002). This constitutes the local dimension of place promotion in Chinese cities. Promotional measures such as development zones, infrastructure improvement, prestige projects, and land

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⁹ For example, Guangdong’s contribution to China’s treasury was only about 5% of that of Shanghai in 1982 (Tian, 1996).
markets, were adopted with the aim of using market instruments to manage state assets so as to generate a return to investment (Wu, 2009).

**Figure 24: Different Urban Status in China’s Reform and Opening-up**

Source: McGee et al, 2007, P2

Large cities, such as Shanghai and Beijing, are generators of economic growth and have attracted more investment from both international corporations and domestic investors that are seeking better returns in large cities. Although China’s official urban policy promotes development of small cities and discourages the growth of large cities, the central government has taken a laissez-faire attitude toward further expansion of large cities in practice, recognizing their contributions to the national economy. Thus urban development and redevelopment projects in large cities have been stimulated. Statistics reveal that the expansion of urbanized areas of large cities was faster than that of other cities, indicating that more development activities have taken place in large cities (Table 5). On the other hand, the population of small cities has increased faster than that of large ones in recent years, a reflection of the official urban policy.

As a result, large scale urban development has happened in all Chinese cities since the 1980s. By 1980, less than 20% (19.6%) of the total population in China lived in urban areas, and the
investment in urban development was very limited. Since the economic reforms in urban areas, however, China has experienced rapid urbanization accompanied by economic growth. Urban population increased to 34% (691 million) in 1998, and the number of cities grew from 381 in 1987 to 668 in 1998, an increase of 75.3% in a decade (NBSC, 1999). By the end of 2011, the mainland of China had a total urban population of 691 million or 51.3% of the total. There were 30 cities with over 8 million urban population and 13 of them exceeds 10 million (Pan and Wei, 2012).

Table 5: Change of Size of Urbanized Area and Population in Cities in China, 1990-1995
Source: Zhang, 2002

<table>
<thead>
<tr>
<th>City Type</th>
<th>Area in 1990 (km²)</th>
<th>Area in 1995 (km²)</th>
<th>Change (%)</th>
<th>Population in 1990 (million)</th>
<th>Population in 1995 (million)</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large city</td>
<td>198.1</td>
<td>249.1</td>
<td>+25.7</td>
<td>40.78</td>
<td>50.51</td>
<td>+23.9</td>
</tr>
<tr>
<td>(population &gt;2 million)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big city</td>
<td>104.9</td>
<td>119.1</td>
<td>+13.5</td>
<td>38.53</td>
<td>40.24</td>
<td>+4.4</td>
</tr>
<tr>
<td>(population 1-2 million)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium city</td>
<td>59.0</td>
<td>69.2</td>
<td>+18.3</td>
<td>25.16</td>
<td>43.09</td>
<td>+71.3</td>
</tr>
<tr>
<td>(population 0.5-1 million)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small city</td>
<td>34.6</td>
<td>42.4</td>
<td>+23.9</td>
<td>79.50</td>
<td>151.41</td>
<td>+90.5</td>
</tr>
<tr>
<td>(population 0.2-0.5 million)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.3 Restructuring the Governance of Universities into Local Plans

As the reforms began to take hold it was soon discovered that the educational level of the workers in China could not keep up with the fast development of the urban economy. The educational system controlled by the central governments alone was woefully too rigid and management inefficient, especially for fast growing cities. It would kill the initiatives and enthusiasm of the urban government if reserving those over-centralizing and stringent rules. Therefore the central government called for resolute steps to streamline educational administration and devolve powers to units at lower levels so as to allow them more flexibility to run education and to fit into local development.

The promulgation of the Decision on Reform of Educational System in 1985 marks the first round of comprehensive reform in Chinese higher education sector. The key to restructuring higher education was considered to lie in eliminating excessive government control over HEIs and, under guidance of the state policies and plans in education, extending the decision-making power of the colleges and universities and strengthening their ties with production units, scientific research institutions and similar sectors, so that they will have the initiative and ability to serve economic and social development (CCCPC, 1985). It put emphasis on local responsibility, multiple sources of educational funds, vocational and technical education, decentralization of power to individual
institutions to govern their own affairs, and diversity of educational opportunities. After the 1985 Decision, the State Education Commission (SEC)\(^{10}\) assumed just an overall leadership, providing policy guidance and direction instead of routine management and administration over higher education (Mok, 2005).

The second round of educational reform began in 1993 when the *Outline for Reform and Development of Education in China* was issued. It recognized the need to develop a better governance model to run and monitor higher education and proposed some key principles about how to restructure the relationship between the government and the university, between the central and the local, and between SEC and other central ministries so that the higher education system could be more compatible with the changing economic system (CCP, 1993b). In 1995, SEC issued a policy document entitled *Suggestions on Deepening Higher Education Structural Reform*, recommending four major restructuring strategies – transferring, joint development, merging, and cooperation – to reform the higher education system (SEC, 1995). The essence of the policy was to decentralize the administration and financing of universities and to merge some universities to achieve economies of scale and economies of scope in terms of disciplines (Xue, 2006).

The large scale management reform and governance change in China’s higher education system was not implemented until 1998 when the central government had a major restructuring with many industrial ministries abolished. Before the education reform, the majority of regular HEIs were directly under different central ministries in order to train professional manpower for the specific industries. With the abolition of some central ministries and the tendency toward decentralization in education reform, measures were adopted to change the leadership and governance structures in higher education. The central government of China relinquished many authorities to local governments so that better coordination among different local universities could be achieved. Universities were also given more autonomy in their day to day management. By 1999, there had been 226 universities in China transferred from different central ministries to education bureaus at the local level (Table 6). As a result, the bulk of the central departments in charge of specialized economic management have been abolished. The leadership of the universities originally led by different central ministries was transferred to local governments. After adopting the transferring strategy, the relationship between the MOE, non-educational central ministries and local governments have gone through significant changes. These developments mark the new trend of localization of higher education in China.

Given the special features and the distinct roles of some institutions, especially those leading universities, a differentiated administering management model was introduced. These institutions were under joint development by the central and local governments, with the former prevailing in major decision-making and the latter prevailing in the daily management of the universities (SEC, 1995). With decentralization policies in place, especially the retreat of the non-educational central departments in higher education, the local governments have strengthened their coordinating function and enhanced their financial responsibility in higher education sector. The local government would place the universities under the local economic and social development plans.

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\(^{10}\) SEC was a central administrative organization responsible for higher education policy and management from 1985 to 1998.
and provides the capital investment funds for them; in return, the universities would gear to the need of local economic and social development in their curriculum and program design, admission, employment of graduates, and scientific research (SEC, 1995). Meanwhile, the local governments have established a close cooperative relationship with the central ministries, largely MOE, to run and fund all leading universities located in their territories.

Table 6: Number of Involved Universities in Higher Education Reform in China
Source: Mok, 2005
Note: Figures refer to the total number from 1992 to the indicated year; those in the blankets refer to the reduced number of institutions after merging.

<table>
<thead>
<tr>
<th>Types of Structural Change</th>
<th>Joint Development (gongjian)</th>
<th>Transferring (huazhuan)</th>
<th>Merging (hebing)</th>
<th>Cooperation (hezuo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1994</td>
<td>15</td>
<td>-</td>
<td>4 (2)</td>
<td>11</td>
</tr>
<tr>
<td>1995</td>
<td>40</td>
<td>5</td>
<td>70 (28)</td>
<td>120</td>
</tr>
<tr>
<td>1996</td>
<td>56</td>
<td>7</td>
<td>103 (42)</td>
<td>178</td>
</tr>
<tr>
<td>1997</td>
<td>100</td>
<td>16</td>
<td>162 (74)</td>
<td>228</td>
</tr>
<tr>
<td>1998</td>
<td>114</td>
<td>177</td>
<td>258 (105)</td>
<td>267</td>
</tr>
<tr>
<td>1999</td>
<td>197</td>
<td>226</td>
<td>304 (125)</td>
<td>317</td>
</tr>
<tr>
<td>2000</td>
<td>-</td>
<td>509</td>
<td>556 (232)</td>
<td>-</td>
</tr>
</tbody>
</table>

Moreover, the education reform has also led to diversified educational services, with the boom of private education. Generally speaking, there are three types of non-state HEIs and they adopt different strategies to run their colleges. The first is self sufficient, primarily relying upon students’ tuition fees or alumni funding to run the institutions; the second are financed partly by tuition fees and partly by the government or social institutions; the third adopt a Minban Gongzhu model (i.e. people-run and publicly assisted), with financial support from the local government, such as a subsidized land price and staff salary payment (Mok, 2000). By 2012, there were 2138 regular HIEs in China as recognized by MOE, among which 403 were private institutions, accounting for 18.8% of the total (MOE, 2012). Although private educational institutions have become popular in China, they still face immense difficulties to compete with their formal counterparts. Knowing these dilemmas, the private colleges have a clear vision to differentiate themselves from state-funded HEIs by specializing in courses which are geared to newly emerging market needs. In addition, they are committed to serve the local communities in which they are located, to establish a very close link with local enterprises to create more opportunities for its students to enrich their internship and placement experiences.

5.4 The Changing Role of Universities in the Chinese Urban Innovation System

To promote the economic role of universities in local development, the Chinese government has take further steps to incorporate universities into national innovation system. Typical measures include the cultivation of research universities, the promotion of university-industry linkages, the practice of university-owned enterprises, and the establishment of science parks.
Research Universities

Studies on the determinants of national innovative capacity found that countries that have located a higher share of their R&D activity in the educational sector (as opposed to the private sector or in intramural government programs) have been able to achieve significantly higher patenting productivity (Furman, Porter and Stern, 2002). To raise the research standards of universities, the central government in China introduces Project 211, attaching a new financial and strategic importance to selected universities to promote development in selected disciplines. On the heel of Project 211 was then launched project 985 with the aim to turn top universities into world-class research universities. Universities are assessed by quantifiable and objective criteria such as staffing, buildings, libraries, laboratories, research and so on to determine whether they are qualified to be designated. Competition for the designation has been fierce because selected universities would receive substantial funding from the central government to expand their research capacities and disciplinary scope, with matching funds from local governments. By now there have been 116 universities listed in Project 211 and 39 universities in Project 985 (Figure 25).

Figure 25: Geographical Distribution of Key Universities in China
Source: MOE, 2010, 2011; compiled by author

Notes: The first number below the name of cities and regions refers to the number of universities in Project 211; the second number refers to that in Project 985.

Chinese universities perform as an important locus of research and development (R&D)\(^\text{11}\). They

\(^{11}\) S&T activities can be classified into three categories: R&D activities, application of R&D results, and related S&T services. Among them, R&D includes three aspects: basic research, applied research, experimental
published 343 thousand, or 64.6% of all, domestic S&T papers in 2010 (Table 7). R&D personnel and expenditure in Chinese universities have been increasing year by year. In 2010, there are 290 thousand R&D personnel in Chinese universities, 5.3% higher than in 2009. Their R&D expenditure reached 59.73 billion yuan in 2010, 27.6% more than in 2009 (MOST, 2012). However, the share of university R&D personnel and expenditure in the national total kept on decreasing because of the large number and rapid development of R&D activities in enterprises. The share of university R&D personnel had been decreased from 18.4% in 2004 to 11.3% in 2010 (Figure 26). The share of university R&D expenditure kept around 10% from 2001 to 2005, but then continued to decrease for the next few years. In 2010, the share was 8.5%, a little bit higher than in 2009 (8.1%) (Figure 27).

Table 7: Domestic Papers Published by Universities, 2005-2010. Source: MOST, 2011.

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic Papers Published by Universities (thousand)</th>
<th>Share of Domestic Papers Published by Universities in the National Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>235</td>
<td>66.2</td>
</tr>
<tr>
<td>2006</td>
<td>243</td>
<td>60.0</td>
</tr>
<tr>
<td>2007</td>
<td>306</td>
<td>66.1</td>
</tr>
<tr>
<td>2008</td>
<td>318</td>
<td>67.4</td>
</tr>
<tr>
<td>2009</td>
<td>342</td>
<td>65.6</td>
</tr>
<tr>
<td>2010</td>
<td>343</td>
<td>64.6</td>
</tr>
</tbody>
</table>

Figure 26: R&D Personnel in Chinese Universities, 2000-2010
Source: MOST, 2001-2011

Figure 27: R&D Expenditure in Chinese Universities, 2000-2010
Source: MOST, 2001-2011

development. The scale and intensity of R&D are widely used internationally to reflect the strength of S&T and the core competitiveness of a country in the world.
Basic research has always been an important part of universities’ R&D activities. In 2006, universities surpassed the research institutes in terms of basic research expenditure to become the largest think tank in China. Basic research expenditure in universities amounted to 17.99 billion yuan in 2010, 23.7% higher than in 2009, while the national increasing rate was just 20%. The share of university basic research expenditure in the nation kept rising and reached 55.4% in 2010. The number of basic research personnel in universities amounted to 10 thousand in 2010, accounting for 41.4% of the total R&D personnel in universities and 69.1% of the total basic research personnel in China (MOST, 2012).

Despite of the dominant role of universities in basic research, an examination of R&D activities of Chinese universities reveals that a very large proportion of their expenditure and personnel are involved in applied research and development. Since 1991, the percentage of applied research expenditure of the total R&D funds in universities and colleges stayed above 55% until the year 2000 when this percentage began to drop, but it is still kept over 50%. The percentage of personnel occupied in applied research has also been over half. In 2011, 56.4% of the R&D personnel in Chinese universities were engaged in applied research, while 30.1% in basic research and 13.4% in experimental development (MOST, 2011). It’s much easier to transfer applied research than basic research into high-tech industrialization.

University-Industry Linkages

In 1999, the role of Chinese universities in the national innovation system was further strengthened by encouraging university-industry linkages through a legal framework – *Several Provisions on Promoting the Transformation of Scientific and Technological Achievements*. The 1999 Provisions was jointly released by seven central ministries and organizations\textsuperscript{12} and was approved by the State Council. It makes generous allowance for rewarding discovers of innovative and productive knowledge. Researchers making the achievements may be rewarded no less than 20% of the after-tax income or stock from technology transfer. The primary researcher may gain no less than 50% of the total reward. The 1999 Provisions also makes it easier for research personnel to move back and forth between research and business. There are also favorable policies about tax relief and intellectual property protection (MOST et al, 1999).

Universities have shown great potential in knowledge production and high-tech industrialization and have become a main force in the national innovation system. The number of patents applied by Chinese universities amounted to 79332 in 2010, 28.8% more than in 2009 (MOST, 2012). Among those, 48294 were inventions, 27.2% more than in 2009 (Figure 28). However, the share of inventions in the total patents applied by universities kept decreasing since 2006 and reached 60.9% in 2010, the lowest in the past decade. In terms of those certified to universities, the number of patents was 43153 in 2010, 54.5% more than in 2009, among which 19036 were certified inventions, 32.3% more than in 2009 (Figure 29). The share of inventions in the total patents certified to universities had also been decreasing since 2004. The share was 44.1% in 2010, also the lowest since then.

\textsuperscript{12} The seven ministries and organizations were MOST, MOE, Ministry of Personnel, Ministry of Finance, the People’s Bank of China, China Administration for Industry and Commerce, and the State Administration of Taxation.
In 2001, the State Economic and Trade Commission and MOE jointly set up the first group of state technology transfer centers in six universities\textsuperscript{13} to promote the commercialization of

\textsuperscript{13} The six universities are Qinghua University, SJTU, Xi’an Jiaotong University, East China University of Science and Technology, Central China University of Science and Technology, and Sichuan University.
technological achievements. Technology transfer from the university to the industry is encouraged through licensing and other arrangements such as consulting, joint or contract R&D, and technical services. The universities are building commercial linkages and there is an entrepreneurial bent of university administration. As a result, the contribution of enterprises in university funding has been growing rapidly while the government funding is dropping from 80.35% in 1996 to 49.56% in 2004 (Yang, Yuan and Chen, 2010). Since 2003, the university R&D funding has remained a relatively stable structure, with 54%-58% from government, 35%-37% from enterprises, and 7%-10% from other domestic and foreign sources (Figure 30) (MOST, 2012). In 2010, the share of government funding in university R&D increased slightly while the share of the enterprises decreased a little, with the percentage getting to 60.1 % and 33.2% respectively (MOST, 2011).

University-Owned Enterprises
All the previous discussions about the role of Chinese universities in the national innovation system are familiar in the world. What are unique in the Chinese context are university-owned enterprises that are controlled by their affiliated universities in one way or another. Legitimacy of this control derives from the fact that many of these enterprises were created with funds from the university or by virtue of the credit (brand) of the university. In some cases, enterprises willingly transfer their management control to universities so that they can generate intangible benefits for themselves. University-owned enterprises are the main sources through which Chinese universities engage in the market.

University-owned enterprises are not new things for Chinese universities. Many Chinese universities, particularly those engineering and science-based universities, have had university-owned factories since 1950s. These are mainly used for students to get short-term internships or apprenticeships in a real production environment. Also, under the ‘work unit system’, many Chinese universities had their own service providers such as print shops, publishers, guest-houses, and so on. What’s new now is the new market environment, the new roles these enterprises are playing (or expected to play), and the complex relationships they have developed with their parent universities.

University-owned enterprises are currently run under three models in general. The first one is university-owned service providers such as factories or print shops. The second model is to bring university technologies to create joint commercial entities with enterprises outside universities. The third model is technology development companies created by universities and departments. Enterprises of high-tech type are particularly encouraged. In 2004, there were 4,563 enterprises affiliated with regular Chinese universities, among which about 40% were involved in S&T activities (Xue, 2006). While the number was less than half of the total, these enterprises accounted for the majority of the total number in terms of sales, profit, and tax paid almost every year. For example, in 2003 and 2004, over 80% of the sales were generated by these S&T enterprises. It’s clear that S&T enterprises are the backbone of the university-owned enterprises.

Although many Chinese universities have university-owned enterprises, only a small number of them have really successful ones. Successful and influential university-owned enterprises are concentrated in a small number of selected universities and cities around the country. Statistics
show that about 75% of the total sales, amounting to 70.57 billion yuan, realized by Chinese university-owned enterprises are concentrated in the top 20 universities (Table 8). Analysis on these 20 parent universities found that contributors to the strong growth of university-owned enterprises include strong engineering research and talented faculty and students, academic strengths and reputation, unique comparative advantages such as well-known pharmaceutical and foreign language advantages (Xue, 2006).

Table 8: Top 20 Universities with highest total sales from affiliated enterprises, 2004
Source: Xue, 2006

<table>
<thead>
<tr>
<th>Sales Ranking</th>
<th>Name</th>
<th>Sales (billion yuan)</th>
<th>Old Classification</th>
<th>University Ranking</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peking University</td>
<td>22.61</td>
<td>Comprehensive</td>
<td>1</td>
<td>Beijing</td>
</tr>
<tr>
<td>2</td>
<td>Tsinghua University</td>
<td>17.84</td>
<td>Engineering</td>
<td>1</td>
<td>Beijing</td>
</tr>
<tr>
<td>3</td>
<td>Zhejiang University</td>
<td>4.98</td>
<td>Engineering</td>
<td>5</td>
<td>Hangzhou</td>
</tr>
<tr>
<td>4</td>
<td>Northeast University</td>
<td>3.59</td>
<td>Engineering</td>
<td>34</td>
<td>Shenyang</td>
</tr>
<tr>
<td>5</td>
<td>Tongji University</td>
<td>2.94</td>
<td>Engineering</td>
<td>21</td>
<td>Shanghai</td>
</tr>
<tr>
<td>6</td>
<td>Petroleum University (East China)</td>
<td>2.27</td>
<td>Engineering</td>
<td>51</td>
<td>Beijing</td>
</tr>
<tr>
<td>7</td>
<td>Haerbin Polytechnic University</td>
<td>2.06</td>
<td>Engineering</td>
<td>13</td>
<td>Haerbin</td>
</tr>
<tr>
<td>8</td>
<td>Fudan University</td>
<td>1.92</td>
<td>Comprehensive</td>
<td>4</td>
<td>Shanghai</td>
</tr>
<tr>
<td>9</td>
<td>Wuhan University</td>
<td>1.89</td>
<td>Comprehensive</td>
<td>13</td>
<td>Wuhan</td>
</tr>
<tr>
<td>10</td>
<td>Xian Jiaotong University</td>
<td>1.81</td>
<td>Engineering</td>
<td>11</td>
<td>Xian</td>
</tr>
<tr>
<td>11</td>
<td>Shanghai Jiaotong University</td>
<td>1.18</td>
<td>Engineering</td>
<td>7</td>
<td>Shanghai</td>
</tr>
<tr>
<td>12</td>
<td>Sun Yat-Sen University</td>
<td>1.10</td>
<td>Comprehensive</td>
<td>11</td>
<td>Guangzhou</td>
</tr>
<tr>
<td>13</td>
<td>Huazhong University of S&amp;T</td>
<td>1.08</td>
<td>Engineering</td>
<td>14</td>
<td>Wuhan</td>
</tr>
<tr>
<td>14</td>
<td>Nanjing University</td>
<td>1.06</td>
<td>Comprehensive</td>
<td>3</td>
<td>Nanjing</td>
</tr>
<tr>
<td>15</td>
<td>Jiangxi University of Chinese Medicine</td>
<td>0.85</td>
<td>Medicine</td>
<td>225</td>
<td>Nanchang</td>
</tr>
<tr>
<td>16</td>
<td>Southeast University</td>
<td>0.81</td>
<td>Comprehensive</td>
<td>21</td>
<td>Nanjing</td>
</tr>
<tr>
<td>17</td>
<td>Taiyuan University of Technology</td>
<td>0.66</td>
<td>Engineering</td>
<td>121</td>
<td>Taiyuan</td>
</tr>
<tr>
<td>18</td>
<td>Beijing Foreign Language Institute</td>
<td>0.65</td>
<td>Language</td>
<td>60</td>
<td>Beijing</td>
</tr>
<tr>
<td>19</td>
<td>Nanjing University of Posts and Telecommunications</td>
<td>0.64</td>
<td>Engineering</td>
<td>195</td>
<td>Nanjing</td>
</tr>
<tr>
<td>20</td>
<td>Shandong University</td>
<td>0.63</td>
<td>Comprehensive</td>
<td>24</td>
<td>Jinan</td>
</tr>
</tbody>
</table>

Over the past several years, especially between 1998 and 2000, university-owned enterprises have maintained their growth momentum in terms of sales, profits, and tax. However, since 2001, the

14 The 20 universities with highest total sales from affiliated enterprises are Peking University, Tsinghua University, Zhejiang University, Northeast University, Tongji University, Petroleum University (East China), Haerbin Polytechnic University, Fudan University, Wuhan University, Xian Jiaotong University, Shanghai Jiaotong University, Sun Yat-Sen University, Huazhong University of S&T, Nanjing University, Jiangxi University of Chinese Medicine, Southeast University, Taiyuan University of Technology, Beijing Foreign Language Institute, Nanjing University of Posts and Telecommunications, Shandong University.
growth rate has slowed down to some extent (Table 9). New controversies began to surface over the appropriateness of universities getting involved in running business enterprises. There were also concerns about the potential financial risks for universities which were linked to university-owned enterprises that were traded on the stock markets. Further, more university-owned enterprises increasingly felt the need to change their governance structure so that they could operate like real commercial enterprises. Recently, the government has begun to encourage universities and their affiliated enterprises to ‘de-link’ by clarifying intellectual property rights and respective obligations, separating management from administration, reforming shareholding arrangements to establish a modern business system, and standardizing the operating quality and investment action to ensure scientific management. Clearly, university-owned enterprises in China are now at a new crossroads.

Table 9: Growth of University-owned Enterprises, billion yuan

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Sales</th>
<th>Profit</th>
<th>Tax Paid</th>
<th>Income to Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>-</td>
<td>29.55</td>
<td>2.72</td>
<td>1.23</td>
<td>1.58</td>
</tr>
<tr>
<td>1998</td>
<td>5928</td>
<td>31.56 (6.8)</td>
<td>2.59 (-5.6)</td>
<td>1.35 (9.7)</td>
<td>1.50 (-5.1)</td>
</tr>
<tr>
<td>1999</td>
<td>5444</td>
<td>37.90 (20.1)</td>
<td>3.05 (18.0)</td>
<td>1.66 (18.6)</td>
<td>1.59 (6.0)</td>
</tr>
<tr>
<td>2000</td>
<td>5451</td>
<td>48.46 (27.9)</td>
<td>4.56 (49.5)</td>
<td>2.54 (53.3)</td>
<td>1.69 (6.2)</td>
</tr>
<tr>
<td>2001</td>
<td>5039</td>
<td>60.30 (24.4)</td>
<td>4.81 (5.5)</td>
<td>2.84 (11.8)</td>
<td>1.83 (8.3)</td>
</tr>
<tr>
<td>2002</td>
<td>5047</td>
<td>72.01 (19.4)</td>
<td>4.59 (-4.6)</td>
<td>3.63 (27.8)</td>
<td>1.72 (-6.0)</td>
</tr>
<tr>
<td>2003</td>
<td>4839</td>
<td>82.67 (14.8)</td>
<td>4.29 (-6.4)</td>
<td>3.87 (6.61)</td>
<td>1.8 (4.7)</td>
</tr>
<tr>
<td>2004</td>
<td>4563</td>
<td>96.93 (17.3)</td>
<td>4.99 (16.3)</td>
<td>4.87 (25.8)</td>
<td>1.75 (-2.8)</td>
</tr>
</tbody>
</table>

Note: Figures in () indicate growth rate.

Science Parks

The normal impact of R&D is important to improve the innovation capability of individual companies and institutions, but more important to promote urban economic development is whether the university and related firms are able to build knowledge networks around clusters of knowledge-intensive production units of goods and services (Audretsch, 1998; Huggins, 2008; Lambooy, 1997; Porter, 1998, 2000). Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, universities and associated institutions in particular fields that compete but also cooperate (Porter, 2000). They affect urban economic development by increasing the productivity of companies, driving the direction and pace of innovation, and stimulating the formation of new businesses, expanding and strengthening the cluster itself (Porter, 1998). A university-based science park focuses on the intellectual and knowledge capital residing within and exchanges among individuals, firms, universities and other knowledge-creating institutions. Universities provide specialized training, education, information, research, and technical support for the science parks.

Instead of a place for mass production, science parks are launched mainly to incubate spin-offs created by faculty or students from universities, to provide a platform for new ideas produced elsewhere to be commercialized for the local market, and to provide services for the enterprises located in the science park (Xue, 2006). Science parks provide a sound environment for
innovation ranging from managing real estate to fundraising, from talent hunting to assuring legal arrangement. Table 10 helps to show the function of university-based science parks as an important incubator for university-owned spin-offs. In 2004, out of 4563 university-owned enterprises in China, 24.57% were located in science parks. Although in the minority, these enterprises performed much better than the off-park enterprises in terms of income, profit and tax paid, which accounted for 60.10%, 64.95% and 49.26% respectively of the total capital generated by all the university-owned enterprises.

Table 10: Performance of University-Owned Enterprises in Science Parks in China, 2004

<table>
<thead>
<tr>
<th>Source: Xue, 2006.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>University-Owned Enterprises in Science Parks</td>
</tr>
<tr>
<td>Total University-Owned Enterprises</td>
</tr>
<tr>
<td>Ratio of the Former to the Latter</td>
</tr>
</tbody>
</table>

China’s science parks have been inspired partly by the legends of Stanford Science Park, Cambridge Science Park, and many others. The first Chinese science park, and now the largest, was launched in 1988 at Zhongguancun, within the Beijing Experimental Zone (Macdonald and Deng, 2004). Since then, university-based science parks have become new avenues for commercializing university technologies and for catalyzing urban development zones. By 2010, there were 86 university-based science parks of national level throughout China, among which 11 were concentrated in Shanghai (Figure 31). Besides, there is also a large group of university-based science parks launched by local governments or independently organized by universities themselves. Most of these parks are located in or adjacent to the university campus and administered by a commercial entity established by the university or through a joint venture between local government and the university. As an important part of the innovation system, a successful science park has become the symbol of a top-class university. They not only help the regional economy’s development by fostering the growth of high-tech enterprises and boosting technology innovation, but also provide an important platform for the university to serve society.

Those science parks that were independent of the universities at the initial stage of their development would also like to collaborate with universities after they were on track. For example, Zhangjiang High-Tech Park, with specialized research in life sciences, software and information technology, was set up in Pudong New Area, isolated from the many universities in central Shanghai. It soon attracted Fudan University, Shanghai Jiaotong University, and Shanghai University of Traditional Chinese Medicine to establish branch campuses in the science park by providing free land and lucrative collaborative opportunities. The current Zhangjiang High-Tech Park is made up of the following areas: Technical Innovation Area, Hi-Tech Industry Area, Scientific Research and Education Area, and Residential Area (Figure 32). Education and research provided by the universities have become an indispensable part for the innovation and industrial production in the science park.
Figure 31: Geographical Distribution of University-Based Science Parks in China
Source: STDCMOE, 2012; compiled by author

Figure 32: Spatial Layout of Zhangjiang High-Tech Park
Science parks facilitate the production, distribution and application of S&T by providing the space in which government, universities, and enterprises work together and creating environments that foster cooperation and innovation. A new model, which is strategically planned mixed-use campus expansion, is emerging and involves shared space in which industry and academic researchers can work side by side. These university-affiliated mixed-use campus developments are not simply real-estate ventures. They embody a commitment by universities to partake in broader activities, offering companies high-value sites for accessing researchers, specialized facilities, and students, and promoting live-work-play environments. Key features of these mixed-use developments include space for significant future research growth; multi-tenant facilities to house researchers and companies; and housing, along with other amenities which are attractive to young faculty, post-doctoral and graduate students. They constitute an evolved form of science parks.

5.5 Town-Gown Development Coalitions with Deliberate Institutional Ambiguity

With the objective of improving urban economic performance as well as strengthening the combination of education, scientific research and social application, the universities got development incentives and were affected by strong market forces. The involvement of universities in the market takes two distinct forms: the first involves attempts to market their academic wares in the commercial world; while the other is to restructure universities in terms of business principles and practices (Buchbinder and Newson, 1990). Therefore, the institutional role of universities begins to change: officially an academic institution, the universities are increasingly incorporated into the economic agenda of the state with emphasis on the importance of market dynamics.

The market is the very locus that can help ease the tension between the university and the city. In comparison with the centralized planning and hierarchical system in which interaction between the cities and the universities were manipulated by the central state, decentralized reform has strengthened the power of cities and granted more autonomy to universities. Both the university and the city got development incentives and were affected by strong market forces. The diffused entrepreneurship leads to a recognized set of codes of conduct, supports, and practices that both the university and the local government can dip into. It also provides an opportunity for them to make joint effort so as to attain the common goal for economic development.

Therefore we see various development coalitions among the university, the government, the industry, and other related important actors. They are represented by a number of hybrid organizations. Hybrids encompass a broad range of organizational combinations of various sizes, shapes and purposes, some of which are formal organization, some are formalized relationships but not properly organizations, whereas others are informal relationships. Several hybrid types can be recognized in the politics of town-gown interaction: mergers unifying two or more universities into a single one; joint governance among multi-level governments; cooperative agreements involving collaborative programs among university-government-industry; joint ventures resulting in the creation of a new company that is formally independent of the parents, such as spin-off companies in science parks.
Hybrid organizations can mobilize resources and/or governance structures from more than one existing organization (Borys and Jemison, 1989, P235), and they are capable of reducing uncertainty in inter-organizational relationships involving bilateral dependency (Preffer, 1972; Preffer and Nowak, 1976). Governed by hybrid organizations, the universities develop their properties with strategies to mix proprietary and academic uses and engage in the construction of cities by producing the whole zones of development in the form of science parks; the enterprises participate joint R&D and publications, contract research, sharing research labs, licensing, technology sales and so on, and contribute to technological innovation and application; the governments facilitate the process by providing land or special revenues and establishing institutionalized channels for market-oriented activities.

Town-gown coalitions on the basis of entrepreneurship, however, are not permanent and stable; it is based on the priority of projects. Among various projects encouraged, those that can suit the needs of the market are especially supported. For example, science parks get boomed immediately largely because it provides a common ground where the university gets space for knowledge commercialization, the industry finds intellectual and institutional support, and the city gets catalyst for industrial upgrading. The strategies of the coalition are adjusted constantly according to the particular requirements of the project. When the project is accomplished, the coalition may be dissolved.

Besides, the overlapping institutional spheres embedded in hybrid organizations may easily induce institutional ambiguity. For example, universities in China enjoy some privilege in obtaining land use rights at ‘allocation price’ that are much lower than ‘conveyance price’ paid by commercial users. They are not allowed to make profit on the land obtained through allocation. However, by transferring land use rights from the university to university-owned enterprises at ‘negotiated price’, it’s possible for the land to be circulated in the market. It is to the advantage of the pro-growth coalition but at the expense of the state revenue and civic benefit. Hybrid organizations may also end up with bad debts because of over-investment and poor management. These bad debts are usually referred to as ‘triangular debt’ (sanjiaozhai) because they involve at least three parties, which are all affiliated to the same organization, usually the state. Consequently, no one knows who should take the ultimate responsibility because they all belong to and work for the same one. There have also been occasions when some of these hybrid organizations or companies ran into bad debts that the central and local governments have taken a hands-off approach and refused to rescue them. The governments therefore escape the responsibility of sharing risks of the coalition.

In China, the higher education reforms are only to improve productivity and enhance economic efficiency. It has never been in the central planners’ minds to replace the centrally planned system with a capitalist market economy but rather to make the planning system more flexible and decentralized. The reforms are used as an instrument to legitimate, rather than to undermine, the existing political structure. The only change has been that socialist pragmatism substituted for socialist idealism, of which socialism and associated state ownership are still the cornerstones (Zhu, 1999). Therefore, the potential of the higher education system for effecting social change has never seen by the state as a relatively autonomous social institution to ultimately address
social ills in the larger society, but rather regarded as a mere apparatus within the state and often becomes an instrument for furthering the interests of those in power (Tsang, 2000).

**Conclusion**

China’s reform has loosened the central-local linkages and placed more incentives and responsibilities for cities to promote local development. Meanwhile, the horizontal linkages among cities are strengthened with fierce competition for attracting both domestic and international investment. There is thus a strategic effort of place promotion in cities to promote more favorable environment so as to attract the investors. With the urban development pushing forward, it was soon discovered the gap between fast economic development and backward intellectual abilities. The higher educational system controlled by the central state alone could not meet the specific requirement of urban development.

Thus a round of higher education reform was implemented with the aim of eliminating excessive government control and strengthening the ties between universities and production units. The governance of some universities previously controlled by the central ministries was transferred to local government; some key universities were under joint development between the central and the local; private universities were established to gear to the emerging market needs. Further steps were taken by the Chinese government to incorporate universities into the national innovation system. Substantial financial and institutional support has been given to selected universities to raise their research standards; university-industry linkages are built to promote the commercialization of technological achievements; enterprises are even run by universities directly, which constitutes the particular characteristic of Chinese innovation system; science parks are established to build knowledge networks around clusters of knowledge-intensive production units.

With increasing involvement in the market, both the university and the city have found common goals for diffused entrepreneurship, which works as a basis for their collaboration. Various development coalitions have been formed such as joint governance and university spin-offs. The coalitions have facilitated the development process by mobilizing resources from more than one party and strengthening their inter-dependence. However, partnerships based on entrepreneurship are not stable but profit-oriented. Those projects of great market values are put into priority while those non-profit projects are usually set aside. Moreover, development coalitions incorporating overlapping institutional fields often generate institutional ambiguity, leading to grey land market or bad debts. In fact, such a coalition is deliberate on the side of the Chinese state as an instrumentality to achieve social experimentation and prevent social upheaval given that institutional ambiguity can serve a protective function.
Chapter 6. University Development and Urban Restructuring in Shanghai

It is evident that the state has served as the initial trigger for and sustained a strong influence on China’s market reforms and opening up, and that nationwide reforms have been responsible for creating an environment in which town-gown relations are being restructured. Deeply embedded in the national environment, town-gown interactions differentiate a lot across cities. A crucial factor influencing university activities is the underlying development needs, conditions, and the priorities of the city. As China’s leading metropolis, Shanghai’s urban development is in an advanced stage compared with other Chinese cities. There are more evident and urgent needs for higher education in Shanghai along with the knowledge-drive urban socio-economic restructuring. Shanghai’s universities are therefore facing more severe challenges such as the growing number of students, the shortage of university facilities, and the need to enhance the quality of education. At the same time, the simultaneous occurrence of inner city renewal and suburbanization in Shanghai exert complex challenges for universities as they occupy a large quantity of land and buildings. The universities have to seek opportunities for self development and to reconsider their relations with the city.

In the following of this chapter will explore the changing relations between universities and the city of Shanghai in the process of urban social-economic restructuring and urban spatial restructuring. First, it will analyze the urban development patterns of Shanghai in the post-reform era. Then will examine the increasing importance of higher education in the urban socio-economic restructuring of Shanghai. After that, it will explore how university expansion is carried out as a consequence of massification of higher education. Next will be discussed the involvement of universities in urban spatial restructuring. Finally is some reflection on the concept of ‘urban university’, i.e. the debates on the university ‘of’ the city versus the university ‘in’ the city.

6.1 Urban Development Patterns of Shanghai

Before 1978

Throughout its history, the urban development of Shanghai has always revolved around its role as an economic center. Initially a seaport and fishing town of only local importance, its designation as a treaty port in 1842 produced a turnaround in Shanghai’s economic fortunes. It soon grew into a strong industrial center, producing textiles (especially cotton and silk), flour and tobacco, and became an international trade port. Between 1860 and 1930, 68% of the total value of Chinese trade passed through Shanghai, while by 1936 it handled half of China’s foreign trade (Gu and Tang, 2002). The penetration of foreign capital sped up industrialization and led to the development of local industrial entrepreneurs in Shanghai and its environs. Shanghai performed as a channel through which foreign products were distributed to the region and at the same time domestic agricultural and mineral products were processed and exported.

After 1949, the turn toward centralized planning and the placement of increasing emphasis on heavy industry, regional self-sufficiency, and minimal reliance on foreign trade began to transform
the character of China’s large coastal cities, in particular, Shanghai. The service functions such as trade, finance, and distribution dwindled. No longer an international city, Shanghai, for the first time in history, developed a comprehensive industrial system, including heavy industries (Wu, 2009). Although the degree of concentration of industrial, financial, and trading capacity in Shanghai was dissipated in the Maoist period, Shanghai still remained China’s leading metropolis through 1978. In the 1970s, Shanghai’s industrial output accounted for one-seventh of the national total; its fiscal revenue was about one-fourth to one-sixth of the national total; and the volume of freight handled and the value of export goods were about one-third of the national total (Wu, 2009). In the heyday of socialist development, Shanghai was also the source of innovation and production capacity.

1978-1990
With the start of China’s reforms in 1978, the experiment of opening up and market economy was initiated in the Special Economic Zones of Guangdong and Fujian Provinces. Given Shanghai’s dominance of the urban economic hierarchy, it was considered too great a risk to allow experiments to take place in Shanghai. Guangdong’s contribution to China’s treasury was only about 5% of that of Shanghai in 1982, and thus any failure on Guangdong’s part would not greatly upset the national budget (Tian, 1996). Besides, the reform initiative in southeastern provinces was also believed to benefit from their proximity to Hong Kong, Macau, and Taiwan (Gu and Tang, 2002). Lacking the locational proximity and the incentive structures of the Special Economic Zones, Shanghai became marginalized in the new race for investment and growth. On the other side, because Shanghai gave a heavy contribution to the national revenues – between 1949 and 1980, roughly 86% of Shanghai’s revenue was remitted to the central government (Yusuf and Wu, 1997) – it was imperative for the central state to impose a strict fiscal policy on Shanghai. So when the central authorities introduced a new decentralizing fiscal regime, under which participating provinces were allowed a fixed and an adjustable share of avenues, Shanghai was largely, if not totally, bypassed during this first round of reforms15. This served to hold back Shanghai’s development throughout 1980s.

After 1990
The opening of Pudong New Area as a special development zone in 1990 proved to be the catalyst for Shanghai’s rapid urban and economic transformation. Closely associated with the new generation of leadership at that time in China16, the importance of Shanghai to the national development was recognized and it was able to retain a larger proportion of revenues to invest in the urban and economic development. It has repositioned as China’s leading metropolis. Shanghai’s official mission has been to become the ‘dragon head’ of the Chinese economy. Shanghai is to become ‘three centers’, namely, a financial center, a trading center and an economic center. Due to Shanghai’s strategic location, the abundant skilled manpower, and highly favorable national policies, few doubt that Shanghai will soon recover its pre-war dominance as the center of China’s economy.

15 For detailed analysis on the fiscal situation in Shanghai, see Yusuf and Wu, 1997, P77-82.
16 Some important leaders serving in the central government of China or the Central Committee of the Communist Party of China rose to prominence in connection to the Shanghai municipal administration, such as President Jiang Zemin and Premier Zhu Rongji.
The opening of Pudong New Area not only provided the main impetus for Shanghai’s dominance in the national economy, but also led to Shanghai’s reintegration into the global economy. Improved transportation links, telecommunications networks, and a web of international firms, including many large multinationals, are providing the infrastructure for the urban interface with global and regional systems (Figure 33) (Zhou and Chen, 2009). Foreign investment to Shanghai, especially foreign direct investment (FDI), has risen rapidly (Figure 34, Figure 35) (Gu and Tang, 2002; Tian, 1996; Wu, 2008; Wu, 2009). Sociopolitical ties, including tourism, educational visits, twinning arrangements, political and cultural exchanges, government-sponsored trade affairs, are increasing in number and frequency, providing an additional means of linkage between Shanghai and other cities regionally and globally. A steadily increasing number of foreign institutions, such as the World Bank and the Asian Development Bank, are also involving in the urban development of Shanghai.

Figure 33: Urban Infrastructure Investment in Shanghai, 1990-2010
Source: SMSB, 2011

Figure 34: Foreign Direct Investment in Shanghai
6.2 Knowledge-Driven Socio-Economic Transformation in Shanghai

Shanghai has been undergoing dramatic socio-economic restructuring since 1990s. Its development mode has been gradually shifted from the dominance of physical wealth to leading of information and service industries (such as communications, advertising, journalism, consulting, technology, patents, commercial, financial, insurance, real estate, tourism). The tertiary sector has been laid on the pride of place. Knowledge plays an important role and performs as the driving force in this process. As a result, higher education has become a strategic field to promote rapid economic development to achieve higher social mobility.

Higher Education as a Lever of Economic Development

As we look back at two full decades of remarkable economic reform and social change in Shanghai beginning in the 1990s, we are struck by how fast Shanghai has developed. The average growth of Shanghai’s GDP between 1990 and 2010 was 16.7%; GDP per capita rose from 5911 yuan (1236 US dollars) in 1990 to 76074 yuan (11238 US dollars) in 2010 (SMSB, 2011). As GDP increases, people’s consumption ability has greatly promoted. The average disposable income per capita of urban households increased from 2183 yuan in 1990 to 31838 yuan in 2010,
while the consumption expenditure per capita rose from 1937 yuan to 23200 yuan. From 1990 to 2010, the expenditure on food (-23.0%), clothing (-3.0%), and household facilities (-2.3%) has substantially decreased; in contrast, more are spent on traffic and communications (+14.6%), residence (+4.6%), medical care (+3.7%), other commodities and services (+2.8%), education and recreation (+2.6%) (Figure 36).

At the same time, a marked structural and sectoral transition has appeared in Shanghai. During the past decade, the tertiary sectors increased substantially and have overtaken the industrial and construction sectors to become the largest (Table 11). The contribution of the tertiary sectors to GDP rose from 31.9% in 1990 to 57.3% in 2010, while the secondary sectors dropped from 63.8% to 42.1% (Figure 37). Accordingly, a new occupation structure has appeared. SMSB classified occupations into seven major categories, namely, technical related staff, administrators, staff and related people, sales and service people, workers in manufacturing-related sectors, workers in farming-related sectors, and others. Comparing occupation structure in 1990 with 2010 (Table 12), the most discernable changes lie in ‘workers in manufacturing-related sectors’ (-15.9%), ‘sales and service people’ (+13.4%), and ‘workers in farming-related sectors’ (-8.5%), and ‘staff and related people’ (+7.7%), while ‘technical related staffs’ (+1.7%) and ‘administrators’ (+1.5%) have increased slightly. Clearly, employment in manufacturing decreased while the service sectors enlarged.

Table 11: GDP and Employee of Primary, Secondary, and Tertiary Sectors in Shanghai, 1990-2010

<table>
<thead>
<tr>
<th>Sector</th>
<th>1990</th>
<th>2000</th>
<th>2010</th>
<th>Change from 1990 to 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP (billion yuan)</td>
<td>3.260</td>
<td>8.320</td>
<td>11.415</td>
<td></td>
</tr>
<tr>
<td>Employee (million)</td>
<td>0.87</td>
<td>0.89</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>Secondary Sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP (billion yuan)</td>
<td>48.268</td>
<td>216.368</td>
<td>721.832</td>
<td></td>
</tr>
<tr>
<td>Employee (million)</td>
<td>4.62</td>
<td>3.67</td>
<td>4.44</td>
<td></td>
</tr>
<tr>
<td>Tertiary Sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP (billion yuan)</td>
<td>24.117</td>
<td>230.427</td>
<td>983.351</td>
<td></td>
</tr>
<tr>
<td>Employee (million)</td>
<td>2.18</td>
<td>3.72</td>
<td>6.10</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP (billion yuan)</td>
<td>75.645</td>
<td>455.115</td>
<td>1716.598</td>
<td></td>
</tr>
<tr>
<td>Employee (million)</td>
<td>7.67</td>
<td>8.28</td>
<td>10.91</td>
<td></td>
</tr>
</tbody>
</table>

Table 12: Occupation Restructuring in Shanghai, 1990-2010

<table>
<thead>
<tr>
<th>Category</th>
<th>1990 (%)</th>
<th>2000 (%)</th>
<th>2010 (%)</th>
<th>Change from 1990 to 2010 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Related Staffs</td>
<td>13.3</td>
<td>12.8</td>
<td>15.0</td>
<td>+1.7</td>
</tr>
<tr>
<td>Administrators</td>
<td>3.7</td>
<td>3.4</td>
<td>5.2</td>
<td>+1.5</td>
</tr>
<tr>
<td>Staffs and Related People</td>
<td>5.8</td>
<td>11.8</td>
<td>13.5</td>
<td>+7.7</td>
</tr>
<tr>
<td>Sales and Service People</td>
<td>15.2</td>
<td>22.4</td>
<td>28.6</td>
<td>+13.4</td>
</tr>
<tr>
<td>Workers in Manufacturing-Related Sectors</td>
<td>50.5</td>
<td>38.2</td>
<td>34.6</td>
<td>-15.9</td>
</tr>
<tr>
<td>Workers in Farming-Related Sectors</td>
<td>11.5</td>
<td>11.3</td>
<td>3.0</td>
<td>-8.5</td>
</tr>
<tr>
<td>Others</td>
<td>-</td>
<td>0.1</td>
<td>0.1</td>
<td>+0.1</td>
</tr>
</tbody>
</table>
Figure 37: GDP Contribution of Primary, Secondary and Tertiary Sectors in Shanghai, 1990-2010

Figure 38: GDP Contribution of Tertiary Sub-Sectors in Shanghai, 1990-2010, %

In detail, the most evident increase in Shanghai’s economic structure appears at both the higher and lower ends of the tertiary sectors, i.e. FIRE (Finance, Insurance and Real Estate) and daily service sectors. Figure 38 shows a bimodal pattern of change: the contribution of ‘retail, wholesale, hoteling and catering’ to GDP increased by 9.8% from 1990 to 2010, that of ‘real estate’ increased by 5.3% and ‘resident service, business service and public facility management’ by 3.9%. While all the tertiary sectors had seen an ultimate increase in GDP contribution from 1990 to 2010, the sector of ‘finance and insurance’ increased most dramatically in the first decade by 5.7% but then began to decrease in the second decade. Reverse trend happened in the sector of ‘transport and communication’ with 1.4% decrease and then 1.9% rebound. The five sub-sectors – transport and communication, retail and wholesale, finance and insurance, real estate, and daily service – contributed to nearly half (48.6%) of Shanghai’s GDP in 2010 (SMSB, 2011).

While tertiary sectors are increasing, Shanghai’s manufacturing sectors has been upgraded. In particular, the gross output value of industries with advanced technology increased while that of traditional industries decreased (Figure 39). Changes are especially pronounced in three sectors:
communication and electronic equipment (+12.6%), transport equipment (+10.1%), and textiles (-11.1%). The six key industries – Electronic Information Product Manufacturing, Automobile Manufacturing, Petrochemical and Fine Chemical Products Manufacturing, Fine Steel Manufacturing, Equipment Complex Manufacturing, and Bio-medicine Manufacturing – accounted for 66.1% of the total gross output value and concentrated 36.4% of the employees in the secondary sectors of Shanghai (SMSB, 2011).

Generally speaking, several features can be perceived in the economic restructuring in Shanghai. First, as national incomes rise, the proportion of money devoted to food at home begins to drop, and the marginal increments are used first for durables (clothing, housing, automobiles) and then for luxury items, recreation, and the like. Second, in the very development of industry there is a necessary expansion of transportation and of public utilities as auxiliary services in the movement of goods and the increasing use of energy, and an increase in the non-manufacturing but still blue-collar force. Third, in the mass consumption of goods and the growth of populations there is an increase in distribution (wholesale and retail) and FIRE, the traditional centers of white-collar employment. These features correspond with typical transformation of an industrial society to a knowledge society (Bell, 1999). In fact, Shanghai is in the transition from investment-driven to innovation-driven economic growth (Zhang, 2009).

Figure 39: Changes in the Composition of Gross Output Value in Secondary Sub-Sectors of Shanghai, 1990-2010, %

Note: Data used in 1990 and 2000 are Gross Output Value; data used in 2010 are Sales Value.
Higher Education as a Promoter of Social Mobility

Economic restructuring in Shanghai posed requirement to encourage scholarship throughout society, to profoundly raise educational attainment and hence to improve labor quality. To meet the rising market demand, Shanghai is to build a so-called ‘intellectual highland’, aiming to transform into a ‘first-rate’ international metropolis with the best talents nurtured by a ‘first-rate’ education system. It also echoes the state’s developmental strategy of developing a knowledge-based society, proclaimed by former President Jiang during the APEC meeting in 2001. Therefore, a series of policies has been promulgated by Shanghai municipality to upgrade the educational attainment.

A typical case is the policy of urban household registration. In large and important cities such as Shanghai and Beijing, registered population is strictly controlled through household registration system. People holding the urban household in these cities can enjoy lots of ‘invisible’ benefits such as better welfare and job opportunities. Shanghai municipal authorities have allowed those with higher education or special talents larger quotas for urban household registration. For example, for students graduating from colleges outside Shanghai, only those holding ‘a degree above or equal to a Master’s degree, or a Bachelor’s degree from colleges/universities located in Shanghai, or from colleges/universities developed by the State Council, or from those local colleges within 211 projects’ are qualified to apply Shanghai urban household registration (SCGCG, 2001). The poor-educated and low-skilled, in contrast, have to go through a long and complicate process to remain legally in Shanghai (Li and Wu, 2006).

All these endeavors are intended to achieve an improvement in workforce quality. Consequently, there is a trend of progressively improving educational attainment in Shanghai. From 1990 to 2010, people with ‘university and above’ education have substantially increased (+15.77%), while those with ‘junior school’ (+3.87) and ‘senior school’ (+0.67) remained nearly unchanged, and those with ‘primary school’ (-10.43) and ‘semi-illiterate and below’ (-9.88) have dramatically decreased (Table 13). The total population with ‘university and above’ education in Shanghai was 5.04 million in 2010, 2.8 times of that in 2000, among which those with technical, bachelor, and master degrees in 2010 was 2.37, 3.06, and 5.54 times respectively of that in 2000 (SMSB, 2011b).

The distribution of the higher educated in Shanghai shows typical features of concentration. Geographically, among the 5.04 million with ‘university and above’ education, nearly half were concentrated in Pudong New Area, Minhang District, Yangpu District and Xuhui District. In particular, Pudong New Area attracted 1.10 million (21.92%). Comparing the share of higher educated in the total population, Xuhui District was the highest, reaching 38.5% in 2010, compared with the urban average of 22.82% (SMSB, 2011b). The geographical distribution of the higher educated in Shanghai was highly influenced by the location of HIE and CBD, the functional orientation and population amount in the area and so on. Sectorally, about 2/3 of those with ‘university and above’ education was concentrated in the six sectors: manufacturing; retail and wholesale; education; leasing and business service; transportation, warehousing and post industries; and finance (SMSB, 2011b). Considering the share of higher educated in each sector (Figure 40), the most highly ranked were finance (80%), information and computer service (79.1%), scientific research and technical service (75.5%), education (73.6%), health and social
security (58.1%), and public administration (57.8%). And the least ranked were farming (1.7%), resident service (6.7%), and hoteling and catering (11.6%).

The relationship between education and income has also become stronger. While it is not possible to compare the distribution of educational attainment among different income groups, as the statistics data does not cover this, the average compensation of employees in various sectors however provides an access for cross comparison. Employees in the sector of finance enjoyed highest salaries, 153603 yuan annually in 2010, more than three times of the social average and 1.68 times of the second highest group – the sector of power production – with annual income of 91409 yuan. The following were sectors of information and computer service (74028 yuan), public administration (73073 yuan), scientific research and technical service (70992 yuan), health and social security (70943 yuan), and education (67909 yuan). The lowest income groups were resident service (22581 yuan), hoteling and catering (27056 yuan), and farming (31836 yuan). In general, the income level in different sectors is correspondent with their educational attainment (Figure 41), except relatively higher income in the sector of power production largely due to the state monopoly in energy control.

Higher education has played an important role in changing the social composition of the most high earning and status jobs. People with higher education have seen large increases in productivity and pay: they are more likely to be employed, more likely to enjoy higher wages and better job satisfaction, and more likely to move from one job to the next. In contrast, those with lower education have experienced reduced demand for their labor and lower wages. Higher education provides an access through which individuals from low-income backgrounds can enter higher status jobs and increase their earnings. It ensures that every person, regardless of their background, their circumstances, or their social class, has an equal opportunity to get on in life, especially in such a knowledge-based society. Higher education has become a strategic means to promote social mobility, to keep vibrancy of the economy, to move towards high-value goods, services and industries, and to maintain competitive edge.

Table 13: Educational Attainments of People at Six Years and Above in Shanghai, 1990-2010
Source: SMSB, 2011b

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>2010</th>
<th>Change from 1990 to 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount (million)</td>
<td>Percentage (%)</td>
<td>Amount (million)</td>
</tr>
<tr>
<td>Semi-illiterate and Below</td>
<td>1.61</td>
<td>13.05</td>
<td>0.7</td>
</tr>
<tr>
<td>Primary School</td>
<td>3.03</td>
<td>24.55</td>
<td>3.12</td>
</tr>
<tr>
<td>Junior School</td>
<td>4.22</td>
<td>34.20</td>
<td>8.41</td>
</tr>
<tr>
<td>Senior School</td>
<td>2.61</td>
<td>21.15</td>
<td>4.82</td>
</tr>
<tr>
<td>University and Above</td>
<td>0.87</td>
<td>7.05</td>
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Chapter 6. University Development and Urban Restructuring in Shanghai

Figure 40: The Share of People with ‘University and Education in Different Sectors in Shanghai, 2010. Source: SMSB, 2011b


Figure 41: Educational Attainment and Income Level in Different Sectors in Shanghai, 2010. Source: SMSB, 2011, 2011b.

Note: as Figure 40.

Table 14: Index of HIEs in Shanghai, 2000-2010

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<td>331600</td>
<td>378500</td>
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<td>442600</td>
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<td>484900</td>
<td>502900</td>
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<td>Student Enrollment</td>
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<td>144600</td>
<td>145800</td>
<td>143500</td>
<td>144600</td>
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<tr>
<td>Enrollment Ratio (%)</td>
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<td>81.2</td>
<td>81.5</td>
<td>84.6</td>
<td>84.6</td>
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<td>82.1</td>
<td>83.8</td>
<td>84.4</td>
<td>85.1</td>
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6.3 University Expansion as a Consequence of Mass/Universal Higher Education

The increasing importance of higher education has led to increasing enrollment in universities. From 2000 to 2010, the number of HIEs in Shanghai increased from 37 to 66 and the number of students increased from 226800 to 515700. At the same time, student enrollment increased from 81300 in 2000 to 144600 in 2010, with the enrolment ratio rising from 67.4% to 85.1%, remaining at the stage of universal higher education (Table 14) (SMSB, 2011). Accordingly, universities have to provide more space for the growing numbers of students. The new knowledge and technology has also brought demands for new facilities, which impose a construction burden on universities for additional space. Therefore, we see an obvious expansion of universities over the past decades.

Enlarging Existing Campus

Universities’ built environment is often the result of decades – if not centuries – of planned or ad hoc change, balancing changing needs with available funds. Difficulties of university relocation exist in generating cost-recovery of initial heavy investment, agreeing commute and other issues with staff and their unions, attracting students to the new campus, establishing positive relationships with the surrounding community and so on. So the university’s first choice for expansion would be the place adjacent or near to the previous campus. This is a quite severe demand often involving the changing of urban land use structure, the relocation of residents from university neighborhood to new estates, the conversion of industrial, residential, commercial or other land to university uses, and the investment of huge amount of money to get the land. And it’s easier to exacerbate historic university-community conflicts due to their differences in terms of perception, values, goals, and available resources (Mayfield and Lucas, 2000).

A particular phenomenon existing in the university-community relationship in China is related to work-unit tradition. As the carry-over from work-unit organization, some neighborhoods around the universities still remain as the living quarters of staffs. It contributes to a shared public culture rooted in and shaped by the history and identity of the university, which makes it much more difficult to relocate the residents due to their sense of belonging to the place, but at the same time also underpins a collective identity which provides a new possibility and sustainable way of integrating various stakeholders harmoniously into university spatial development. Take the outreach activity of Tongji University as an example, a commercial and business center was planned to be developed around the university, which need to relocate the neighboring residential area of university staffs. Most of the residents there are well-known experts who have devoted all their life in the development of the university. They were reluctant to be relocated no matter how much compensation they could get. There was tough negotiation between the university and the community. What mattered at last was their shared culture and consensus for the good of the university: considering the future development of the university, the community finally agreed to move out to leave the space for university expansion.

Building Satellite Campus

Considering the difficulty and cost of campus expansion in the inner city, most universities would like to develop satellite campuses in the suburb while keeping the main campus in the inner city,
such as Jiading Campus of Tongji University and Fengxian Campus of East China University of Science and Technology. Usually, the satellite campus is relatively independent from the mother campus, with separate libraries, stadiums, students’ residences and with commuting buses connecting to the mother campus. Taking Tongji University as an example, the farthest campus, Jiading Campus, is about 35 km from the mother campus, which takes more than 40 minutes by car and more than two hours in public transportation (Figure 42). An affiliated administrative committee has been set up in Jiading Campus to cope with daily management in a relatively independent way.

There are also some universities that have relocated the whole or the main campus to the suburb, such as Shanghai Maritime University and Shanghai Ocean University from Yangpu District and Pudong New Area to Lingang New City. Often this is because the requirement of university spatial development can not be met in original campus while the new one has a superb location, sufficient land, satisfying natural and social environment, and high-quality teaching facilities. Most importantly, the funds for constructing new campus can be partly financed through the expropriation of the original campus. At the same time, urban and regional authorities who act as the original university landlords may see these assets as too valuable for educational use and prefer leaving the large urban site for upmarket housing and offices, while at the same time the relocation of the university may create opportunities for the vibrancy of the new nestle.

Figure 42: Campus Distribution of Tongji University
Source: TJSEI, 2012; edited by author
University Towns
A strategic initiative led by the local government to meet various challenges of university expansion is the set-up of university towns, which was very popular in many Chinese cities in the past decade. By April 2004, there had been 54 university towns newly established in 43 cities of China (Lu, 2005). Songjiang University Town, Nanhui University Town and Fengxian University Town have been established successively in Shanghai. In addition, there have been also some cases, mostly influential universities or university clusters, which have been aimed to develop into a university town based on their existing spatial structures, such as Yangpu University Town that will be mentioned in Chapter 7.

The development of university town is based on the principle of ‘1+1>2’, which means that an extra value could be added and productivity gain could be achieved by gathering multiple universities together. University towns pull resources of those involved institutions together and make up one’s disadvantages with others’ strength, while each institution remains relatively independent from each other. Colleagues and students from these institutions joining the collaboration project can enjoy better resources, including facilities and equipments for teaching, learning and research. It has effectively solved the problems facing universities in terms of limited space for school buildings, and thus eased the tension between university expansion and rare urban space. University towns perform as an efficient spatial form to facilitate the cooperation among universities and as an important catalyst for the fast development of the cities. They also help building an urban brand by profiling the city as a centre of excellence and making the city more attractive.

Figure 43: Various Locations of University Towns in Cities
Source: drawn by author

Considering the location of university towns in the city, there are three models (Figure 43). The first are strategically planned in the inner city on the basis of original concentration of universities, such as Yangpu University Town. They can make use of existing resources such as urban infrastructure, close university-industry linkages, and favorable creative atmosphere. University towns of this kind usually develop faster, with less investment but better interaction with the city. The second type of university towns are developed in the urban fringe with available cheap land and also convenient urban infrastructures and services. The third are geographically independent from the mother city as a satellite town and are connected through convenient transportation system. This kind of university towns are usually in a large scale with extensive investment and long construction period. Most of the university towns in Shanghai follow the third model.
6.4 University Involvement in Urban Spatial Restructuring

In the process of university expansion, there has been constant interaction between the universities and the city. As the universities are increasingly involved in urban development, the way that campus is planned and built is changed accordingly. Campus plan no longer focuses on the self-containedness of the institution and its separateness, but performs as key ingredients in the changing patterns of its neighborhood, downtown, and citywide development (Perry and Wiewel, 2005). A cluster of educational facilities that mix in seamlessly with commercial, retail, and service functions are major principles in the model of campus design. The university has become deeply involved in improving communities surrounding its campus by ensuring good schools, safe streets, good transportation, and attractive housing choices. The development of multi-institutional and multi-functional campus often catalyzes the deteriorated inner city and contributes to peri-urbanization. Through its own real estate development efforts such as land clearance and infrastructure building, it’s possible for the university to advance the overall citywide redevelopment and become the lead institution in this process.

For example, Shanghai Conservatory of Music and Shanghai Theater Academy, in collaboration with Shanghai Library and Shanghai Audio & Video Archive, have enhanced the cultural and entertainment atmosphere in the historical urban center on the occasion of campus renewal. Shanghai Maritime University and Shanghai Ocean University have developed new campuses in Lingang industrial park which is aimed to be a shipping center by strengthening university-industry linkages: Shanghai Maritime University provides rent exemption to attract the world’s leading shipping companies to establish R&D center while Shanghai Ocean University embeds itself in the logistics, shipping, and marine industries to develop innovative fishery technologies. In Jiading District, the College of Automotive Engineering of Tongji University has attracted more than 800 billion yuan investment and developed into the large national innovative base for automotive and rail technologies, which has promoted the urban brand of ‘Automotive Jiading’. In Fengxian District, East China University of Science and Technology, Shanghai Normal University, and Shanghai Institute of Technology have tried to make use of their specializing disciplines and human resources to develop the district into a chemical industrial park as well as to explore the coastal tourism resources in the district.

Universities are natural catalysts of sub-centers in favor of multi-nucleation due to the concentration of university population and resources. Wujiaochang, one of the four sub-centers in Shanghai, for example, owes much of its prosperity to the agglomeration of universities. There are currently 14 higher education institutions around Wujiaochang, occupying 458.2hm2 of land, 7.55% of the area in Yangpu District where Wujiaochang is located. The number of university students accounts for 40% of that in Shanghai. There are more than 500 research institutes and 40 national key disciplines in the district, respectively accounting for half of and two thirds of the total in Shanghai. Sufficiently nurtured by the universities, Wujiaochang has developed into a famous knowledge-intensive business district.

Universities also contribute to the formation of development zones. Shanghai’s development zones are designed with functional specialization; however, their business and industrial scope is broadly defined with designations such as ‘high-technology development’ or ‘export processing’. These
have qualitative as well as quantitative implications for the universities. The increasing requirement for high-educated workers calls for higher education services of universities. The high-tech jobs also encourage more collaboration between the industry and the university. Moreover, the knowledge-intensive nature of universities tends to invoke agglomeration of cultural industries and service industries, which lead to the specialization of the district.

Figure 44: University Spatial Structure in Shanghai
Source: drawn by author

To integrate various university clusters into the urban plan, a ‘2+2+2+X’ university spatial pattern has been proposed in Shanghai (Figure 44) (SMEC, 2012). The first ‘2’ refers to Yangpu Creative Cluster and Minhang Science Park led by key research universities; the second ‘2’ refers to Songjiang University Town and Nanhui University Town with joint effort of the university, the government and the enterprises; the third ‘2’ refers to Fengxian University Town and Lingang Science Park that were newly developed for urban strategic integration and transformation; ‘X’ refers to a group of universities that have close linkages with innovative industries based on various disciplinary characteristics. The ‘2+2+2+X’ spatial restructuring involves numbers of universities, covers several urban districts, and integrates various sectors and institutions such as education, technology, economy, construction, finance, planning, transportation, real estate and so on. It takes into consideration the urban and the suburban as a whole in the planning process. It is
a very complex planning process which would be difficult, if not impossible, to achieve the proposed goal without the central control and coordination of the government.

After years of exploration, a guiding principle – ‘3-zone interaction’ – has been put forward in Shanghai to maximize the role of university in urban development (SMEC and SAEC, 2007). The 3-zone refers to the university, the community and the enterprise. The three parts assume different roles in the process of university development. The universities function as the main source of knowledge production and personnel training, providing human resource and intellectual support for economic and social development. The community provides social services to universities and innovative clusters, aiming to create a favorable ecological and social environment. The enterprises facilitate commercialization of academic research and management of industrial linkages, boosting innovative technology and its application into production. The role and power of different actors may vary across different stages and places of development. ‘3-zone interaction’ is regarded as an effective and sustainable way of enhancing urban competitiveness by facilitating the collaboration among the university, the community and the enterprise in Shanghai.

6.5 The University ‘of’ the City versus the University ‘in’ the City

The close interconnection between the university and the city does not mean that their relations are harmonious and cordial. In fact, the relative independence of universities, especially those private institutions, creates potential urban criticism for their imperiousness and irresponsibility. University real estate practices, usually driven by internal goals of campus design, academic program needs, and endowment, easily exacerbate historic town-gown conflicts, often running at odds with the broader urban and community development agendas of the city. For example, in the development of Jiangwan Campus of Fudan University, an expansion program occupying 1600 mu (1km2) of land, severe opposition was invoked among the communities against the large scale land occupation of the university. In the past, it took 15 minutes on foot or 5 minutes by bike for the communities from their residence to the nearest metro station (Figure 45). After the set up of the expanded campus, however, the communities have to circle around the campus which has definitely increased both the time and financial cost. Negotiation is still in the process and a possible solution might be to open the university to the communities so that they can go through the campus along a shortcut.

As a product of its relationship with the city and its urban surroundings, the university is increasingly called for to be an urban university. An urban university is viewed to be ‘of’, not simply ‘in’, the city (Bender, 1998; Brockliss, 2000; Perry and Wiewel, 2005). It ‘supports research and teaching to address specific needs of metropolitan areas and the community; integrates the teaching, research, and service functions of the university in an interdisciplinary manner; and promotes partnerships with public agencies and the community for broad public affairs and civic interests’ (Mayfield, 2001, P231-232). In general, an urban university is aimed to become a more vigorous partner in the search for answers to our most pressing social, civic, economic, and moral problems, and to affirm its historic commitment to the scholarship of engagement (Boyer, 1996).

An urban university operates with a closely meshed and intertwined mission, milieu, and
An operational definition of the urban university would incorporate both its setting and the clientele it serves. The Coalition of Urban and Metropolitan Universities suggests several criteria applying to such institutions:

- Location in a major metropolitan area
- Dedication to achieving excellence through teaching, research, and public service
- A diverse student body reflecting the demographic composition of the region
- Responsiveness and service to the local region as part of the university's mission
- Serves the region not only by providing an educated citizenry and workforce, but also as a cultural and intellectual resource
- Engages in partnerships with other local organizations
- Uses practical experience in the urban setting to enhance students’ education.

Figure 45: Jiangwan Campus of Fudan University

At one time the term urban university might be used only to describe institutions located in central cities, but this is no longer the case. Urban sprawl and the advent of edge cities have changed conventional notions of what constitutes urban. Today an urban university is one located in an urban agglomeration consisting of the densely populated urban core and its less-populated surrounding territories, irrespective of political boundaries or administrative definitions. An urban university can even be planned in a de-urbanized way given the requirement of the urban plan. It can also shift locations between sites and even cities purposely in accordance with the urban strategy. In the development of satellite campuses, especially in the set-up of university towns, the universities have been founded before significant urban development took place. Large-scale urban settlement came after the establishment of universities. The universities have led the suburbanization process of the city. It can be considered that the universities have been spilled out of the city deliberately to trigger the large-scale urban development and to fulfill the strategic
mission of the city.

While the scholars are worrying about the university ‘in’ the city but not ‘of’ the city, new issues rise as the university is ‘of’ the city but not ‘in’ the city, which has made the university-city landscape more complex. Yet the question remains as to what extent the urban university, especially those universities ‘of’ the city but not ‘in’ the city, contributes to urban development. Depending on a university’s location, in the centre of a large city, in a small town, an out of town campus or a completely disembodied virtual institution, the nature of such linkage – and hence its overall impact – varies. Compared with the suburb, urban locations provide a university with greater access, connections and linkage to the urban environment. Instead, the outflow of educational and cultural resources along with university suburbanization has undermined the intangible capital of the city not only due to the solely geographical retreat but also an overall capital loss due to the changing environment. Decisions on an urban university not to be ‘in’ the city should be given particular attention given its potential tremendous loss and gain to the city.

**Conclusion**

Over the past few years, Shanghai has undergone significant socio-economic restructuring. There is a growing consumption expenditure devoted to durables and luxury items. The service sectors have overtaken the manufacturing and industrial sectors to become the largest in terms of economic contribution and occupation provision. An overall upgrading of the industrial structure appeared, with enlarging occupation positions in knowledge intensive sectors and unemployment in low-skilled sectors. Shanghai is in the transition from investment-driven to innovation-driven economic growth. Although income level and education attainment have risen in all groups in the past decades, people with higher education tend to have higher earning and status jobs. Higher education has become a strategic means to climb the earning ladder and to achieve social mobility. To level social and economic differences and to move towards advanced industrial structure, learning was adopted as a conscious effort by the individuals and was incorporated as an urban strategy by the city. Various efforts have been taken to facilitate learning, ranging from technological to institutional measures.

Most obviously, university enrollment has been dramatically increased and there is a trend from elite to mass and to universal higher education. Accordingly, large scale expansion has taken place in universities, providing additional space for the increasing number of students as well as for the upgrading of teaching facilities. Campus expansion in the inner city often involves the relocation of neighboring communities and the change of urban land use structure. It’s inevitable to induce conflicts with the communities due to their different opinions and interests. To avoid the many difficulties of campus expansion in the inner city, many universities would like to set up branch campus in the suburb. A typical phenomenon of university suburbanization in China is the set up of university towns by gathering different universities in a piece of land designated by the local government for free or at favorable prices. University town has resolved many challenges of campus expansion, especially land acquisition. It is also regarded as a catalyst to trigger the suburbanization process of the city.

As the role of university in urban development is increasingly important, the university is called
on to engage more actively and to become an ‘urban’ university. However, the notion of ‘urban’ has been changed along with the prevailing urban sprawl. An urban university is no longer constrained in the central city as perceived in the past. Instead, it can be located either in the urban core or in the suburb of the large metropolitan area. It can also shift locations across cities in accordance with the specific development goals of the cities. University spatial restructuring in Shanghai is planned in such a way taking into consideration both the urban and the suburban as a whole. Taking the chance of real estate development such as land clearance and infrastructure building, universities have emerged as key ingredients in the changing patterns of community development planning as well as inner city renewal and peri-urbanization.
Chapter 7. University as an Economic Actor in Urban Renewal:

Tongji Creative Cluster

Tongji University, located in Yangpu District, the northeast of Shanghai, has nearly 50,000 students and more than 6300 staff members (as of August 31, 2011). Among its various departments it is especially highly ranked in engineering: its architecture, urban planning, and civil engineering departments have consistently ranked first in China for decades. Tongji Creative Cluster was developed by harnessing the superiority of the university’s leading disciplines in commercializing academic research and managing industrial linkages. It is the only cluster based on modern services in China with special focus on creative and design industry, engineering consulting services, new energy, new materials and environmental technology. Different from the many science parks promoted by the government, Tongji Creative Cluster came into being spontaneously and grew up from the bottom. It was when the economic and social value of Tongji Creative Cluster was shown up that the governments began to intervene and provided financial and institutional support. Now Tongji Creative Cluster has integrated driving forces of various kinds to promote its further development.

7.1 Spontaneous Spatial Spillovers of Tongji University

Tongji Creative Cluster is predominated by the sectors of architecture, engineering and construction, whose ebb and flow is directly influenced by real estate market. After China’s reform and opening-up, especially after individual housing loans were released in the late 1990s, real estate market began to prosper in China. There was a great demand in the real estate market driven by the long-term accumulated purchasing power and by the rapid urbanization process (Figure 46; Figure 47). But there was a short supply of human resources and public services in the fields of architecture design and civil engineering, constrained by the domination of a small number of state-owned enterprises. Along with the economic reform in China, national control over private economy was loosened and there were some preferential policies encouraging the development of small and medium private enterprises. This constitutes the external conditions for the emerging of university spin-off companies.

Figure 46: Investment in Residential Housing in Shanghai, 1981-2010
Source: SMSB, 2011.
Institutional reform of the higher education system created the internal incentives for the development of Tongji Creative Cluster. After the reform, the modes of average distribution in universities were eliminated: personal income was largely dependent on the profit from research programs. This evoked the enthusiasm of professionals in applying their knowledge and research results for commercial use and building linkages with business communities. At the same time, Tongji University offers a tolerant environment for entrepreneurial activities: there is no restriction on the teachers’ entrepreneurship or the students’ part-time jobs; neither is there any regulation about those activities that undertake commercial programs by virtue of the university’s brand. But the university charges certain amount of money from the staff as management fees. Usually it’s 20% of the program funding. For those programs related to architecture design and urban planning, the fee amounts to 30%. In contrast, if the programs are carried out in an independent company, the total expense is no more than 10% (Liu, 2007). Therefore, most of the teachers and scholars would like to run business by themselves so as to maximize their benefit. The studios and research groups were gradually replaced by firms and enterprises.

As early as in the 1980s, some teachers and researchers began to set up company publicly inside the university. Ancillary services such as rendering, model making and printing emerged subsequently. In the mid 1990s, along with the trend of university merger in China, Shanghai Institute of Urban Construction and Shanghai Institute of Building Materials were merged into Tongji University. There came a large-scale increase of enrollment. Facilities in the university, such as classrooms, dormitories, and offices, were in serious shortage. Some functions had to be spilled out of the campus to leave space for expanded construction (Figure 48). The first to move were printing, model making and other supporting businesses; then the teachers’ companies were moved out too. Most of them were relocated in the east section of Chifeng Road, a secondary urban street bisecting the university into central campus (Siping Campus) and south campus (Figure 49). By 2003, there had been about 400 enterprises concentrated along the 860 meter long Chifeng Road, among which 47.13% were occupied in architecture related jobs (Yu and Chen, 2005). The scenery of Chifeng Road was being transformed (Figure 50) and it was gradually becoming famous for the agglomeration of design industries.

The prosperity around Chifeng Road attracted more companies and institutes to come and promoted the development of the neighboring Miyun Road, Guokang Road and Siping Road.
Graduates from Tongji University and designers from elsewhere began to set up companies around. They were settled in the office buildings, the storefronts, or the residential housings in the neighborhoods. Several well-known large design enterprises, such as Tongji Architectural Design and Research Institute, Tongji Urban Planning and Design Institute, Shanghai Municipal Engineering Design & Research Institute, Lin Tung-Yen & Li Guo-Hao Consultants, were all attracted to settle down. By the year of 2003, the cluster had been expanded to 2.6km² around Tongji University, which formed the core area of the current Tongji Creative Cluster (Figure 51).

Figure 48: Campus Evolution of Tongji University (Siping Campus). Source: Zhang, 2008.

Figure 49: Plan of Tongji University
Source: TJPB, 2012
7.2 Government Intervention in Promoting Tongji Creative Cluster

Tongji Creative Cluster was originated from the spontaneous agglomeration of creative industries: there was no business tradition around the university, neither was there any public investment at the beginning. Moreover, dominant industries in Tongji Creative Cluster were neither high technology nor new science, which made it highly neglected in the official urban plans. The government was considered to make minimum contribution to Tongji Creative Cluster in a long time, which actually facilitated a tolerant environment for the cluster and alleviated its burden of investment returns (Pan and Lu, 2005). But along with its fast development, the social and economic effect of Tongji Creative Cluster was soon realized and the government began to intervene. The first to perceive the potential of Tongji Creative Cluster and to promote its development was Siping Street Office (Liu, 2007), a representative agency of Yangpu District Government (YPDG). When Siping Street Office noticed the continuous rising spatial demand for
offices around Tongji University, it proposed to transform the industrial plants in Chifeng Road N.63 into a creative park in collaboration with Tongji University. However, the proposal was rejected by Tongji University because of its worry about the market purpose of manipulating university brand. Then Siping Street Office collaborated with Shanghai Institute of Fishery Machinery and Instrument (IFMI) and Hudong S&T Salon to fulfill the program and received great success in the end.

At the same time, economic development in Yangpu District, where Tongji University locates, was slowing down due to the stagnancy of traditional industry. Yangpu District has been the traditional industrial base in Shanghai since 1880s. Its industrial output amounted to 6.135 billion yuan in 1965, accounting for 26.52% of the total in Shanghai, and in 1990 it was 15.45 billion yuan, accounting for 14.59% (OSLH, 2012). However, after China’s reform on state-owned enterprises in the early 1990s, traditional industries such as textile and manufacturing which were characterized by extensive growth couldn’t adapt themselves well to the market mechanism and therefore met great challenges. The proportion of industrial added-value to the urban added-value in Yangpu District decreased from 34.24% in 1992 to 18.57% in 1998 (Figure 52). And it became a negative force for economic growth (Table 15). It was necessary for Yangpu District to transform the modes of economic development. The prospering of Tongji Creative Cluster at that time provided such an opportunity and soon attracted the attention of the upper-level governments.

Figure 52: Proportion of Industrial Added-Value to the Urban Added-Value in Yangpu District, %
Source: Li and Chen, 2005.

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<tr>
<td>The contribution of industry to urban economic growth (%)</td>
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<td>11.48</td>
<td>8.42</td>
<td>2.78</td>
<td>-2.24</td>
<td>1.65</td>
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In 2003, YPDG invested over eight million yuan to improve the environment around Chifeng Road and officially named it Tongji Modern Architecture Design Street. When the enterprises along Chifeng Road was spilled out to the neighboring area, YPDG invested another five million yuan to renovate Guokang Road and set aside a lot of space by exchanging land use right and reusing the idle buildings. There was a trend of developing university towns in China at the turn of the century and therefore the idea of Yangpu University Town was put forward by YPDG. The area
around Tongji University, Fudan University and Shanghai University of Finance and Economics was planned as an integral part, which constituted the western zone of Yangpu University Town (Figure 53). It was aimed to facilitate collaborative growth through the joint effort of multiple universities and to develop the cluster into a high-tech industrial base predominated by large enterprises.

Figure 53: Land Use Structure of Yangpu University Town

But it was soon discovered that the high-tech orientation of the cluster was in contradiction with Zhangjiang High-Tech Park, a national level science park that was established in 1992. Reflecting on the advantages of the university and the characteristics of the enterprises, the cluster was readjusted to incubate small and medium start-ups based on creative industries, which could be integrated with Zhangjiang when they were developed into a larger scale. A series of favorable policies and services were provided by YPDG. These include financial service of preferential loans and venture investment for medium and small businesses, entrepreneurship service of pioneering funding and guidance for startup companies, procedural service to assist program evaluation and funding application, training service for policy interpretation and vocational training, human resource service for personnel recruitment and recommendation, intermediary service to provide professional consultancy about property rights, law, finance and so on.

In 2007, Wan Gang, president of Tongji University at that time, proposed to develop the cluster around Tongji University into a knowledge economic area on the basis of Tongji Modern
Architecture Design Street. The proposal received immediate approval from YPDG and they worked out together two important documents – Preliminary Agreement on Strengthening Further Cooperation in Promoting Independent Innovation, Planning Framework for Tongji Knowledge Economic Area. The cluster was planned to include the core area, the expansive area and a number of distant nodes (YPDG, 2011) (Figure 54). The core area is centered on Siping Campus of Tongji University, with an area of 2.6 km2. The expansive area is a symmetrical pentagon with Siping Road as the axis, with an area of about 10 km2. The distant nodes include Energy and Fuel Institute at New Jiangwan City, Creative Industry Plaza on the north bank of Huangpu River, Environmental Protection Center near to Huangxing Park and Advanced Material Center around Forest Park.

The cluster was formally launched by YPDG and Tongji University in May 2007 and was integrated into the management system of Zhangjiang High-Tech Park in 2008. In January 2009, the cluster was included into the National Torch Plan by the Ministry of Science and Technology (MOST). It is the first and the only state-level characteristic industrial cluster based on modern services in China: all the other clusters in the National Torch Plan are based on high-tech industry. In September 2009, the cluster was named as Tongji Creative Cluster by Shanghai Economic and Information Technology Commission. And it ranked the first batch of Creative Cluster Exemplar in Shanghai in May 2010.

Figure 54: Spatial Layout of Tongji Knowledge Economic Area
Source: YPDG, 2011.
7.3 Self-Reinforcement of Tongji Creative Cluster
Tongji Creative Cluster enjoys some critical attributes of self-reinforcement. Spatial networks due to high density and mixed use in the cluster have contributed to frequent interaction and entrustment among various actors; business networks have reduced the transaction cost and united enterprises of various kinds to jointly resist the market instability; the continuous moving in and out of intellectuals and enterprises have kept fresh momentum in the cluster and helps to its self-renewal.

Spatial Networks
Due to the long-term inefficacy of public capital at the initial stage of Tongji Creative Cluster, most real estates in the cluster are subject to private control. It's difficult to implement large-scale demolition and construction. Corresponding measures such as zoning to purify land use can't prevail in the cluster either. The upgrading and renewal of physical facilities in the cluster are carried out in an incremental and flexible manner, such as reuse, multi-use and mixed-use, which contributes to spatial complexity in the cluster. For example, the industrial plants of Shanghai Institute of Fishery Machinery and Instrument (IFMI) in Chifeng Road N.63 were reconstructed into a creative park in 2001 through the joint effort of Hudong S&T Salon, Siping Street Office, and IFMI, providing 41869.5m2 of space for creative companies; residential housings of Shuxiang Apartment and Guokang Apartment around Tongji University were largely rented for commercial and office uses. Different functions are concentrated in the same building. Some even share the same office.

Spatial proximity helps enterprises reduce the transaction costs, especially transportation costs, which is of particular importance for small businesses with limited budget. So the cluster predominated by small enterprises tend to have higher density and more efficient use of space. The closer to the core area of Tongji Creative Cluster, the more efficiently the space is used. At present, over 90% of the office buildings in the core area of Tongji Creative Cluster are put into efficient use (Pan and Lu, 2005). Taking an office building on Chifeng Road as an example, the floor area of the building is 2500 m2, but there has settled as more as 11 enterprises. The direct and close spatial connection among enterprises is helpful to frequent contact and entrustment. Some enterprises have established contractual and long-term business relationships based on their spatial connection. Spatial networks contribute to social networks in the cluster, and social networks helps to spatial agglomeration vice versa.

Business Networks
Considering the scale of enterprises in Tongji Creative Cluster, small businesses are the predominant. In 2004, the average number of employees in Tongji Creative Cluster was less than 16; in 2008, the number rose to 25, but there were still 78.3% of the enterprises with less than 20 people (Chen and Wang, 2010). Different from large enterprises with complex internal functions, small and medium enterprises depend more on external support with regard to industrial chains. Tongji Creative Cluster is in high degree of labor division. An integral industrial chain exists (Figure 55; Figure 56) – with design industry as the core; design-oriented services such as handicraft and software industry as the second layer; business administration and information industry as the third layer; public services such as goods delivery, real estate broker, equipment
maintenance, travel agency, banks and restaurants as the outer layer (YPDG, 2011). There are professional and specialized companies involved in every section of the industrial chain. The industrial chain contributes to such a favorable environment that highly reduces the transaction cost. It’s estimated that the cost to set up a design company in Shanghai without any other external support is about one million yuan, disregarding the daily expense and registration fees to run business. But in Tongji Creative Cluster with sufficient external support such as high labor division and integral industrial chains, it costs only 150 000 yuan to set up a design company (Pan and Lu, 2005). The lower investment to run a company reflects the advantage of Tongji Creative Cluster and makes it easier for small enterprises to join the cluster, which also explains well their continuous vitality and predominance.

Settlement of several large enterprises in Tongji Creative Cluster is also an indispensable factor for the success of the cluster. In China, different projects have different requirement on the qualification of the participants, which is defined by professional and technological index. Most small enterprises in Tongji Creative Cluster don’t have the required qualification. When applying for projects at higher level, they often cooperate with large enterprises and ‘borrow’ their qualifications. In addition, it’s usually difficult for small enterprises to undertake complex projects by themselves due to their relatively inferior professional techniques. They have to turn to large enterprises for help. On the other side, large enterprises are sometimes too busy to be engaged in all the projects, but they are not willing to lose customers at the same time, so they would like to sub-contract some projects to small enterprises. This kind of sub-contract is of mutual benefit for both large and small enterprises and it creates abundant entrepreneurship opportunities for the young designers, which contributes to the bloom of Tongji Creative Cluster. In fact, most of the businesses that small enterprises undertake in Tongji Creative Cluster are originated from their cooperation with the four large enterprises. However, such a business network dependent on sub-contract is too frangible. It’s easier for small enterprises to close down whenever there is any shrinkage in the market. But on the other hand, it helps to the self-renewal of Tongji Creative Cluster, with those less competitive easily washed out.

Figure 55: Industrial Chain Centered on Architecture Design in Tongji Creative Cluster

Figure 56: The Output and Enterprises in Various Sectors of Tongji Creative Cluster

Source: Liu, 2007

Self-Renewal

Pan and Lu (2005) carried out a survey on the location choice of enterprises in Tongji Creative Cluster and they found that the most important factors are ‘adjacency to university’ (22.47%), ‘place brand’ (15.76%) and ‘concentration of peers’ (12.36%); the highest scored factors are ‘adjacency to university’ (110/120), ‘concentration of peers’ (104/120), ‘place brand’ (101/120) and ‘sensitive to latest ideas’ (100/120) (Figure 57). Similar results also appeared in the satisfaction factors of Tongji Creative Cluster towards the enterprises: the top satisfaction factors are ‘adjacency to university’ (22.73%), ‘place brand’ (17.05%), and ‘concentration of peers’ (11.36%). It shows that Tongji Creative Cluster has some attributes as expected and valued by the enterprises, which explains well the reason of its attractiveness. Investigations have shown that about 77% of the enterprises along Chifeng Road are spontaneous inflows (Table 16) (Yu and Chen, 2005). Among all the enterprises in Tongji Creative Cluster, nearly half of them (56.68% in 2004, 41.12% in 2008) are registered in other areas but then attracted to relocate into Tongji Creative Cluster (Chen and Wang, 2010).

Many enterprises in Tongji Creative Cluster are evolved from research groups in Tongji University. The organization of research groups extends out of the university, which forms a ‘club’ linking groups of alumni firms with potential partners. It’s estimated that 80% of the enterprises in Tongji Creative Cluster are set up by alumni of Tongji University (YPDG, 2009). Teachers and researchers work as professional consultants in the cluster or set up companies by themselves. Some projects undertaken in the cluster are often selected as teaching cases in the university courses. University students participate in the projects with guidance of the teachers or do interns
and part-time jobs directly in the neighboring enterprises. Investigations have shown that 42.9% of the students in Tongji University have the experience of doing part-time jobs in Tongji Creative Cluster, of which 53.6% are involving in programs related to their majors (Chen et al., 2006). They perform as low-cost and high-quality temporary employees for Tongji Creative Cluster. What the students have gained in this process, such as professional experience, entrepreneurship knowledge, project management skills, market awareness and social capital, lays a solid basis for their future career, which may end up as skilled personnel in Tongji Creative Cluster.

While there are continuous new set-ups and inflowing enterprises in Tongji Creative Cluster, many enterprises that were originated and incubated in Tongji Creative Cluster have already grown out of the cluster and integrated into other high-tech parks in Shanghai. TJ Innova Engineering & Technology Company (TJI), for example, the first professional auto design and engineering company in China, was founded in Tongji Creative Cluster in 1999. Now its design capability and enterprise scale is ranking first in Asia and third in the world. It first R&D center was set up in Jinqiao Development Zone in 2002 and the second was settled in Nanhui Development Zone in 2005. Many other enterprises that were born in Tongji Creative Cluster have also been scattering in Lujiazui, the Bund, People’s Square and other sub-centers in Shanghai. Tongji Creative Cluster is not only attracting many enterprises in, but also sending some out, which keeps fresh momentum and helps to its self-renewal.

Figure 57: Scores of Factors Influential to Enterprises’ Location Choice in Tongji Creative Cluster

Source: Pan and Lu, 2005
Table 16: Types of Enterprises along Chifeng Road by Relationship with Tongji University

<table>
<thead>
<tr>
<th></th>
<th>university-affiliated enterprises</th>
<th>university-incubated enterprises</th>
<th>spontaneous inflowing enterprises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>20</td>
<td>16</td>
<td>122</td>
</tr>
<tr>
<td>Proportion</td>
<td>13%</td>
<td>10%</td>
<td>77%</td>
</tr>
</tbody>
</table>

7.4 Flexible Driving Forces in the Development of Tongji Creative Cluster
In the development process of Tongji Creative Cluster, there are various driving forces. One usually serves as a motive force, around which the others revolve. Their relations are rarely stable but tend to change at different stages and in different places. It is this flexibility embedded in the development strategy that enables Tongji Creative Cluster to be easily adaptive to the complex social environment and to be competitive in the challenging market.

Different Stages, Different Driving Forces
There are different driving forces at different development stages of Tongji Creative Cluster. At the initial stage, it was driven by the spontaneous spill-over of university spin-off companies which was largely influenced by the institutional reform of the university. When the cluster began to grow, the neighboring community, which was led by Siping Street Office, played an important role for the promotion of Tongji Creative Cluster. The community had strong desire to encourage the agglomeration of creative industries and to promote the development of a creative cluster. Although their initial proposal to develop a creative park in Chifeng Road N.31 did not get any support from Tongji University, their effort to meet the increasing spatial needs of housings and offices was critical for the growing up of Tongji Creative Cluster. With the urban strategy of relying on science and education for economic restructuring, Tongji Creative Cluster got special attention from YPDG and SHMG with financial and institutional support which led to the rapid expansion of the cluster. When the market value of Tongji Creative Cluster was shown up, real estate developers engaged to make large investment on commercial projects, which helped to maintain a superior environment for the cluster. For example, Tongji Yangpu Science and Technology Venture Development Company (TJSTVD) carried out market research on Tongji Creative Cluster and found that the space of office was in serious shortage whereas the entrepreneurial atmosphere was still prevailing and the small startups continued to emerge. It proposed to establish Shanghai International Design Center in Guokang Road and got immediate approval from YPDG. TJSTVD then purchased land use right around Guokang Road with the coordination of the government, and invited several large enterprises such as Shanghai Design Institute of Posts and Telecommunications and Tadao Ando Design Company to settle down. Meanwhile, it invested nine million yuan to improve the environment of Guokang Road. During this process, TJSTVD enjoyed some preferential policies as part of the national science park and transformed from a purely commercial developer to a quasi public institute.

Different Places, Different Driving Forces
The driving forces of Tongji Creative Cluster also differentiate across places, such as the two creative hubs around Chifeng Road and Guokang Road. Chifeng Hub was originated from spontaneous agglomeration of design companies around the university; whereas Guokang Hub
was developed through strategic planning in response to the rapid expansion of creative industries. They were driven by different forces at the initial stage of their development. Although after years both of them have incorporated forces of various kinds, there is still great difference in terms of the power of the forces. It is this difference that leads to further diversity in their development strategy and management modes (Table 17). In Chifeng Hub, government intervention is constrained by the complexity of spatial structure and the diversity of property rights, so its development is proceeding step-by-step with incremental adjustment, predominated by market mechanism and self-regulation. In contrast, Guokang Hub used to be industrial plants of state-owned enterprises whose land use rights are easily expropriated and then reallocated through government intervention, so its development is prone to large-scale reconstruction and subject to the management of government-controlled property companies.

Table 17: Comparison of the Development Modes between Chifeng Hub and Guokang Hub
Source: made by author

<table>
<thead>
<tr>
<th></th>
<th>Chifeng Hub</th>
<th>Guokang Hub</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Urban street, easy availability</td>
<td>Urban island, limited availability</td>
</tr>
<tr>
<td>Origin</td>
<td>Spontaneous agglomeration</td>
<td>Official planning for cluster expansion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Real estate development</td>
</tr>
<tr>
<td>Previous Land Use Structure</td>
<td>Mixed-use, private real estate, high density, high complexity</td>
<td>Industrial plants of state-owned enterprises</td>
</tr>
<tr>
<td>Land Development</td>
<td>Exchange land use right</td>
<td>Expropriate land use right and reallocate</td>
</tr>
<tr>
<td></td>
<td>Incremental, step-by-step</td>
<td>Large-scale reconstruction</td>
</tr>
<tr>
<td>Management</td>
<td>Self-regulation according to market laws</td>
<td>Government-led property company</td>
</tr>
<tr>
<td>Industrial Structure</td>
<td>Private medium and small enterprises</td>
<td>State-owned or university-affiliated large enterprises</td>
</tr>
<tr>
<td></td>
<td>Sufficient auxiliary services</td>
<td>Insufficient auxiliary services</td>
</tr>
<tr>
<td></td>
<td>Interdependent</td>
<td>Self-dependent</td>
</tr>
</tbody>
</table>

7.5 University Engagement in Urban Renewal
Tongji Creative Cluster has proved to be an effective catalyst for local development, particularly for the transformation of Yangpu District from an old industrial base to a knowledge economy center. Geographically, Tongji Creative Cluster has helped to improve the neighboring environment and to optimize the land use structure. Economically, an integral industrial chain has formed in Tongji Creative Cluster, contributing to the local tax and employment positions. Institutionally, successful experiences in Tongji Creative Cluster have been fixed as official strategies to maintain the long-term viability and to set an exemplar for other cases.

Geographical
Yangpu District is an old industrial district. Its industrial land was about 12.8 km2 at the end of 1998, accounting for 21.3% of the total (Li and Chen, 2005). Along with the shift of urban
strategy from Industrial Yangpu to Knowledge Yangpu, it was necessary to relocate industrial land out of the central city and to provide more space for university expansion and creative industries. By expropriating and reallocating land use rights on the occasion of university engagement activities, YPDG managed to coordinate the spatial demand of different actors and to optimize the urban land use structure. For example, the government expropriated the land use right of Shanghai No.1 Bus Company opposite to Siping Campus and reallocated it to Tongji University, so that Tongji University can transfer its land use right in Wuchaun Campus to the neighboring Shanghai University of Finance and Economics (SUFE). In this way, the parking house of Shanghai Bus No.1 Company, occupying 120 mu (80 000m²) of land, was redeveloped as a design center to meet the increasing spatial need of TJ Cluster (Figure 58); and at the same time, SUFE got sufficient space from the neighborhood for campus expansion (Figure 59). In another case, two plots amounting to about 400 000m² of land from Shanghai Bicycle Factory and Shanghai Construction Machinery Factory were reconstructed as student apartments for Fudan University and SUFE. Some other science parks in Tongji Creative Cluster, such as Chifeng Road N.63 and Shanghai International Design Center in Guokang Road, were all developed based on the renovation of industrial plants. A large scale of industrial land was put into efficient use after the government’s expropriation and reallocation.

Figure 58: Renovation of Shanghai No.1 Bus Company into Design Plaza
Source: Zeng and Ding, 2010.

Figure 59: Campuses of Shanghai University of Finance and Economics. Source: SHUFE, 2012
Economical
The development of Tongji Creative Cluster has made great economic contribution to the city. Its output value kept increasing at the rate of over 20% every year, with 7.98 billion yuan in 2007, 10.2 billion yuan in 2008, and 12.3 billion yuan in 2009 (Yuan and Zhao, 2011). During the 11th Five-Year Plan period (from 2006 to 2010), the number of enterprises in Tongji Creative Cluster had increased from 227 to 800, their floor area had almost doubled, the number of employees had increased by more than four times, and the output value increased by more than 5.5 times. The tax from Tongji Creative Cluster at the district level amounted to 208 million yuan in 2006 and increased to 504 million yuan in 2010 (Table 18). Its output value is planned to achieve 30 billion yuan in 2015, with 3000 enterprises and one million m2 floor areas (YPDG, 2011). Driven by Tongji Creative Cluster, modern design industries have been playing a more important role for the economic development of Yangpu District. Their output value increased from 4.92 billion yuan in 2006 to 10.24 billion yuan in 2010 and contributed 434 million yuan to the district tax in 2010 (Table 19). The five state-level science parks17 in Yangpu District were all developed based on university resources. The added-value of knowledge-based services and high-tech industries in Yangpu District achieved 14.878 billion yuan and 2.939 billion yuan respectively in 2011, with the former paying 1.597 billion yuan and the latter 0.235 billion yuan tax to the district government (Table 20; Table 21).

Table 18: Index about the Development of Tongji Creative Cluster in the 11th Five-Year Plan
Source: YPDG, 2011.

<table>
<thead>
<tr>
<th>Index</th>
<th>Beginning of the 11th Five-Year Plan (the year of 2006)</th>
<th>End of the 11th Five-Year Plan (the year of 2010)</th>
<th>Rate of Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Enterprises18</td>
<td>227</td>
<td>800</td>
<td>252.42%</td>
</tr>
<tr>
<td>Number of Employees</td>
<td>6135</td>
<td>31000</td>
<td>405.29%</td>
</tr>
<tr>
<td>Floor Area</td>
<td>288 600 m2</td>
<td>523 000 m2</td>
<td>81.2%</td>
</tr>
<tr>
<td>Output Value</td>
<td>2.3 billion yuan</td>
<td>15 billion yuan</td>
<td>552%</td>
</tr>
<tr>
<td>Tax at the District Level</td>
<td>208 million yuan</td>
<td>504 million yuan</td>
<td>142%</td>
</tr>
</tbody>
</table>

Table 19: Index about the Development of Modern Design Industries in Yangpu District in the 11th Five-Year Plan. Source: YPDSTC, 2011

<table>
<thead>
<tr>
<th>Index</th>
<th>Beginning of the 11th Five-Year Plan (the year of 2006)</th>
<th>End of the 11th Five-Year Plan (the year of 2010)</th>
<th>Rate of Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Enterprises</td>
<td>1428</td>
<td>1670</td>
<td>12%</td>
</tr>
<tr>
<td>Number of Employees</td>
<td>22990</td>
<td>31700</td>
<td>37.88%</td>
</tr>
<tr>
<td>Floor Area</td>
<td>220 000 m2</td>
<td>380 000 m2</td>
<td>72.7%</td>
</tr>
<tr>
<td>Output Value</td>
<td>4.92 billion yuan</td>
<td>10.24 billion yuan</td>
<td>108.13%</td>
</tr>
<tr>
<td>Tax at the District Level</td>
<td>208 million yuan</td>
<td>434 million yuan</td>
<td>109%</td>
</tr>
</tbody>
</table>

17 The five universities with state-level science parks in Yangpu District are Fudan University, Tongji University, University of Shanghai for Science and Technology, Shanghai University of Finance and Economics, Shanghai University of Electric Power.
18 The number includes only those registered in the region, excluding those settled in the region but registered in other areas.
Chapter 7. University as an Economic Actor in Urban Renewal: Tongji Creative Cluster

Table 20: Index about Knowledge-Based Services in Yangpu District, 2011. Source: YPDSB, 2012

<table>
<thead>
<tr>
<th></th>
<th>Modern Design</th>
<th>S&amp;T, Finance</th>
<th>Educational Services</th>
<th>Technical Services</th>
<th>Else</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Added-value (billion yuan)</td>
<td>47.00</td>
<td>52.23</td>
<td>9.00</td>
<td>35.10</td>
<td>5.50</td>
<td>148.78</td>
</tr>
<tr>
<td>Increase over the previous year (%)</td>
<td>22.6</td>
<td>12.7</td>
<td>18.4</td>
<td>22.8</td>
<td>23.6</td>
<td>18.8</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th></th>
<th>Software and Information</th>
<th>Electronics</th>
<th>Energy and Environment</th>
<th>Else</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Added-value (billion yuan)</td>
<td>15.80</td>
<td>7.70</td>
<td>3.90</td>
<td>1.99</td>
<td>29.39</td>
</tr>
<tr>
<td>Increase over the previous year (%)</td>
<td>26.4</td>
<td>22.6</td>
<td>16.1</td>
<td>-12.7</td>
<td>20.4</td>
</tr>
</tbody>
</table>

**Institutional**

At present, there are multi-level interaction among the university, the government, the industry, the community, the developers and other actors involved in Tongji Creative Cluster. At the decision-making level, senior leaders from Tongji University and YPDG constitute a joint committee to discuss the strategic plan and major issues concerning about the cluster development. At the implementation level, representatives from the university, the government, the enterprises and professional scholars participate in the project altogether to guarantee the interest of various actors. At the communication level, there is an agreement of exchange and cooperation: scholars from the university are invited to work in the government, and officials from the government are sent to university for further education. Positive social relations are established through frequent interaction, which contributes to the establishment of various partnerships. Some successful experiences in the development of Tongji Creative Cluster have already been institutionalized and spread to other areas of the city. The strategy of 3-zone interaction mentioned in Chapter 6, for example, was first created in Tongji Creative Cluster on the basis of positive interaction among the university, the community and the enterprise, and was later adopted by the municipal government as an exemplar.

**Conclusion**

Tongji Creative Cluster was originated from the spontaneous spill-over of university spin-off companies. As early as in the 1980s, some teachers and researchers in the university had begun to set up studios and companies inside the university. They were soon spilled out of the campus due to the expansive enrolment and construction. Largely relying on university resources, they were settled down in the neighboring office buildings, storefronts, and residential housings adjacent to the university. Their agglomeration had brought about huge social and economic value and soon attracted the attention of the government. At that time, Yangpu District, where Tongji University locates, was struggling to get rid of the stagnancy and to explore new patterns of economic development. The prospering of Tongji Creative Cluster provided such an opportunity for Yangpu
District to shift from an industrial base to a knowledge hub. Therefore YPDG took a series of actions to promote the development of Tongji Creative Cluster, including the exploration of university town, the adjustment of cluster orientation, financial support to improve the infrastructure, preferential policies and favorable services.

After years of evolution, Tongji Creative Cluster was embedded with some self-reinforcing attributes. High density and complexity in spatial networks have facilitated the frequent interaction among enterprises, which is helpful to develop long-term social relations. High labor division and integral industrial chain in the cluster have reduced transaction costs, especially the initial investment of small startups. Collaboration and sub-contracting between large and small enterprises has strengthened their adaptation to market variety and created opportunity for small entrepreneurship. Adjacency to the university have brought about numerous human resources to the cluster; the integration of the cluster into the management system of municipal or national science parks provides supportive environment for those fast-growing enterprises. The cluster keeps self-renewal in its development process. What’s more, there are different driving forces in different stages and in different places of the cluster.

On the occasion of cluster development, the land use structure in Yangpu District has been optimized by expropriating, reallocating and exchanging land use right, which help to relocate industrial land out of the central city and to provide more space for university expansion and creative industries. The output value of Tongji Creative Cluster kept increasing at a rate of over 20% year by year. Knowledge-based services and high-tech industries has become an important economic momentum in Yangpu District. Positive social relations and various partnerships are established through multi-level interaction in the cluster. Successful experiences, such as 3-zone interaction, have already been institutionalized and spread to other areas of the city.
Chapter 8. Universities as Spatial Actors in Urbanization: Songjiang University Town

Songjiang University Town is located in the southwest of Shanghai, about 30km to the city center, concentrating seven universities and colleges – Shanghai International Studies University, Shanghai Institute of Foreign Trade, Shanghai Institute of Visual Art, Shanghai Lixin University of Commerce, Donghua University, Shanghai University of Engineering Science, and East China University of Political Science and Law. It occupies an area of 7833.2 mu (5.2 km²) and is one of the largest university towns in China. The development of Songjiang University Town is a strategic initiative to meet the challenges of university expansion and to promote the urbanization of Songjiang New City. It was led by Songjiang District Government (SJDG) and coordinated by SHMG. Government-controlled enterprises were established to be responsible for the real estate development around the university town. Other actors such as the banks, the farmers, and various sectors of the government were all involved in this process. Universities have achieved their goal of campus expansion through the development of Songjiang University Town and performed as a means of urbanization.

8.1 Urban Strategies on the Satellite City and University Town Set-up

Songjiang used to be an agricultural county. In February 1998, it was authorized by the State Council to be an urban district and was planned to be ‘a political and economic center of the region, a historical and cultural town, and a relatively independent city in the southwest suburb of Shanghai’ (Wang, 2001). In the urban plan at that time, Songjiang was still oriented as a center at the county level. Its infrastructures and public services which were provided just for the urban district within the 17km² boundaries could not match the requirement of the metropolitan Shanghai. Later in the master plan (1999-2020), Shanghai was aimed to become an international metropolis and China’s economic, trade, financial and shipping center, with a prosperous central city as well as competitive suburb. It was proposed to establish a multi-scale urban system including four levels of cities and towns – central city, new cities, central towns, and townships. The development priority was shifted from the urban to the suburb. As a consequence, SHMG decided to select one new city (Songjiang New City) and nine central towns (Anting, Fengjing, Zhujiajiao, Luodian, Pujiang, Gaoqiao, Fengcheng, Lingang and Chenjiazhen) as the key development nodes which could spread their influences to the surrounding rural areas. It was the so called ‘One City Nine Towns’ strategy (Table 22; Figure 60). The strategy was aimed to accelerate the industrialization and urbanization in the suburb and to facilitate the industrial restructuring and urban transformation in central Shanghai.


<table>
<thead>
<tr>
<th></th>
<th>Songjiang</th>
<th>Anting</th>
<th>Lingang</th>
<th>Fengjing</th>
<th>Zhujiajiao</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Area (km²)</td>
<td>63.5</td>
<td>62</td>
<td>296.6</td>
<td>5.44</td>
<td>9.46</td>
</tr>
<tr>
<td>Population (thousand)</td>
<td>600</td>
<td>160-180</td>
<td>830</td>
<td>27.7</td>
<td>64.5</td>
</tr>
<tr>
<td></td>
<td>Luodian</td>
<td>Pujiang</td>
<td>Gaoqiao</td>
<td>Fengcheng</td>
<td>Chenjiazhen</td>
</tr>
<tr>
<td>Land Area (km²)</td>
<td>6.8</td>
<td>10.3</td>
<td>5.89</td>
<td>16.08</td>
<td>15</td>
</tr>
<tr>
<td>Population (thousand)</td>
<td>30</td>
<td>99.2</td>
<td>85</td>
<td>72</td>
<td>120</td>
</tr>
</tbody>
</table>

Note: The land area of Chenjiazhen includes part of the beach. The land area and population of all the others refers only to those of the urban area.
Chapter 8. Universities as Spatial Actors in Urbanization: Songjiang University Town

Figure 60: Location of One City and Nine Towns
Source: edited by author

Figure 61: Master Plan of Songjiang New City, 2001-2020
Source: SJDG, 2001
Chapter 8. Universities as Spatial Actors in Urbanization: Songjiang University Town

The ‘Great Leap Forward’ of Songjiang New City was the set-up of the university town (Figure 61). Songjiang had never been planned to be a HEI agglomeration according to the ‘One City Nine Towns’ strategy. However, its rapid development brought about considerable needs for human resources. As early as in 1995, government leaders had already been aware of the gap between demand and supply of human resources in Songjiang (Yan, 2007). When Songjiang was selected as a new city in 1999, SJDG decided to introduce one or two universities and began to work hard for this. In 2000, along with the advancement of urban strategy in developing the city through science and education, SHMG started to renovate the campus in the central city, according to which the land of universities in the central city would be exchanged to the suburb in order to expand campus and to improve the infrastructures. It provided a tremendous opportunity for Songjiang to attract the universities.

Songjiang University Town came into being both necessarily and randomly. Some universities in the central city had to relocate to the suburb or build new campuses in the suburb to meet the increasing enrollment. It is necessary by any means. But with regard to where to move, it’s random for any place in the suburb to get the opportunity. There are many factors influencing the campus location – transportation, environment, infrastructures, opinion of the faculties, decision of the university leaders, and most importantly, the land price of the new campus. SJDG would like to allocate 4600 mu (3.07 km²) of land, valuing one billion yuan at that time, for free to four universities in order to attract them to settle down in Songjiang (Wang, 2001). This delighted the universities a lot: they didn’t need to be worried about the substantive money any more. Then SJDG signed contracts with Shanghai Municipal Education Commission (SMEC) in terms of the development of the university town and finished the construction of supporting infrastructures within half a year, which guaranteed the overall startup of university town projects.

Songjiang University Town was planned as an integral whole and was constructed in two phases (Figure 62). The first phase of Songjiang University Town, which includes the campuses of the first four universities, was started in December 2000. It covered 4067.2 mu (2.7km²) of land, on which was planned to accommodate 1189395 m² of floor area (Table 23). In October 2001, the first batch of 5300 students began to move in, which attracted three more universities to join Songjiang University Town. In February 2002, SJDG signed another contract with SMEC and reallocated another 3000 mu (2.0 km²) of land on the north for the development of the second phase of Songjiang University Town. The second phase, which occupied 3766 mu (2.5 km²) of land and was planned to accommodate 1005000 m² of floor area, was soon put into construction (Table 24). The first batch of 8000 students from the latter three universities began to have lessons in Songjiang University Town in September 2003. The construction of the whole university town was concluded in 2005. The number of students in Songjiang University Town amounted to 72000 in September 2007.

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19 The four universities are Shanghai International Studies University, Shanghai Institute of Foreign Trade, Shanghai Institute of Visual Art, and Shanghai Lixin University of Commerce.
20 The three universities are Donghua University, Shanghai University of Engineering Science, and East China University of Political Science and Law.
Table 23: Land Area and Population in the First Phase of Songjiang University Town

<table>
<thead>
<tr>
<th></th>
<th>Population</th>
<th>Land area (mu)</th>
<th>Floor area (m2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharing Space</td>
<td></td>
<td>544.2</td>
<td>65000</td>
</tr>
<tr>
<td>Shanghai International Studies University</td>
<td>10000</td>
<td>867.4</td>
<td>135490</td>
</tr>
<tr>
<td>Shanghai Institute of Foreign Trade</td>
<td>8000</td>
<td>630</td>
<td>103559</td>
</tr>
<tr>
<td>Shanghai Institute of Visual Art</td>
<td>3000</td>
<td>753.5</td>
<td>120000</td>
</tr>
<tr>
<td>Shanghai Lixin University of Commerce</td>
<td>6000</td>
<td>499.9</td>
<td>91246</td>
</tr>
<tr>
<td>Living area</td>
<td></td>
<td>772.2</td>
<td>674100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>27000</td>
<td>4067.2</td>
<td>1189395</td>
</tr>
</tbody>
</table>

Note: 1 mu = 666.667 m2.

Table 24: Land Area and Population in the Second Phase of Songjiang University Town

<table>
<thead>
<tr>
<th></th>
<th>Population</th>
<th>Land area (mu)</th>
<th>Floor area (m2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donghua University</td>
<td>20000</td>
<td>1472</td>
<td>415000</td>
</tr>
<tr>
<td>Shanghai University of Engineering Science</td>
<td>12000</td>
<td>1170</td>
<td>230000</td>
</tr>
<tr>
<td>East China University of Political Science and Law</td>
<td>10000</td>
<td>824</td>
<td>120000</td>
</tr>
<tr>
<td>Living area</td>
<td></td>
<td>300</td>
<td>240000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>42000</td>
<td>3766</td>
<td>1005000</td>
</tr>
</tbody>
</table>

8.2 Governance Coalitions in Songjiang University Town Development Planning Coalition Involving Multi-Level Governments and Experts

When the set-up of Songjiang New City was initially decided, a professional group was gathered by SJDG to prepare the outline of the master plan. Both domestic and international experts were invited for discussion; their proposals were adopted by official leaders of SJDG and then reported
to SHMG and finally approved as official decision. To stipulate the detailed plan for various construction projects, a public tender was held in 2001 and five design studios from UK, France, Italy and China were invited. An international tender about detailed planning on a piece of land with dozens of km² was rare in China at that time, and there were neither related laws nor regulations to follow. The foreign studios were very excited about the tender but at the same time they were also worried about the evaluation process. Considering all these factors, evaluation on the competition schemes was proceeding with strict supervision: planners and designers introduced their works; international planning experts worked as judges and gave suggestions on further revision; counselors from the three countries were invited as witness; officials from SJDG and SHMG censored on the whole process. Optimal ideas of different schemes were collected through public tender, working as the guidance for the future development of Songjiang New City and Songjiang University Town.

**Development Coalition of Governments and State-Owned Enterprises**

The 5.2 km² of land occupied by Songjiang University Town was allocated by SJDG for free. It cost more than one billion yuan to expropriate land use right, to relocate residents, and to compensate the landless peasants. Without any subsidy from higher-level government, SJDG loaned one billion yuan from banks to get land for the university town. A state-owned enterprise, Songjiang University Town Construction and Development Company, was then set up to carry out land development. It was entrusted by SJDG to participate in the primary land market while its transaction in the secondary land market was strictly forbidden although performing as a coordinator. It was also responsible for the implementation of the university town planning, such as the construction of urban infrastructures, the improvement of urban environment, and the provision of public facilities.

Figure 63: Development Coalition of Songjiang University Town. Source: drawn by author

Then SJDG issued a series of favorable policies such as tax reduction to attract social enterprises to invest in the construction of campus. Oriental Pearl Group, a state-owned cultural company, and several other enterprises got the development right. They formed the Construction Headquarter of
Songjiang University Town with the coordination of Shanghai Education Infrastructure Center, a sub-institute of SMEC. Thereafter, Shanghai Education Infrastructure Center, on behalf of the Construction Headquarter of Songjiang University Town, loaned another 1.5 billion yuan from Industrial and Commercial Bank for the construction of the university town. Development enterprises such as Oriental Pearl Group have the ownership of Songjiang University Town. The universities rent the campus for a long tenure, using tuition fees and accommodation charges to pay rent and management costs (Figure 63).

Management Committee including Municipal Government and Universities
Songjiang University Town Management Committee (SJUTMC) is a branch office of SMEC. It is composed by leaders of each university in the university town and officials of related sectors in SMEC. SJUTMC is responsible for coordinating the activities such as resource sharing and socializing logistics among various universities. It is also entrusted by SMEC to conduct and to supervise administrative management in the university town. There were several offices in SJUTMC and they were in charge of student affairs, teaching and research, logistics services respectively. After institutional reform in 2010, offices in SJUTMC were reorganized into departments in charge of investigation, public opinion, administration, and publicity. Besides, there is a student working group under the leadership of SJUTMC. It’s constituted by the student delegates from the seven universities in the university town. They help to exchange ideas among universities and to organize cross-campus activities.

Service Organization Involving Multiple Sectors of District Government
Songjiang University Town Service Office was established by SJDG to provide public service and coordinate the public affairs in the university town. It’s a joint office consisting of officials from various bureaus of SJDG, including Administration of Industry and Commerce, National and Local Tax Bureau, Health and Epidemic Prevention Station, Police of Urban Management and so on. They work together to check regularly the catering, lodging, entertainment and other public services in the university town.

8.3 Fantasy and Reality in Songjiang University Town Planning
Songjiang University Town had put much emphasis on sharing and interaction, which is regarded as the core value of a university town. SJUTMC was established to coordinate the sharing of educational resources and to promote higher efficiency of resource utilization. Teachers were encouraged to give classes across universities through employment contract; students were able to take lessons in other universities with recognizable credits. Public facilities in the university town were encouraged to be shared among all the students and faculties as well as to be open to the neighboring community. Logistics and daily services in the university town were no longer managed by the universities any more; instead, it was operated by professional companies in the society.

The ideal of sharing and interaction was vividly reflected in the spatial planning of Songjiang University Town (Figure 64). An area of 544.2 mu (0.36 km2) extending from the south to the river was planned as the sharing space, which formed the longitudinal axis of the university town. The central library, gym, auditorium, and theater were all planned to be located here. To facilitate
frequent interaction among universities, the students’ living areas were separated from their own campuses and were concentrated in the belt between the river and the main road, which formed the horizontal axis of the university town. The walls between campuses were abolished to facilitate the flows of space and to encourage cross-border activities inside the university town. The spaces with higher sharing potentials, such as the playground, were located in the periphery of the campuses so that it will be much easier to be shared among universities as well as with the society.

Figure 64: Plan of Songjiang University Town, 2012. Source: edited by author

However, Songjiang University Town was not constructed according to the original plan, but was adjusted constantly in the implementation process. The contribution of the sharing space to each university was considered unequal, especially in terms of distance, therefore unsuitable for frequent use. The universities also differentiate a lot in terms of size, type, discipline and so on, which can’t be all satisfied by the same standard. Therefore, the universities had to build their own public facilities to meet their particular needs. For example, Shanghai International Studies University and Shanghai Institute of Foreign Trade all built their own libraries, with 30000 m² and 28000 m² floor area respectively, which have become their campus landmark. The central library in the sharing space was finally cancelled since every university had already had their own. Although the central gym came into being in the end, it is not in efficient use because the universities have also built their own small ones. The sharing space exists just in name.

The integration of students’ living area was not realized as well. Although they are not enclosed by high walls, a 2-meter high fence is used to separate the apartments of each university and there is strict security inspection for visitors. This might takes into consideration the complex social environment in the neighborhoods which are under large scale construction and with frequent flows of people of various backgrounds, but it undoubtedly hampers free interaction among universities and between the university and the society. The ideal of Songjiang University Town in sharing, open and interaction did not come true in the implementation process. There is a great difference between the mental space and physical space in the university town.
In an investigation carried out by Yan (2007), 83.86% of the students took consideration of the advantage of sharing and interaction when they decided to enroll in the universities in Songjiang University Town, and 52.33% of the respondents held the opinion that resources in the university town should be shared among each other. However, 27.99% of the students in Songjiang University Town had never enjoyed the resources of other universities, 48.54% occasionally, and only 23.47% made frequent use (Figure 65). Concerning the role of SJUTMC which is responsible for the coordination and daily management of the university town, although 98.43% of the students and faculties knew about the function of SJUTMC, only 15.65% used to have some contact with it and only 12.11% would turn to it for consultancy and help (Figure 66).

If the opinions were classified according to university, it was found that the attitudes of universities differentiated a lot (Figure 67). Shanghai Lixin University of Commerce, Shanghai Institute of Foreign Trade and Shanghai Institute of Visual Art showed higher recognition towards sharing and interaction in the university town: the supportive ratio was up to 70%. In contrast, there were only 35% people favoring the idea of sharing and interaction in Shanghai International Studies University, Donghua University, and Shanghai University of Engineering Science. In general, the attitudes of different universities towards sharing and interaction were much dependent on their own resources and competitiveness. For those universities with abundant resources and higher competitiveness, such as Shanghai International Studies University, they were not active to open and share with others. Instead, for those universities short of resources, such as Shanghai Lixin University of Commerce, they showed higher enthusiasm to support sharing and interaction.
8.4 Real Estate Booms around Songjiang University Town

The direct influence of Songjiang University Town was the fast capital accumulation in Songjiang New City, which was reflected in the increasing land price. Research showed that the influential area of the university town to real estate development was about 3-5 km around (Lv, 2009). Before the development of Songjiang University Town, Songjiang New City was originally farmland and the land price was about 250000 yuan per mu in 2000. After the set-up of Songjiang University Town in 2003 (Figure 68), land price in the south area to the university town rose to 360000 yuan per mu, the north to 400000 yuan, the west to 380000 yuan, and the commercial area rose to 500000 yuan per mu, doubled to the previous land price (Li, Xiao and Zeng, 2003).

Figure 68: Land Price around Songjiang University Town, 2003
Source: Li, Xiao and Zeng, 2003.
Metro Line 9, which was partly put into use in 2007 and is still being under construction, has shortened the commuting time between Songjiang New City and central Shanghai from two hours to 35 minutes. It attracted more people to live nearby and promoted the housing price. The housing price near to Metro Line 9 (about 6000 yuan/m² in 2006) was much higher than other places in Songjiang New City (about 5000 yuan/m² in 2006). The annual increasing rate of real estate investment in Songjiang District (Table 25) was up to 58% in 2006 (SJDSB, 2007). The soaring land price soon recuperated the value of the land that SJDG had allocated to the university town for free, thus contributing to the capital accumulation in the district.

Table 25: Real Estate Investment in Songjiang District

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Investment (billion yuan)</td>
<td>5.95</td>
<td>7.99</td>
<td>12.63</td>
<td>11.75</td>
<td>10.19</td>
<td>11.44</td>
<td>13.57</td>
<td>15.38</td>
<td>17.02</td>
</tr>
<tr>
<td>Increase over the previous year (%)</td>
<td>56.5</td>
<td>34.3</td>
<td>58.1</td>
<td>-7.0</td>
<td>-13.2</td>
<td>12.2</td>
<td>18.7</td>
<td>13.3</td>
<td>10.7</td>
</tr>
</tbody>
</table>

The rapid development of Songjiang New City, however, had interrupted the regular rhythm of real estate market and resulted in an imbalance between supply and demand. There had been 3.52 km² of land – 5.5% of the total area of Songjiang New City – put into market all of a sudden in one year of 2003 (SJDSB, 2004), contributing to the emergence of a large quantity of commercial housing in 2005. But the housing needs were not strong enough to absorb them all. The anxious real estate development led to oversupply and thus tremendous vacancy of the newly built housing. An investigation on the 21 residential areas in Songjiang New City showed that 16.4% of the newly built housing was left vacant (Tao and Lu, 2005).

Another factor contributing to the imbalance between supply and demand in the real estate market was the ignorance of population structure. The population of Songjiang New City was planned to be 600000 in 2020, but it was only 250000 in 2007, among which 50000 were students and staffs of the university town, 25% were the elderly at 60 years and above and the children at 15 years and below, the rest of which were mainly concentrated in the periphery of the old town (Lu, 2007). Population growth in Songjiang New City was primarily caused by migration, which happened mainly in four ways – labors, students, housing buyers, and invited talents. The number of migrants in each type was 362114, 51175, 39933, 1108 in 2005 (SJDSB, 2005). This kind of population structure had limited impetus for real estate development. However, the developers had ignored these key factors and focused on high-price large-area apartments. The area of most apartments in Songjiang New City was 100-140 m², the prices of which were 700000-1000000 yuan, while the small housing unit with about 90 m² and at the price of 600000 yuan was in short supply (Lu and Xu, 2006). Although the real estate market in Songjiang New City seemed over-developed, it still couldn’t meet the needs of the residents. There was an imbalance between supply and demand in the real estate market.

Table 25: Real Estate Investment in Songjiang District
8.5 University-Triggered Urbanization and Industrialization

At the initial stage of its development, there was little transport connection and it took about two hours by bus from Songjiang to the inner city. Public transportation between the university town and the old town of Songjiang was also scarce. Metro Line 9, a strategic public transport program connecting Songjiang with central Shanghai, had been planned to be finished in 2010. But due to the set-up of the university town, it was decided to be ahead of schedule and finally put into use in 2007. Two transport centers – Metro Station Transport Center and Wenhui Road Transport Center – were established by SJDG around Songjiang University Town to connect it with the metro; some new bus lines were also opened (Figure 69). The improved transport system has expanded the spatial scope of people’s activity and laid down the basis for urbanization in Songjiang.

Figure 69: Public Transport Network of Songjiang New City
Source: SJDCTC, 2007
The establishment of Songjiang University Town has transformed the land use structure in its surrounding areas. The previous agricultural land was gradually reallocated for industrial parks and commercial uses. Public facilities such as the administrative body of Songjiang District, Shanghai First People’s Hospital, and the branch of Shanghai Library were all settled down successively around Songjiang University Town. The 2.5 km long street – Wenhui Road – along the living area in the middle of the university town, concentrates various services such as catering, publishing, telecommunication, bookstores, banks and so on. It has become a famous commercial street in Songjiang New City. Investors in the commercial area on the south of the university town declared that 80% of their investment was based on the consumption needs and preference of the university town (Li, Xiao and Zeng, 2003).

Gradually, the employment structure in Songjiang has been shifted from the dominance of primary sector to the secondary and the tertiary sector. The proportion of working population in the primary sector had decreased from 17.0% in 2000 to 1.3% in 2010 (Table 26). In contrast, those in the secondary sector had increased from 58.4% to 63.3%, and those in the tertiary sector from 24.6% to 35.4% (SJDSB, 2011a). As a consequence, the urbanization rate of Songjiang District had been increased dramatically (Table 27). In 2000, there were only 254500 people (39.7%) living in the urban area and 386700 (60.3%) in the rural. In 2010, those living in the urban area of Songjiang District had increased to 1342900 (84.9%) and those in the rural decreased to 239500 (15.1%). Comparing the population that has hukou registration in Songjiang District, those with urban hukou had increased from 30.6% in 2000 to 81.7% in 2010, while those with rural hukou had decreased from 69.4% to 18.3% (SJDSB, 2011a).

Table 26: Working Population in the Primary, Secondary and Tertiary Sectors in 2000 and 2010
Source: SJDSB, 2011a

<table>
<thead>
<tr>
<th></th>
<th>Primary Sector</th>
<th>Secondary Sector</th>
<th>Tertiary Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>17.0%</td>
<td>58.4%</td>
<td>24.6%</td>
</tr>
<tr>
<td>2010</td>
<td>1.3%</td>
<td>63.3%</td>
<td>35.4%</td>
</tr>
</tbody>
</table>

Table 27: Urbanization Rate of Songjiang District in 2000 and 2010
Source: SJDSB, 2011a

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>number</td>
<td>proportion</td>
</tr>
<tr>
<td>Residents</td>
<td>Urban residents</td>
<td>1 342 900</td>
</tr>
<tr>
<td></td>
<td>Rural residents</td>
<td>239 500</td>
</tr>
<tr>
<td>Hukou registration</td>
<td>Urban hukou</td>
<td>467 000</td>
</tr>
<tr>
<td></td>
<td>Rural hukou</td>
<td>104 800</td>
</tr>
</tbody>
</table>

University towns and science parks often come up together. The abundant human resources in Songjiang University Town have stimulated the prospering of electronic industries. Taiwan Semiconductor Manufacturing Company, the leading company in the field of semiconductor of the world, was the first to develop its high-tech park on the west of Songjiang University Town. Later, the electronics and chip park invested by Acer of Taiwan was attracted to settle down in the northwest of Songjiang New City. The largest enterprises that have settled down in Songjiang
Hi-Tech Park include Changjiang Computer Group Corporation, Shanghai Synchronization Electronics Company and so on. The industrial structure of Songjiang District was shifted from the dependence on light industry, textile, chemical, mechanical, and instrumentation to the predominance of computer, electronics and other high-tech sectors. In 2011, there were 252 high-tech industrial enterprises above designated size\(^2^1\) in Songjiang District. Their annual income amounted to 66.83 billion yuan in total, 8.1% higher than the previous year (Table 28), while the annual income of all the industrial enterprises above designated size in Songjiang District had decreased 3.9% compared with the year of 2010 (SJDSB, 2012a).

Table 28: Annual Income of High-Tech Industrial Enterprises above Designated Size in Songjiang District in 2011
Source: SJDSB, 2012a

<table>
<thead>
<tr>
<th>Number of enterprises</th>
<th>Annual income (billion)</th>
<th>Increase over the previous year (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major equipment</td>
<td>101</td>
<td>20.59</td>
</tr>
<tr>
<td>New material</td>
<td>66</td>
<td>10.90</td>
</tr>
<tr>
<td>Electronics</td>
<td>45</td>
<td>29.00</td>
</tr>
<tr>
<td>Biomedicine</td>
<td>29</td>
<td>2.49</td>
</tr>
<tr>
<td>New energy</td>
<td>8</td>
<td>3.51</td>
</tr>
<tr>
<td>Naval Architecture and Marine Engineering</td>
<td>2</td>
<td>0.18</td>
</tr>
<tr>
<td>New energy vehicles</td>
<td>1</td>
<td>0.17</td>
</tr>
<tr>
<td>Total</td>
<td>252</td>
<td>66.83</td>
</tr>
</tbody>
</table>

**Conclusion**

To set-up university towns in the suburb is a strategic initiative in China to meet the emergent needs of campus expansion and to provide a catalyst for urbanization. On the occasion of developing a new satellite city in Shanghai, SJDG allocated a large piece of land for free to the universities, which served as the determinant for the set-up of Songjiang University Town and for the prospering of Songjiang New City. Various coalitions have been formed in the development process: planning coalition involving multi-level governments and experts was formed to make master plan and detailed plan; development coalitions consisting of governments and state-owned enterprises facilitated transactions in the land market and carried out various construction projects; management committee consisting of leaders in each university and officials in SMEC was responsible for coordinating administrative affairs in the university town; service organization involving multiple sectors of SJDG was set up in the university town to provide particular public services.

The ideal of sharing, open and interaction in the planning of university town, however, was largely frustrated in the implementation process. The sharing space in the middle of the university town was blamed for its unequal distance to each university and its indifference to the characteristics of each university. The concentrated living area for students was separated apart through fences and

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\(^2^1\) Before 2010, the industrial designated size in China refers to over 5 million yuan business income. In 2011 and after, it refers to over 20 million yuan business income.
was constrained from free entrance through strict security check. Few students and faculties had enjoyed the resources of other universities. The role of Songjiang University Town Management Committee was largely ignored, or it was not competent enough.

Despite of the various problems unforeseen, the set-up of Songjiang University Town had indeed promoted the development of Songjiang New City. The most obvious impact was the fast capital accumulation through real estate development. The land price was continuing soaring after the establishment of the university town, which recuperated in a short period the land value that SJDG had allocated to the university town for free. Actually it was a typical strategy of place promotion and capital accumulation in China through land development. The establishment of Songjiang University Town also contributed to the improvement of infrastructures such as metro lines, hospitals, and libraries. Places around Songjiang University Town that used to be occupied by large scale of farmland were transformed into industrial parks and commercial zones. The economic contribution of the primary sector was decreasing while that of the secondary and tertiary sector was increasing. Songjiang University Town not only helped to the spatial restructuring of Songjiang New City, but also contributed to the socio-economic restructuring in Songjiang District.
Chapter 9. Conclusion

The purpose of this research is to explore the changing town-gown relations in the knowledge society from a spatial perspective. By analyzing the conditions, actions/interactions, and consequences of university spatial development at the global, national and local scales, it seeks to understand the dynamics of town-gown interaction in the knowledge society. This chapter provides a conclusive review on the research. First, it evaluates the relevance of universities to cities in terms of urban geography, urban governance, and urban competitiveness. Then it summarizes the answers to the research question: what are the dynamics between university spatial development and urban transformation in the knowledge society? Next, it identifies the tensions and barriers in the interaction between universities and cities. Finally, it proposes spatial strategies for the mutually beneficial town-gown relations.

9.1 The Relevance of Universities to Cities in the Knowledge Society

This research confirms that universities are valuable to cities, especially in the knowledge society. First, universities can optimize urban morphology by changing urban land use structure and improving urban infrastructure. Second, universities are helpful to improve urban governance through interaction with other urban actors. Thirdly, universities contribute to the accumulation of intangible capital in urban competitiveness.

Urban Morphology

Most evidently, universities occupy a large quantity of land and buildings. Their internal changes can lead to differentiation from the urban surroundings. Universities help to create new knowledge-intensive spaces in cities, either by improving facility provision in particular locations or by promoting the whole knowledge districts. Some universities have exerted significant impacts on the city through investment in campus redevelopment or expansion which helps to improve the quality of urban infrastructures and environment (Perry and Wiewel, 2005). The development of special facilities contributes to the localized clustering within the city. In some cases university spatial development is mobilized directly for the development of sub-centers or satellite cities. In other cases, the universities’ attempts to support their own prestigious status have underpinned new mixed-use urban growth centers, such as science parks and development zones.

Size makes a difference at both sides of the university and the city. Pretty large universities may completely dominate their urban environment if the city is smallish: they may be key actors especially if a strong commercial real estate sector to promote physical urban development is not present (Benneworth, Charles and Madanipour, 2010). In larger urban economies such as Shanghai, however, single universities may drown in the metropolis, but they can work together to trigger large scale urban development such as the initiative of university towns and to maintain the urban status as world cities. This suggests a distinction in the types of physical campus development which affects individual urban trajectories.

Urban Governance

Universities challenge urban governance through their action and interaction with various actors. The locating of a university in the city does not always mean benefits; there are also conflicts
between the university and other urban actors. They compete with each other in employing personnel, attracting funds, acquiring public services and land. University expansions have major consequences for local transport and housing infrastructure, creating new tensions and conflicts between universities and urban planners over land availability. Universities may demand specialized infrastructures necessitating investments from the whole city, stimulating debates over who bears the costs and receives the benefits of university developments. University real estate development may easily evoke historic town-gown conflicts or run at odds with the broader and community development agendas. At the same time, cross-border development brings about mismatch between organizational and geographical management of the university. The university may be affiliated to an institution beyond the geographical reach of the city. It challenges the governance capacity of local authorities in embedding the university into local plans. To mitigate the negative impacts and to maximize the positive aspects that the university brings about, the local authorities need to strengthen their governance capability. Having these debates and challenges can facilitate subsequent strategic urban discussions which can improve the quality of urban governance.

**Urban Competitiveness**

Universities contribute to the intangible development of urban competitiveness, directly contributing to place branding while also becoming involved in strategic urban projects that help repositioning the city’s profile to external investors and knowledge workers (Benneworth, Charles and Madanipour, 2010). The universities are a vivid card of the city – they bridge the city to other knowledge centers of the world through their global reaches. They perform as key knowledge infrastructures producing and disseminating knowledge, the valuable means of production in the knowledge society. They cultivate numerous intellectuals, contributing to urban and national development through the promotion of human capital. They provide places and opportunities for frequent interaction among actors, thus generating possibilities for the accumulation of social capital. Moreover, the largely transient population and weak ties among actors help to a tolerant atmosphere in the university, coupled with the abundance of technology and talent, contributing to the growth of creative capital. The spatial practices of the university, ranging from campus expansion to science parks to global reaches, are both induced by and contribute to the proliferation of these resources, thus have largely transformed the urban competitiveness.

**9.2 Dynamics between University Spatial Development and Urban Transformation**

In this research, analysis on the dynamics between university spatial development and urban transformation in the knowledge society is guided by a multi-scale coding matrix (Table 29), which can be interpreted either vertically or horizontally. The organization of the chapters follows the vertical line, i.e. they explore town-gown relations at the global, national and local scales respectively, with each scale guided by the coding paradigm. To provide a cross-dimension understanding, the following will summarize the findings in a horizontal way, i.e. grouping dynamics at various scales according to basic components of the coding paradigm – conditions, actions/interactions, and consequences – which are also corresponding to the sub research questions: What are the social and urban contexts for university spatial development? How is the space of university developed? How is the city transformed due to university spatial development?
Table 29: Dynamics between University Spatial Development and Urban Transformation in the Knowledge Society

Source: made by author

<table>
<thead>
<tr>
<th>What are the dynamics between university spatial development and urban transformation in the knowledge society?</th>
<th>Global</th>
<th>National (China)</th>
<th>Local (Shanghai)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conditions</strong></td>
<td>The rise of the knowledge society; Importance of human capital and institutional milieu in global urban competitiveness; Urban strategy on learning.</td>
<td>The changing state governance with market incentives; Place promotion and large-scale urban development; Necessity of higher education reform to align with economic development.</td>
<td>National priority on Shanghai’s urban development; Knowledge-driven urban transformation: higher education as a lever of economic growth, higher education as a means of social mobility; Massification of higher education.</td>
</tr>
<tr>
<td><strong>Actions/Interactions</strong></td>
<td>Flexible and diversified organizational patterns: virtual university, franchise university, corporate university, mobile university, academic brokers; Global university networks: cross-border mobility, branch campus, international cooperation and alliances, concentration of global universities in global cities.</td>
<td>Restructuring higher education governance into local plans: transfer, joint development; Embedding universities into urban innovation system: research university, university-industry linkages, university-owned enterprises, science parks.</td>
<td>Campus expansion: enlarging existing campus, building satellite campus, university towns; Mix-use campus development; University-community conflicts; University-government-industry partnerships.</td>
</tr>
<tr>
<td><strong>Consequences</strong></td>
<td>Human capital accumulation through mass higher education; Financial gain and foreign market entry through global universities; A network of academic excellence; Restructuring local environment to be consistent with the world.</td>
<td>Town-gown development coalitions; Hybrid organizations; Institutional ambiguity; The instrumentality of the state.</td>
<td>Changing urban land use structure; Localized clustering: sub-centers, specialized districts, development zones; University-triggered inner city renewal and peri-urbanization.</td>
</tr>
</tbody>
</table>

Social and Urban Contexts for University Spatial Development

Cities today are caught up in a globalizing world as a product of technological revolution and capitalism restructuring in which economic, technological, political and cultural features are intertwined (Kellner, 2002). But neither capitalism nor technical innovations are new; both are common, recurrent phenomena throughout the ages. What is brand new is their speed of diffusion...
and their global reach across culture, classes, and geography (Drucker, 1993). This speed and scope is driven by a radical change in the meaning of knowledge: knowledge is fast becoming the basic means of production, sideling natural resources, labor, and capital. The central wealth-creating activities in the global system are shifted from the allocation of capital and labor for productive uses to ‘productivity’ and ‘innovation’ through applications of knowledge. Intangible capital, which includes human resources and institutional quality, has become key factors in determining global urban competitiveness. As a response, cities have to embrace learning as an urban strategy to be successful in the global competition. Learning makes it possible for cities to assimilate the incredible amount of new knowledge that they regularly produce and to make full use of the networked relations that they are indulged in. The capability of the universities to facilitate learning has become an important measure for the transformative power of a learning city.

Cities today are also experiencing a fundamental change in the philosophy of governance and the way public sector is managed. The mode of governance associated with classic ideal type of bureaucracy is in the process of being deconstructed. In its place are emerging forms of governance that bring both state and non-state actors into the policy process. In China, for example, the central state has abandoned direct allocation of production materials, capital, land, and workforce since market-oriented reform in the late 1970s while transferring the power and responsibility to the local level and at the same introducing market mechanisms in the provision of public services. Cities get more power and autonomy in making decisions on local affairs and become strategic arenas of state governance. Promotional measures such as development zones, infrastructure improvement, prestige projects, and land markets, have been adopted by cities to attract foreign and private investment. Therefore we see fast urban development in China during the past decades. As the urban development began to take hold, it was soon discovered that the labor quality and the educational qualification of the workers in China was too inferior to keep up with the fast development of the urban economy. Out of these issues began a process of higher education reform to meet the rising market demand.

As China’s leading metropolis, Shanghai has received much more support from the central state to promote urban development than many other cities. It has been undergoing dramatic socio-economic restructuring since 1990s. The tertiary sector has increased substantially and has overtaken the industrial and construction sectors to become the largest. Producer services such as FIRE (Finance, Insurance and Real Estate) constitute the leading edge of the growth of tertiary sector. Industries with advanced technology increased while traditional light industries decreased. Urban development in Shanghai is in the transition from factor-driven and investment-driven to innovation-driven. Higher education has become a lever of economic growth. To transform into a ‘first-rate’ international metropolis with the best talents, Shanghai municipal government has promulgated a series of policies to allow selective social groups with higher education to work and live in Shanghai. Correspondingly, in the rapidly enlarging occupation sectors and upgrading income levels, there is a trend of progressively improving educational attainment. The relationship between education and income has become stronger with an increasing influence of human capital and entrepreneurial activity on earnings. Unemployment happens mainly to those low-skilled and middle-aged workers with poor education. People with higher education have seen large increases
in productivity and pay. Higher education has become a promoter of social mobility.

**University Spatial Development Patterns**

As important knowledge infrastructure of the learning cities, universities are offering flexible and innovative responses to the rapidly changing economies. A remarkable diversified organization of universities transcending the conceptual, institutional, and geographical boundaries of traditional universities has created new opportunities to meet the growing social demand, such as virtual universities, franchise universities, corporate universities, mobile universities, and academic brokers. The diversified and flexible forms in the organization of university, coupled with the growing demand for international sharing of education and training, have transformed the global geography of urban universities: international education mobility has become more frequent due to the advancement of technology; cross-border campuses are facilitated by national policies with the expectation for an entry into the global market; university cooperation and alliances are established to attain the goal beyond the reach of any single university; global universities are strategically concentrated in global cities to maximize their benefit. The historic alignment between the city and the university is giving way to one based more on global networks.

In the Chinese context, the localization of universities in cities began with the national policy of restructuring higher education governance. To fit universities better into local development, the leadership of some universities originally led by different central ministries in China has been transferred to local governments, while others have been under joint development by the central and the local. The local governments place the universities under the local economic and social development plans and provide the capital investment funds for them; in return, the universities gear to the need of local economic and social development in their curriculum and program design, admission, employment of graduates, and scientific research. At the same time, to align higher education with fast urban development, universities are incorporated into the national innovation system and are encouraged to strengthen the combination of education, scientific research and social application. Selective universities can receive substantial funding from the central government to expand their research capacities and disciplinary scope, with matching funds from local governments. University-industry partnerships are developed through principal-agent relationships, spin-off companies, or collaborative programs. Some enterprises are directly run by universities to facilitate the involvement of universities in S&T activities.

As the universities are increasingly involved in urban development, the way that campus is planned and built is changed accordingly. Campus plan no longer focuses on the self-containedness of the institution and its separateness; a cluster of educational facilities that mix in seamlessly with commercial, retail, and service functions are major principles in the model of campus design or expansion. These university-affiliated mixed-use campus developments are not simply real-estate ventures. They embody a commitment by universities to partake in broader activities, offering companies high-value sites for accessing researchers, specialized facilities and students, and promoting live-work-play environments. Science parks – a geographical concentration of interconnected companies, specialized suppliers, service providers, universities and associated institutions in particular fields that compete but also cooperate – come into being either spontaneously or with official promotion, which has provided a sound environment for
innovation ranging from managing real estate to fundraising, from talent hunting to assuring legal arrangement.

Any spatial development is not an easy matter for universities because it usually involves the changing of urban land use structure, the relocation of residents from university neighborhood to new estates, the conversion of industrial, residential, commercial or other land to university uses, the investment of huge amount of money to get the land, and so on. It's easier to exacerbate historic university-community conflicts due to their differences in terms of perception, values, goals, and available resources (Mayfield and Lucas, 2000). To avoid the difficulty and to reduce the cost of campus expansion in the inner city, some universities would like to develop satellite campuses in the suburb. The new campuses help to create opportunities for the vibrancy of the new nestle. A strategic initiative led by the local government in China to meet various challenges of university expansion is the set-up of university towns. University towns pull resources of those involved institutions together and make up one’s disadvantages with others’ strength. It has effectively solved the problems facing universities in terms of limited space for school buildings, and thus eased the tension between university expansion and rare urban space.

Urban Transformation Due to University Spatial Development

Rather than being necessarily structural followers of urban transformation, universities have often successfully transformed the way of urban development. University expansion has provided more opportunities for higher education and promoted the accumulation of human capital for urban development. Networks among universities generate an entry for cities into the global/regional circuits and are relevant to the trade dimension of international higher education services as well as other related interests. It is also an alternative way for cities to develop academic excellence without heavy investment on and long-term commitments to the creation of large university establishments. The strategic localization of the universities is not only aimed to seek consistency with the local environment, whether market, infrastructure, or culture/society, but also in a way that is consistent with the university’s strategy and operations in other places of the world. Local environment may have to be inventively molded if the university organization and strategy in one city are not to become inconsistent with those in other cities.

To maintain an advanced and superior environment, pro-growth coalitions are formed with the joint effort of the university, the government, the industry, and other related important actors. They are represented by a number of hybrid organizations on the basis of entrepreneurship, such as collaborative programs and joint ventures. The coalition based on entrepreneurship is not permanent and stable; it is focused on the priority of projects. Those projects that can suit the needs of the market, such as science parks, are especially supported. Instead, those of less profit but of public good may be left behind. The strategies of the coalitions are adjusted constantly according to the particular requirements of the projects, inducing institutional ambiguity from time to time. On the part of the Chinese state, these hybrid organizations and ambiguous institutions are deliberate to allow experimentation and prevent social upheaval given that institutional ambiguity can serve a protective function. But it also increases cognitive uncertainty and risks by providing socially irrationalized rules for action, such as a grey land market and triangular debt.
Supported by the development coalitions, universities have emerged as key ingredients in the changing patterns of neighborhood, downtown, and citywide development. University areas are natural catalyst of sub-centers due to the concentration of university population and resources. The knowledge-intensive nature of universities tends to invoke agglomeration of cultural industries and service industries, which lead to the specialization of the district and contribute to the establishment of development zones. The development of mixed-use campuses often catalyzes the deteriorated inner city and contributes to peri-urbanization. The location of an urban university is strategically manipulated between locations, sites and even cities according to the urban strategies. Through its own real estate development efforts such as land clearance and infrastructure building, it’s possible for the university to advance the overall citywide redevelopment and become the lead institution in this process.

9.3 Tensions in the Interaction between Universities and Cities
The dynamic interaction between universities and cities does not mean that their relations are harmonious and cordial. In fact, there are often tensions and conflicts. Some are long-term existence from the beginning while some emerge in the new situation. Considering the levels of the social formation of the space of university, tensions exist in the urban universities’ spatial orientation and practices, the relations and orders established in the process, and the underpinning culturally embedded symbols and values.

Challenges to the Paradigm of Urban University
New situations have brought about new challenges to the so-called ‘urban’ university. On the one side, the universities are leaving their historical rooted cities along with the development of cross-border campuses and suburban sites. On the other side, universities and cities do not always share the same opinion and their perspectives on some key issues are often misaligned. These have questioned the ‘urban’ nature of the universities.

Cross-border development. The development of satellite campuses, especially cross-border campuses, creates reciprocal attraction between the university and the city. The university is looking for an attractive city to locate itself in order to attract more talents. And the city is also looking for competitive universities to promote its competence by virtue of university resources. In a world of global networks, both gown and town need to identify their own space to survive in the mutual selection between the university and the city. Moreover, with the emergence of virtual university, the original reason that brought the town and the gown together – the need for students to be physically close to their teachers – no longer pertains (Brockliss, 2000). In a world of new technology, both the university and the city also need to identify what will be the essential cement maintaining their interconnection in the twenty-first century.

Suburban development. Suburbanization of the universities has happened in many cities along with the process of urbanization and university expansion. It has indeed eased the tension between university expansion and rare urban space and has promoted the fast development of the suburb. However, compared with their urban congeners, suburban universities have limited interaction with the city. They are alienated from the urban community due to long distance, and they are often enclosed by walls due to safety consideration which has definitely isolated them from the
surrounding suburban areas. Suburbanization has downgraded the social attributes of the universities. Moreover, along with the suburban development of universities, educational and cultural resources have flowed out of the city. It has undermined the intangible capital of the city not only due to their solely geographical retreat but also an overall capital loss due to the changing environment. Suburbanization of the universities is a two-edged knife to urban development.

**Misalignment between university plans and urban strategies.** The global visions and ambitions of the universities often run in contradiction with the local agenda. As universities grow in importance as part of the knowledge economy, their power and need for autonomy will grow. However, the growing importance of universities also exerts a greater incentive for the cities to strict their control. Therefore, the reduced public subsidy into higher education is shifted toward particular private interests that are beneficial to the state (Rhoades and Slaughter, 2006); the government is less favorable toward those global research whose outcomes are open to all and for everyone’s free benefit, especially when the resulting innovations are easily captured by exotic companies and the local economy gets zip (Marginson, 2010). Therefore, by controlling the finance and shaping the new knowledge, the local government exerts influence on the global agenda of the university.

On the other side, local authorities may have unrealistic ambitions for what universities can achieve as urban development policies in the knowledge economy are characterized by a huge amount of me-too-ism (Benneworth, Charles and Madanipour, 2010). Many local authorities idealize new university developments as being necessary to trigger fundamental urban transformation, e.g. promoting the city into the global circuits. However, the reality is that many regions worldwide don’t host a Stanford University or MIT. The universities may have local benefits, but do not substantially improve that locality’s global positioning. The establishment of science parks may have substantially improved the economic performance of the industrial sectors rather than promoting a world-leading innovative cluster as centers of the knowledge economy.

**Contradictive relationships among stakeholders**

In the process of university spatial development, there are many interest groups involved – students and academicians, companies and institutions, the neighborhood, government, developers et al. They all have a stake, something to gain or lose as a result of university’s spatial activities. Although the collaboration among stakeholders can be mutual beneficial, there are usually conflicts between them. The relative independence of universities, especially those private institutions, created potential urban criticism for their imperiousness and irresponsibility. University real estate practices, usually driven by internal goals of campus design and academic program needs, easily exacerbate historic town-gown conflicts and often run at odds with the broader urban and community development agendas of the city (Perry and Wiewel, 2005).

It’s found that the conflicts between universities and communities are often not caused by the instrumental results but rather the problematic social relations among partnership members (Prins, 2005). For example, failing to specify partnership purposes, membership, and expectations regarding decision making and authority increases the risk of confusion and disputes. Often, disputes are not about the issue at hand but rather about what it represents, such as the experience of disrespect or the illegitimate exercise of authority. The relationships among stakeholders are
subtle and complicate. They are affected in various ways by actions, decisions, policies, practices or goals both in and beyond the process of university spatial development. The specific interests that different stakeholders have may be partially contrasting. The role of universities to affect local development depends crucially on their ability to balance the multiple relationships established between the place in question and its stakeholders (Russo, van den Berg and Lavanga, 2007).

Confusion about the Role of University

The nature of university. Today the space of university is developed to achieve many goals that used to be predominated by other institutions, such as economic momentum by industrial and commercial sectors; social service by public agencies, global orientation by multinational corporations. A new model, which is strategically planned mixed-use campus design, is emerging and involves seamless coexistence of educational, commercial, retail and service functions. Meanwhile, in a knowledge-based society, every institution is attempting to harness knowledge and intelligence at all points of its organizational and management systems. Learning groups of various sizes are encouraged, formally and informally, ranging from networks of shared interest to corporate universities and science parks and then to learning cities. The distinction of the space of university is challenged, which causes reflection on the nature of the university. Actually, the anxiety is not about the engagement of the university per se; it is the elimination of any clear boundary separating university from other urban institutions (Washburn, 2005).

Effectiveness of university engagement. The engagement of the university in so many areas generates doubt about its effectiveness. Investigations in America found that only few universities make significant profits from technology licensing, many others barely break even – or lose money (Washburn, 2005). Similar results are also found in Chinese universities: about 40% of university enterprises in China were involved in S&T related activities in 2001 and their sales revenue made up a mere 2.3% of all high-tech enterprises nationwide (Xue, 2006). It’s evident that the universities’ commercial interventions are slightly successful. To which extent universities contribute to the socio-economic development of their urban hinterland remains a questionable issue. Therefore the orientation of university spatial development for commercial uses should also be managed carefully.

Mode of innovation. The role of university in the knowledge society is elevated to an equivalent status as government and industry, in contrast to previous institutional configurations in which government and industry have always been major institutions and university occupied a secondary status. This concept is represented in the notion of Triple Helix as a guiding principle in dealing with university-government-industry relations. However, the ideal model of Triple Helix does not apply to all the cities given their divergence in terms of development stages, historical town-gown relations and so on. Even through there is a pursuit of Triple Helix in theory, it is difficult to fulfill in practice. In Shanghai, for example, the municipal government proposed ‘3-zone interaction’ as the guiding principle in university spatial development, but the reality is that the government has always become the leading force no matter in a top-down or bottom-up way. This leads to reflections on the diversity in the modes of innovation, which remains to be discovered. Perhaps, in the Chinese context, it’s better to be defined as a state-led innovation model rather than a Statist Model in the past or Triple Helix in the ideal (Figure 70). There is constant interaction between the
university and the industry, but all are under the control of the government.

Figure 70: Statist Model (left), Triple Helix (middle) and State-Led Model (right)
Source: Etzkowitz, 2003 (left, middle); author drawing (right).

9.4 Spatial Strategies for Mutually Beneficial Town-Gown Relations
The last part of this research tries to give some recommendations on how to better manipulate town-gown relations in the knowledge society. It is oriented towards the general world situation while also pointing out some particularity of the Chinese cases. The spatial strategies are proposed in response to the tensions discussed above, thus penetrating into the three levels of the social formation of the space of university – the spatial practices, social interactive processes and underpinning ideologies.

Aligning University Spatial Development with the Changing Social Environment
Encouraging appropriate university networks. The rise of the knowledge society and the consequent necessity of learning in urban strategy imply that the university can no longer be confined to a set and settled space-time. To effectively support the intellectual requirements of the city, universities have to incorporate flexible methods in the organization of space. Virtual universities, franchise universities, mobile universities and corporate universities are all new variants of the traditional campus-based university. Meanwhile, the university should encourage cross-border mobility and international cooperation, which would be effective supplement to the permanent sources of funding and hierarchical organizational patterns. For those cities lack of investment in higher education, building networks will be an alternative way of enhancing self capacity with less costs. Universities should also build networks with other knowledge producers and users since knowledge production in the global era is no longer proceeding in a hierarchical way but socially interactive.

Incremental planning rather than big bang. When we don’t know the outcome of our actions, we can’t develop grand plans. Rather there should be small and step-by-step changes. Universities occupy a large quantity of land and buildings; the adjustment of these properties by the universities will generate profound consequences for their host cities. Therefore university spatial development should follow a step-by-step evolutionary process and proceed by trial and error,
with frequent mid-course corrections and reversals of policy. For example, in the gradual development of Tongji Creative Cluster, its strategy was able to be readjusted in time to avoid competition with Zhangjiang Hi-tech Park who has got strong national and local support in the same field. Successes or failures in some universities can also work as reference for others. In this sense, the reform experience in China provides a good example for other countries and cities.

**Establishing Long-Term Partnerships among Stakeholders**

Town-gown coalitions can address urban problems better or more cost-efficiently than acting alone. Coalitions can be developed on the basis of hybrid organizations which assume a broad range of forms, of various sizes, both formally and informally, such as cooperative agreements, collaborative projects and joint ventures. There can be temporary town-gown coalitions on the basis of entrepreneurship, which provide practical and specific responses to particular program issues. But more importantly, there should be permanent and stable town-gown coalitions which can avoid speculation and protect public interest in the process of university spatial development.

**Institutionalization.** To maintain the long-term viability of town-gown coalitions, it is necessary not only to make internal institutional changes of either partner, but also to institutionalize it at the national level and local level (LeGates and Robinson, 1998). Efforts at the national level include assuring continued favorable policies for the collaboration, joint action among multi-level government, participation of multiple stakeholders in the resolution of the spatial issues, and part independence of the university in avoid of becoming passive arms of certain group. Institutionalization at the local level involves not only achieving a stable, long-term town-gown coalition or even successful creation of a town-gown decision-making structure based on specific circumstances and characters of either partner, but also developing working relationship with the local counterparts of the upper-level stakeholder groups such as transnational corporations and foundations. Internal institutionalization of the universities and the cities will benefit from inter-university or inter-city organizations which share relevant information, create and disseminate national models, organize training sessions, facilitate personnel decisions both formally and informally, develop standards, and other advance the state of the art in their particular domain.

**Cultural approach.** To effect enduring changes in urban transformation, university spatial development needs to penetrate into the underpinning culturally embedded assumptions and habits. There should be a cultural approach and more balanced policies to overcome the growing disparities among diverse actors in university spatial development. For the university, culture serves a particular unifying function by constituting national culture and producing good citizens (Readings, 1996). The transition from elite university to mass university enables a shift in the university from a high-cultural role to a broader cultural role (Chatterton, 2000), which is helpful to promote a progressive, open and tolerant culture (Florida, 2002). In particular, the work-unit tradition in Chinese universities would be of strategic importance to ease the tension between the university and the community. It is based on a shared public culture rooted in and shaped by the history and identity of the university, and is helpful to facilitate a collective identity, providing a possibility and sustainable way of integrating various stakeholders harmoniously.
Keeping a Systematic Perspective on the Role of University

Building an integral innovation system rather than relying on independent university spatial practices. University by itself does not transform cities, nor is there any guarantee of positive returns to investments in the space or in other properties of universities. Many cities have invested heavily in building up university real estate without reaping significant returns. This is because space yields its greatest value when it is embedded within a positive and appropriate social environment. To maximize the benefit of university spatial development, it’s necessary to link the space of university with the knowledge society, to incorporate university spatial development within a complex system of institutions and practices known as the innovation system. An innovation system is a web made up of the knowledge-producing organizations, the appropriate macroeconomic and regulatory framework, innovative firms and networks of enterprises, adequate communication infrastructures, and other factors such as access to the global knowledge base and certain market conditions that favor innovation (World Bank 1999). Any progress in urban innovation is far beyond the spatial practices of any single institution. Although universities figure prominently in this framework, serving not only as the backbone for high-level skills but also as a network base for information sharing, the effectiveness of its innovative role and any positive outcomes of related spatial practices depends crucially on the promotion of such an innovation system.

Contributing university spatial development to the third mission as well as to the first and second missions. The space of university is often managed to promote the third mission of the university which includes several different activities such as the commercialization of academic knowledge through collaboration with industry, patenting/licensing, creation of spin-off companies, participation in policy-making, involvement in social and cultural life. All these activities are strongly related to and based on the first (education) and second missions (research). The stronger education and research, the better the third mission can be developed. In contrast, the university will lose its essential and valuable asset in serving the society without teaching and research. While universities spatial development supporting the third mission is highlighted in the process of adapting to new challenges, those spatial practices contributing to the first and second mission should also be strengthened instead of ignored, even though they do not yield instant and direct economic benefit.
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