DIGITAL BEIJING:
A CASE STUDY OF CHINA'S DEVELOPING INFORMATION ECONOMY

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ABSTRACT

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Information and Communication Technology (ICT) has profoundly influenced social transformation today, of which economic transformation, including related urban spatial restructuring, has become a key feature. This research aims to examine the policymaking and implementation processes in order to investigate the political initiatives of China's developing information economy. Beijing has been taken as a specific case study to look in depth at the development processes. The research focuses on 'government' and 'enterprise' as the two major agents playing strategic roles in driving China's information economy development.

In the research study, Manuel Castells' two theoretical approaches, namely 'informational economy' and 'space of flows', are adopted as the theoretical framework, because they are most relevant to China's distinctive national situation. For the research work, three questions are addressed. 1). what kind of information economy is being supported in China and why? 2). how and how well is the information economy developed in Beijing? 3). what are the major problems and difficulties challenging this development?' In my fieldwork, documentary analysis and in-depth qualitative interviewing are adopted as the two research methods.

The research found that owing to China's incomplete industrialization, the Chinese government has created a new way to promote China's information economy called 'neo-industrialization' path. This means that through promoting the use and development of ICTs, the processes of informatization and industrialization can be integrated into one process, so that a 'leap-forward' of the national economy will be realized. In the process, the city of Beijing has been experiencing an unprecedented spatial restructuring, through which it is believed that the capital city of China is becoming a more functionalized 'digital city' in the 21st century.

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ABBREVIATIONS

ACI	Airport Council International
ACSI	Advisory Committee for State Informatization
ACZSP	Administrative Committee of Zhongguancun Science Park
ATPC	African Trade Policy Centre
BAST	Beijing Association for Science and Technology
BJCBDAC	Beijing CBD Administrative Committee
BJPOPSS	Beijing Planning Office of Philosophy and Social Science
BJQX	Beijing Qian Xian (Monthly)
BMCDR	Beijing Municipal Commission of Development and Reform
BMACH	Beijing Municipal Administration of Cultural Heritage
BMBID	Beijing Municipal Bureau of Industrial Development
BMCT	Beijing Municipal Commission of Transport
BMCUP	Beijing Municipal Commission of Urban Planning
BMEPB	Beijing Municipal Environmental Protection Bureau
BMG	Beijing Municipal Government
BMOI	Beijing Municipal Office of Informatization
BMPCSC	Beijing Municipal People's Congress Standing Committee
BMSTC	Beijing Municipal Science and Technology Commission
BTMB	Beijing Traffic Management Bureau
BOC	Bank of China
B2B	Business-to-Business
B2C	Business-to-Customer
BSB	Beijing Statistical Bureau
CASS	Chinese Academy Social Sciences
CBD	Central Business District
CCCPC	Central Committee of the Communist Party of China
CCG	Chinese Central Government

CCIC	China Internet Information Centre
CCID	China Center for Information Industry Development
CCP	Chinese Communist Party
CIIA	China Information Industry Association
CLLG	Computer and LSI Leadership Group of the State Council
CRD	Capital Recreation District
CSD	Central Shopping District
CDI	China Development Institute
CEW	China Economic Weekly
CIFGD	China International Forum of Green Development
CNOOC	China National Offshore Oil Corporation
CNNIC	China Internet Network Information Center
DRC	Development Research Center of the State Council of China
EC	European Commission
ECLAC	Economic Commission for Latin America and the Caribbean
EDI	Electronic Data Interchange
ENT	Enterprise
ERCIM	European Research Consortium for Informatics and Mathematics
EVLG	Electronics Vibration Leadership Group of the State Council
EU	European Union
FCC	Federal Communications Commission
FDI	Foreign Direct Investment
GI	Government Institute
GII	Global Information Infrastructure (U.S.)
GDP	Gross Domestic Product
GNP	Gross National Product
HKTDC	Hong Kong Trade Development Council
HQ	Headquarter
IGI	ICON Group International
IG	Internet Governance

IMF	International Monetary Fund
IPR	Intellectual Property Right
ICT	Information and Communication Technology
IIMB	Internet Information Management Bureau
ITIF	Information Technology & Innovation Foundation
IWLG	Informatization Works Leadership Group
JISC	Joint Information Systems Committee
MEP	Ministry of Environmental Protection
MII	Ministry of Information Industry
MIIT	Ministry of Industry and Information Technology
MOST	Ministry of Science and Technology
MNE	Multinational Enterprise
MOC	Ministry of Communication
MOFCOM	Ministry of Commerce
MOLSS	Ministry of Labor and Social Security
MPS	Ministry of Public Security
MSTI	Ministry of Science, Technology and Innovation
NBSC	National Bureau of Statics of China
NDRC	National Development and Reform Commission
NIEC	National Informatization Evaluation Center
NII	National Information Infrastructure (U.S)
NAE	National Academy of Engineering (U.S)
NGO	Non-Government Organization
NPC	National People's Congress
NRC	National Research Council’s NII 2000 Steering Committee (U.S.).
OECD	Organization for Economic Co-operation and Development
OTA	U.S. Congress’s Office of Technology Assessment,
PBC	People's Bank of China
PDO	People’s Daily Online
PIS	Post-Industrial Society

RIS	Research and Information System for Developing Countries
SACH	State Administration of Cultural Heritage
SARFT	The State Administration of Radio Film and Television
SCC	The State Council of China
SCIO	State Council Informatization Office
SCITO	The State Council Informatization Office
SIIA	Software and Information Industry Association
SILG	The State Informatization Leading Group
SME	Small and Medium Enterprises
TWN	Third World Network
UTCS	Urban Traffic Control Systems
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USD	United States dollar
WIPO	World Intellectual Property Organization
WGIG	United Nations' Working Group on Internet Governance
WWI	Worldwatch Institute
WWW	World Wide Web
WTO	World Trade Organization

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Chapter 1

Introduction

> 'This information age has never been a technological matter. It has always been a matter of social transformation, a process of social change in which technology is an element that is inseparable from social, economic, cultural and political trends.'
>
> (Castells with Catteral 2001:3)

Information technology, as one of the most important recent inventions, has made enormous impact on the world economy today. On the one hand, the use of information technologies can help to increase productivity and improve industrial development; while on another hand, the economic space of human activities has been to a large extent reorganized under such impact. The U.S. is undoubtedly one of the first economies in the world developing under the enormous impact of information technologies; and this has precipitated the rise of a new mode of economic development in the country since the second half of the twentieth century (Jorgenson, 2001:2). Don Tapscott (1996:6) names it a 'digital economy', in which he explains that most, if not all, economic activities would be represented in the form of 'digits', such as '0' and '1'; and the effective management of the 'digits' would help to improve the productivity of the economy. In fact, the idea of 'digital economy' has indeed attracted the attention of the U.S. government since the 1990s. In 1998, the Department of Commerce, released a

report called ‘The Emerging Digital Economy’ (Margherio et al., 1998), making the U.S. government the first government that has formally written about the idea of ‘digital economy’ into political agenda. Actually as early as in 1993 and 1994, the U.S. government had already announced two ambitious plans, which are ‘National Information Infrastructure (NII)’ and ‘Global Information Infrastructure (GII)’, in order to improve the application of information technologies for economic development; the U.S. economy has benefitted hugely from the plans since then (NAE, 1995:12).

Apart from the U.S., many other countries and regions have also carried out their own strategies in supporting the application of information technologies for economic stimulation. In 1993 the European Commission (EC) published the 'Delors White Paper' on ‘Growth, Competitiveness and Employment’ (Goetschy, 1999:120); and in 1994 they announced the ‘Europe and the Global Information Society’ or ‘The Bangemann Report’ (Anttiroiko, 2001). These actions have set up a clear guideline for the future development of European countries in the global information age. Japan was also one of the earliest countries in the world to have made the connection between information technologies and economic development. The idea of ‘information industries’ or ‘Joho sangyo ron (On Information Industries)’ was first raised by Tadao Umesao in 1963; it inspired the use of the term ‘information society’ or ‘Joho Shakai (Information Society)’ later; and attracted increasing attention afterwards (Duff, 2000:4; Whittaker, 2003:32). In 1983, the Japanese government raised a ‘Comprehensive Digital Communication Plan’ in order to encourage economic development in Japan (Cui, 1999:171), although

this plan failed to be implemented until the 1990s due to some political reasons (Wang &Zhang, 2003:5-6). In India, the software industry has been developing at a rapid pace over the recent years. As early as in 1986, the Indian government issued a 'Software Development and Training' plan, in order to stimulate India's software industry; and this policy has obviously achieved a great success (Arora and Athreye, 2002:256). In Russia, the government established a specialized committee for stimulating informatisation in 1994, and announced the 'Informatisation of Russia' scheme, in order to improve the use of information technology for constructing an information society of Russia (Castells with Kiselyova, 2000e:127; Yudina, 2000:7).

Although a developing country, China is undoubtedly undergoing an important historical shift now. It is obvious that the increasing application of information technologies has already caused some dramatic changes in the country and this has stimulated a unique orientation in the development of China's own digitalizing 'information economy'. It is this new developmental focus that is believed to have initiated the country's 'leap-forward' towards a brand new economic society (Dan, 2004:2). In 1984, the Chinese government (CCG) drafted an official document named 'The Report on China's Electronic Information Industry Development Strategy'. This report stresses that China should develop its own electronic information industries. In 1993, CCG formally launched the 'Golden Projects', declaring that China's informatization development eventually got on track (Lu, 2002:52-53). However, although the progress of China's informatization is rapid and remarkable over the recent

decades, it seems that there are always some problems or challenges hindering the development. One of the major problems is that China has not completed its industrialization process; therefore the economic efficiency of China's informatization is lower than that of the industrialized countries. In consideration of this special national situation, CCG raised a policy called, 'driving industrialization with informatization', because the policymakers wanted to create a 'neo-industrialization' path for promoting China's information economy development (Lu, 2002: 53; Huai, 2006:123).

As the capital city of China, Beijing has always been leading the way in the new economic practice, and this has enabled the city to head the list of China's Digitization Index, namely the 'National Informatization Quotient (NIQ)', since the period, 1995-1998 (PDO, 2000). In 1998, in order to further promote the development, Beijing Municipal Government (BMG) drafted a 'Capital Informatization Development Planning 1998-2010' (BMCDR, 1998) that is one of the earliest official documents to support the development of 'information economy' on city basis in China. After that, in 1999, the ex-mayor of Beijing Liu Qi, announced an official project called 'Digital Beijing' (BJPOPSS, 1999) that is one of the first official projects to support the development of 'digital city' in the country. Since then the case of 'Digital Beijing' has been copied or referred by many other Chinese cities, such as 'Digital Shanghai' and 'Digital Shenzhen'. During the period of the Eleventh Five-Year Plan (2006-2010), BMG attached even more importance to the technological development of the capital city. In one of the most influential documents during the period, namely 'Beijing

Eleventh Five-Year Period Informatization Development Planning', BMG announced a '3, 2, 1'[1] strategy, in order to further boost the informatization works in the city (BMIO & BMCDR, 2006). In the course of development, enterprises (ENTs) have undoubtedly played an important role in driving the progress; actually they are the key promoters or the pioneering motivators of the new economic practices in the digital era of China.

1.1 About the Project

This is a project that aims to examine the policymaking and implementation processes in order to investigate and evaluate the political initiatives of China's developing information economy. As one of the most developed Chinese cities in digitization, Beijing is taken as a specific case study that helps to look into the depth of the development processes. The thesis mainly focuses on 'government' (including both central and local governments) and 'enterprise' as the two major agents playing strategically important roles in driving the application and development of information and communication technologies (ICTs) in China, in order to promote a Chinese mode of information economy development. I have set two objectives for my research work. Firstly, through the research I want to find out the basic political rationale for the development of China's information economy over the recent decades; and how such rationale has been turned into practice at the local level. Secondly, I would intend to

[1] The '3' stands for the 3 themed development programmes, including 'Xin Xi Hui Min' (information to benefit citizens), 'Xin Xi Qiang Zheng' (information to strengthen governance), 'Xin Xi Xing Ye' (information to promote economy). The '2' stands for 2 basic tasks to improve Beijing's information infrastructure, including further improving the information security assurance system and the information infrastructure. The '1' stands for a special project, namely the 'Digital Olympics', in order to ensure the IT support of the 2008 Beijing Olympics.

investigate and examine the practical problems and difficulties of the development; and how such problems or difficulties can be improved for a better development of China's information economy in the future. In order to achieve the objectives, three key questions are posed to facilitate the research work. The first question is, 'what kind of information economy is being supported in China and why'. For this question, I want to reveal the motives behind China's economic development under the impact of information technologies, or say to find out the reasons why CCG makes policies to support the technological transformation of China's socio-economic development. The second question is, 'how and how well is the information economy developed in Beijing'. Through this question, I want to look at the specific achievements or status quos in the development of Beijing's information economy over recent years; and this will help to examine the effectiveness of policy implementation for development. After that, the third question I am interested in is, 'what are the major problems and difficulties challenging China's information economy' through the case of Beijing. For this question, I want to focus on the major problems and/or the practical difficulties that might have restricted or hindered China's developing information economy, in order to figure out the next step for development. Generally with the research study, I believe that people are expected to have a more systematic and in-depth understanding about China's socio-economic development (through the case of Beijing) over the recent decades, from a socio-technological perspective. This is also believed to be crucially important when many people are now trying to make understanding of China's modern development, including the challenges, in the new global information age.

This project is considered as a study of the political economy of information technology that intends to reveal the technological origins and causes of the ‘wealth of nations’ (Smith, 1880:2) in the twenty first century. Firstly, the work assumes that the mode of information communication, or simply say ‘communication’, of human society has been vastly revolutionized due to the ubiquitous and innovative use of the new ICTs; and this has, to a large extent, influenced or changed the ways people work, live and most importantly think in the world today (Negroponte, 1995:4). Under the new circumstance, the focus of national economies is tending to shift from simply relying on the use of heavy machines to the intensive use of the new information technologies. In other words, at present it is the creative and efficient communication of information or information processing that has become the major indicator of economic growth (Toffler, 1990:10). Nevertheless, it does not mean that industrial production will vanish from people's sight; rather it is still mostly industrial production or the production of industrial goods that carries socio-economic value. Therefore, it is the ICT- generated communication or knowledge, which is embedded in the industrial production process, that formulates the core meanings of economic growth today; and this is described by Castells (1989:17; 2000:99) as ‘informationalism’ or an ‘informational mode’ of development. During the process, ‘government’ and ‘enterprise’ are the two key agents that drive and manipulate the social progress in the new age. Since they hold the power and are driven by huge social interests, both of them are strong enough to quickly get hold of the new technology system and resources, in order to secure or stabilize their hierarchical authority as the rule-makers of society. Therefore, social inequality has, to

certain degree, remained; and those who are supposed to benefit the most from the use of information technologies are still kept in poor or disadvantaged situations (Mosco, 1996:212-213). Now the division of class is between the information 'haves' and 'have nots' (Schiller, 1973:175; Schiller, 1981: 16; Schiller, 1983: 88). Certainly in the new context, 'labour' is still given great importance, as it is always one of the essential factors of national economic growth (Marx, 1976:175); and this is the reason why 'knowledge experts', 'informational workers', and the so-called 'gray-collar workers' are considered to be the 'essential resource' in the new digital economy era (Cortada, 1998:3; Webster, 2002:112; Drucker, 2007:116; Qiu, Castells & Cartier, 2009:105).

In order to achieve the goal of the research work, 'policy analysis' is taken as the entry point for my discussion. It is believed that only through understanding the policies and the relevant policymaking and implementation processes, are we able to indicate the implied ways in which the two major socio-economic agents, namely 'government' and 'enterprise', purposefully act upon, or respond to, the specific agendas in support of socio-economic development (Dunn, 2007:4; Knoepfel, Larrue & Varone, 2007:23). However, what has to be clarified here is the difference between 'policy analysis' and 'policy study', since although the meanings of the two conceptions are related, their methods of collecting information could be radically different from each other. For 'policy analysis', it 'involves the systematic identification of the causes and consequences of public policy' (Dye, 1976:3), by which the ideas or thoughts are generated through the analysis of a set of interpretive information or knowledge (Nagel

& Neef, 1979:17). ‘Policy studies’, however, according to Mosco (1996:253), are more likely drawn from ‘pluralist political science and neo-classical economics research to analyze and evaluate alternative courses of action’, such as the approach of ‘public choice theory’, which deals with ‘explicit attempt[s] to apply the tools of orthodox economic research to political science with the aim of creating a policy science’. To explain it, ‘public choice aims to constitute a science whose coordinates are the market, individual choice, and private self-interest’, more than focusing on the huge potential influence of the key agents on social progress (Udehn, 1996:447). The main focus of this research project is to understand and interpret how the key agents, including both ‘government’ and ‘enterprise’, are making decisions in support of socio-economic progress; ‘policy analysis’ is therefore a rather helpful measure to reach that goal. In practical terms, in this study, it assumes that, although the ‘market’ has become increasingly important since the late 1970s or early 1980s[2], largely the success of China’s economic growth is still considered to be the result of a set of polices developed by CCG with the cooperation of ENTs. Actually China’s economic boom is usually seen by the officials as the result of Deng Xiaoping’s policy of ‘socialist market economy with Chinese characteristics’ (Deng, 1993:416; Kluver, 1996:110; Hughes, 2002:235). It presumes that CCG would want to construct ‘a form of state-manipulated market economy that delivered spectacular economic growth’ under China's ‘complicated and changeable social situation at the current stage of development’ (Harvey, 2005:120; Cao, 2000:14). Therefore, the analysis of the government policies

[2] This is because during this period, the economic reform and open door policy were eventually carried into practice.

and the relevant policymaking and implementation processes becomes significantly important if anyone wants to understand the substance of China's rapid economic growth, in particular today when information technologies have been massively equipped and geared up with its already booming industrial development.

1.2 Theoretical Framework

Due to the continuously increasing impact of the information technology revolution, socio-economic development of the global society has been making greater progress than ever before. However, it seems that the debate on the relationship between information technologies and socio-economy has never stopped. One of the focuses of the debate is that whether it is the use of information technologies that drive socio-economic development or it is the socio-economic development that chooses to use the technologies. In other words, some people think that we human beings are now entering a brand new society, where socio-economic activities are increasingly centered on 'weightless' information or knowledge rather than the 'heavy' machines of before. Accordingly this analysis suggests that we are going to live in a 'post-industrial society' (PIS) or an 'information society' from now on (Bell, 1973; Bell, 1980; Coyle, 1997; Kelly, 1998; Quah, 1999; Leadbeater, 2000). However, over the recent decades, there are an increasing number of social observers that criticise the view above; they think that the use of information technologies can only change the 'form' rather than the 'substance' of human society (May, 2002:3). To explain it, they insist that the

development of our economic society should be a continuous process; and it is the social progress, rather than the information technology itself, that drives socio-economic development (Sardar, 1999). According to Webster (2002:10), the only reason for which the information technology is applied is that it contains certain social 'techniques' that are necessary to be used for social development. Actually the essence of the debate between these two opposing views can be summarized as a controversy between the 'exogenous' and 'endogenous' features of technology (Kofman & Youngs, 2003:269). The former view argues that information technology should be seen as an external and powerful tool that can be used to change society, depending on whether it is made use of or not; while the other view would rather insist that technology is only a part of society that is inseparable from social development as a whole. As Castells (2000:5) has indicated, 'technology is society'; therefore, technological progress and social development should be simultaneously interdependent on each other. On the one hand, information technologies have profoundly impacted the ways of social transformation; while on the other hand, the adoption and applications of information technologies are resulted and driven by the relevant progressing social requirements.

In fact, the idea of an 'informational economy' (Castells, 1989:7) can be seen as a very typical form of expression of the argument above. Apart from that it is seen as a new mode of production of goods or services 'dependent upon digital technologies' (Kling and Lamb, 2002:297), 'informational economy is usually considered as 'a social production' that is 'a product' of our own making (Orlikowski and Iacono, 2002:357).

According to Carnoy et al. (1993), an 'informational economy' can be understood as an objective and ongoing process to achieve a dramatic change in the socio-economic development of human society, through which the strategic use of the ICTs is rather important, as it relates to whether the new mode of development can be meaningfully and efficiently made to meet the particular needs of economic progress in a certain social context. Therefore, although the 'informational economy' can be seen as a 'new economy' due to its radical change in the mode of development, it does not necessarily have to be considered or understood as a 'different economy', because its outcomes are rather embedded in the basis of the previous development (Toffler, 1971; Toffler, 1981). For instance, manufacturing-based material production is still an essential part of the world economy today; but information processing or knowledge generating through the creative use of ICTs has become the major element in the value generating process of the economy (UNIDO, 2009:89). In addition, while the information technologies are having a great impact on the informational transformation of socio-economy, the structure of the economic space is reorganized too. In other words, since having been facilitated by the new information technologies, the structure of the previous economic activities don't have to be merely based on the 'vertical' form of organization that is typical in an industrial economy; rather it can be to some extent 'horizontalized' or spatially 'decentralized', in order to achieve a broader and deeper range of economic performance (Mosco, 1996:190; also see Burt, 1992)[3]. In the new spatial form, the

[3] For instance, in the past, when a company tried to manage the space of its business activities, it was always likely restricted by the physical places; therefore head office, market office, HR office, R&D office had to be all located in one place. But today with the support of ICTs, these offices can be now dispersed anywhere around the globe, as long as these different sectors can be well connected via the means of Internet and/or other telecommunication devices.

‘flows of information’ become the determining element that dominates the organization of economic activities; and the ‘space of flows’ then becomes the new structural formation of the spatial organization (Castells, 1989:168-169). Accordingly, in practice, during the course of spatial transformation, the functionalities or the functional features of a city have now become unprecedentedly highlighted in comparison with its past. This is the reason why we can see the rise of some real-time ‘financial centers’ like the City of London, and the emergence of ‘technopoles’ such as Silicon Valley, in the world today (Castells and Hall,1994:8; Castells, 2000:410 ; also see Clarke, 2008).

1.3 Research Methodology

Methodology is usually seen as one of the most important parts of a research work, as it embodies the rationale by which the research work is conducted. However, how to properly propose the methodology for a research work could be a very difficult question to answer in social science studies, because simply there is no single fixed rule to follow (Baugh, 1990:1). Therefore what I think could be one of the best ways to determine the methodology for a research work is to start from the research questions; it is these questions which should suggest the whole direction of the research work. As mentioned earlier, there are three key questions of my research. The first question is ‘what kind of information economy is being supported in China and why’. The second question is ‘how and how well is the information economy developed in Beijing’. The third question is ‘what are the major problems and difficulties challenging this

development'. In terms of the nature of my research questions, I have decided to take an interpretivist approach towards carrying out my research work, because what I would expect from the work should be some in-depth information or analysis that can be taken to explain or interpret the whole progress of China's developing information economy.

Another reason why I would prefer to take an interpretivisit approach for conducting the research work is that I believe that the use of ICTs in the world today is increasingly dependent on the interpretive meanings more than the positive numbers of the technologies. There the focus of my research work is more likely to be based on the questions 'why', 'how' and 'how well' the new ICTs have been used to support the socio-economic development rather than simply asking 'if' or 'how many' technology devices are used in the development. In fact, from a great variety of statistical reports today, we've already had enough information about the amount of ICTs being used in the social development; but what we are still not clear on yet are how and how well these technologies have been used and how we can take further efforts to improve the uses of such technologies in order to further promote the socio-economic development in the global information age. While interpretivism has been taken as the main approach of my research work, it does not mean that I will abandon the positivist measures in my research. In order to improve the accuracy of my research analysis, I will also use some empirical evidences including both statistical data and graphical figures to support my discussion; I believe that doing this will to some degree help to improve the validity and viability of the work so as to improve the overall quality of my research findings.

In practice, in order to answer the three key research questions in an interpretivist approach, I have carried out my fieldwork at three different layers, which are respectively the national layer, the local layer, and the enterprise layer. To be specific, for the first question, 'what and why is the information economy supported in China?' I want to seek answers from the relevant departments of CCG, because it is these official sectors that have made the key policies in support of China's information economy development; and therefore they should be the right places to go for asking about the specific details and the rationale of the development. For the second question, 'how and how well is the information economy developed in Beijing?' I want to look for answers from the relevant bureaus or offices of BMG. Since they are the implementers of China's economic policies, BMG should be more eligible than anyone else to tell how and how well the policies have been implemented in Beijing as a specific case study of China's information economy development. As for my third question, 'what are the problems and difficulties have been challenging the development?' I would like to see the responses of the related ENTs to both the making and implementation of the relevant policies, because it is ENTs that are the practical promoters of the development; after all they are the business owners. In that sense, ENTs can point out the problems or difficulties in the development from a more realistic perspective.

For collecting the data, I have made use of a combination of two qualitative methods in the fieldwork, which are respectively 'documentary analysis' and 'in-depth qualitative interviewing'. Specifically in this study, through 'documentary analysis', the concrete

policy information relating to the research questions can be analyzed and achieved; while on another hand, through ‘in-depth qualitative interviewing’, some more in-depth information or details relating to the questions will be collected so that the research results can be cross-examined or double-checked (Denzin, 1970b:3). Arguably such a methodological combination of research methods can be understood as a strategy of ‘triangulation’, by which it means that more than one method is used in the process of data collection in order to cross-check and improve the accuracy or the ‘confidence‘ of the research results (Denzin, 1970a:472). In fact, there was another method I had also considered making use of for my data collection, which was ‘focus groups’ interviewing. But because of the practical limitations to my capability, I had to give up this plan eventually. Actually I may still want to organize a few ‘focus groups’ interviews as a follow-up part of my research study in the future, since I think this could be a really good way to keep on improving my research findings. To explain it, if possible, I would want to invite some of the interviewees to sit together and exchange ideas on the basis of the research questions or the results, so that more critical findings and more meaningful implications will be generated to support my follow-up research analysis.

1.4 Structural Overview

My thesis report is structured into eight chapters. Chapter one is the introduction to the research project. Chapter two and three are the theoretical chapters that deal with the literature review. Then chapter four and five are respectively the methodology and the

background of my research study. After that, chapter six and seven are the main findings and implications of my work. At last chapter eight contains the final discussion and the conclusions of my project. In more detail, in the introduction part, chapter 1, I will have a general discussion about my thesis in four sections. Firstly there is a brief presentation about a few key things of my research project, including the goal of my research, the research objectives and the research questions, and the nature of my work as a study of political economy. Then there is a discussion of my theoretical framework that briefly explains the idea of 'information economy'. After that, there is a general discussion of my research methodology for clarifying the rationale of how I conduct my research and collect data. The final part is a short summary of each of the chapters, so that the overall structure of the thesis report can be explicitly introduced and explained.

Following the introduction chapter, 2 & 3 are the theoretical chapters. Specifically in chapter 2, I will have a systematic and critical analysis of the relationship between the information technology and socio-economic development, because this is the essential meaning of the idea of 'information economy'. The discussion will be divided into four sections. In the first section, I would have a critical debate on the modern transformation of the socio-economy under the impact of the information technology revolution, and rethink Daniel Bell's idea on the 'post-industrial economy'. In the second section, I would have a discussion about Manuel Castells' 'informational economy', and explain the reasons why the idea is critically important to the world economy today. After that, I will discuss the rise of the 'information industry', because

it is seen not only as a new economic area but also as a strategically important area that supports the sustainable development of the 'informational economy'. In the last section, the focus will be on the challenges and the opportunities for the informational economic development, as they relate to the future development of the 'information economy'.

In chapter 3, I will switch the focus of my discussion from the substantial transformation of socio-economy to its spatial restructuring. Since that the 'time-space compression' that is caused by the new information technologies has led to a spatial reorganization of socio-economic activities (Harvey, 1996:247; Mosco, 1996:173), without analyzing the socio-spatial restructuring, the discussion of 'information economy' would be defective. There are also four sections structured in this chapter. Firstly I will provide a general discussion of the profound impact of information technologies on socio-spatial restructuring. Then I will talk about the formation elements of the new socio-space, including advanced economic centers, high technology poles, functional cities, and metropolitan regions. After that, I will discuss the material construction of the new socio-space namely the idea of a 'digital city', because they are the visible elements of the new socio-spatial development. At last, the discussion will be focused on 'internet governance', as this is one of the most contentious areas when people think about the rise of the new 'digital space'.

Chapter 4 is the methodology chapter of my thesis report; and I will base my discussion on the parts of 'research strategy', 'documentary analysis', 'in-depth qualitative

interviewing', and 'integrative analysis' respectively. Although the discussion is divided into four parts, each part is closely related to one another. For 'research strategy', I would have an overview of my research methodology, including the key questions, the main research approach, the data collection methods, and the timeline and procedures of my fieldwork. After that I will take a closer look at the two key data collection methods, namely 'documentary analysis' and 'in-depth qualitative interviewing'. Through the section of 'documentary analysis' I want to discuss the way I collect and analyze the policy information relating to the research questions. Then through 'in-depth qualitative interviewing', I will discuss how I conduct the relevant qualitative interviews, in order to seek in-depth answers for the research questions. In the last section, I will discuss the 'integrative analysis', through which I match up the different data, in order to help generating the 'coherent meanings' of my research findings on a more critical basis.

In the next chapter, chapter 5, I would like to have a brief discussion about the current situation of China's developing information economy. Actually most of contents in this chapter are based on a 'desk research' I have conducted prior to my main fieldwork, for which I have used both primary and secondary data in the discussion. My main purpose for doing this is to draw a background picture of China's relevant development over the last two decades and to provide a contextual framework that will help people better understand my main research findings in the following two chapters. In fact, in order to have the background study more focused and easier to follow, I would like to only involve those key contents closely relating to my research findings. In more specifics, I

would discuss China’s digitization development in four sections. The first two sections, namely ‘China's economic informatization’ and ‘China’s information industry’, are responding to the first part (chapter 6) of my research findings; while the latter two sections, namely ‘China's digital infrastructure’ and ‘China's information control’, are reflecting to the second part (chapter 7) of my research findings.

Chapters 6 & 7 are the main research findings chapters of my thesis report. Chapter 6 reflects the theoretical discussion in chapter 2. In this chapter, I will look at the policymaking and implementation processes in support of the informational transformation of China’s industrial economy, in order to find out how ICTs have been strategically made use of to promote the development of China’s information economy. In detail, I will carry out my discussion in four sections, namely ‘readjusting China's development strategy’, ‘driving industrialization with informatization’, ‘promoting informatization with industrialization’ and ‘overcoming the challenges, seizing the opportunities’. This chapter argues that, in the global information age, CCG has been actively promoting a new mode of development in China, namely the ‘neo-industrialization’, by which they hope that the process of China’s informatization can be strategically integrated into that of industrialization through the ubiquitous and creative applications of information technologies in industrial production, so that a ‘leap-forward’ of China’s national economy can be achieved as a great goal.

After that, Chapter 7 reflects the theoretical discussion in chapter 3. In this chapter, I will focus on the 'time-space' aspect of China's developing information economy. Through analyzing the specific case of Beijing, this chapter aims to reveal how CCG has been actively engaged to promote China's spatial transformation from a 'space of places' to a 'space of flows'. As the capital city of China in the new age, Beijing's city functions have been redefined with new meanings, namely 'national capital', 'world metropolis', 'renowned cultural city', and 'livable city'; and this has profoundly influenced the process of spatial restructuring of the city of Beijing. As a consequence, we can see the concrete development of a 'Digital Beijing', which includes both the 'functional transformation' and 'material construction' of the city. In the last section of the chapter, China's network regulation will be taken into discussion in a general way, as this relates to the economic scope that Beijing's digital space can reach. Generally it is believed that, coming up with the new city functions, Beijing will play a more active role in leading China's economic development in the global information age.

At last, in chapter 8, I will give a final analysis and draw conclusions for my project. Firstly I will give a final review of a few key things about my research work, including my research objectives, my research questions, how the research questions have been answered, and the three key answers to the research questions (in bullet points). Then I will have a conclusive analysis of the eight key findings (in two separate parts). In the first part, namely 'China's neo-industrialization', I will provide a final discussion of the four key points of my research findings within the area, with which each of the points is

seen as a good reflection of each section of my research findings in chapter 6. After that, in the second part, namely ‘Beijing’s neo-urbanization’, I will present another four key points corresponding to the research findings in chapter 7. In the last section of this chapter, I will offer an evaluation on the significant contributions of my project as the results of knowledge building, in order to indicate the value of my research study.

Chapter 2

The Rise of Information Economy

With the fast increasing influence of the information technology revolution in the world today, many people would believe that human beings are entering a brand new society, in which information is becoming the dominant feature of socio-economic development. Accordingly they call it an 'information society' (Beniger, 1986:22) or an 'information age' (Naisbitt, 1984:28). It is assumed that, being different from the industrial society, 'the basis of social and economic stratification would no longer be a property relation turning on ownership of the means of production, but rather control over systemic information and knowledge: a new class of technocrats, managers, professional engineers and scientists would replace the owners of factories and mines at the top of the social and political hierarchy, and those executing the more menial tasks of service delivery would replace the industrial proletariat at the its bottom' (Barney, 2004:6). According to Bell (1973:127), we are going to have an information or 'post-industrial' economy; and from then on, 'what counts is not raw muscle power or energy, but information'. Negroponte (1995:11) thinks that the new economy should be considered as a 'digital' or digitized economy, by which he believes that the mode of economic growth will be shifting from the processing of 'atoms' to the processing of 'bits' due to the significant use and development of information technologies (also see Tapscott, 1996, 1998; Margherio et al, 1998; Brynjolfsson and Kahin, 2002).

In this chapter, I will give an in-depth analysis of the relationship between the information technologies and socio-economic development, because this is the essential meaning of the concept of an 'information economy'. Basically the discussion will be divided into four sections. In the first section, I will look critically at the modern transformation of the socio-economy under the impact of the information technology revolution, and rethink Daniel Bell's 'post-industrial economy'. In the second section, I will have a discussion about Manuel Castells' 'informational economy', and explain the reasons why the idea is critically important to the world economy today. In the third section, I will discuss the rise of the 'information industry', because this is not only seen as a new economic area but also as a strategically important area supporting the development of an informational economy. Finally I will finish with a discussion focusing on the challenges and the opportunities for development, as they closely relate to the sustainability of the information economy in the world today.

2.1 ICTs and Socio-Economic Transformation

With the increasing and widespread use of information technologies, people are now living in a period in which the form and practice of our lives is transforming or changing in many aspects, of which changes in the socio-economic transformation could be seen as the most obvious. Accordingly, some social observers indicate that due to the revolutionary features of ICTs, there will be an economy emerging that is brand new in the history of social development, which is very much like the industrial

revolutions that happened in the 18th and 19th centuries in the Europe; today we are having an 'information revolution' and 'the major arenas of economic activity are the information goods and service producers, and the public and private bureaucracies' (Porat, 1978:32, also see Machlup, 1962). As Alvin Toffler (1981:177) claims, we are witnessing the third social revolution, if taking account of the agricultural revolution and industrial revolution. 'The computer…can be asked by us to "think the unthinkable" and the previously unthought. It makes possible a flood of new theories, ideas, ideologies, artistic insights, technical advances, economic and political innovations that were…unthinkable and unimaginable before now. In this way it accelerates historical change and fuels the thrust toward Third Wave social diversity'. In the new social paradigm, 'information' or 'knowledge' is expected to be processed instead of 'physical materials', which is essential in the 'industrial society', and taking the central position in social development. 'Computer technology is to the information age what mechanization was to the industrial revolution' (Naisbitt, 1984:28). In their opinion, this is therefore a 'post-industrial economy' or 'information economy' (Bell, 1973:1; Leiss, 1990:132; also see Gates, 1995; Dertouzos, 1997). However, as Webster (2002:23) has asked, 'what is information [for]?', or in another way, what can information really bring to us (Roszak, 1986)? What are the relationship at all between information technologies and socio-economic development (Castells, 2001)? To be clear, these questions are very important, because it relates to the spiritual meaning of the 'information economy', and any other concepts help to understand the meaning of an 'information society'.

2.1.1 Information Technology Revolution

Prior to the discussion about the idea of an 'information economy', it is necessary to have a brief talk about the Information Technology Revolution, because it is the original point of the whole social transformation. According to Castells (2000:39), 'although the scientific and industrial predecessors of electronics-based information technologies can be found decades before the 1940s …, it was during the Second World War, and in its aftermath, that major technological breakthroughs in electronics took place: the first programmable computer, and the transistor, source of micro-electronics, the true core of the information technology revolution in the twentieth century' (also see Forester, 1980, 1985; Braun and Macdonald, 1982; Ceruzzi, 1998; Naughton, 1999; Berners-Lee, 1999; Deans, 2009). According to Kumar (1995:8), the information revolution 'had been gestating for more than a century. Its earlier expressions were the electric telegraph, the telephone, the gramophone, film, radio and television. But it was the computer that marked its culmination'. After 'entering the new millennium', the ubiquitous and manifold uses of the Internet has further advanced the trend 'from technology to people' and create the 'new experiments with the self and identity' (Kumar, 2005:8; also see Hakken, 2003). As Castells (2000:30-31) argues, unlike the previous 'revolutions', 'the core of the transformation we are experiencing in the current revolution refers to technologies of information processing and communication … [Therefore] What characterizes the current technological revolution is not the centrality of knowledge and information, but the application of such knowledge and information to knowledge

generation and information processing/communication devices, in a cumulative feedback loop between innovation and the uses of innovation'; 'There is therefore a close relationship between the social processes of creating and manipulating symbols'; and 'for the first time in history, the human mind is a direct productive force, not just a decisive element of the production system'.

Generally it is believed that there are at least three stages of information technology revolution to date, which are respectively that since the invention of microchips and computers (Capron and Perron, 1992), since the invention of the Internet and World Wide Web (WWW) (Abbate, 1999; Berners-Lee, 1999), and since the evolvement of web 2.0 technologies and social media (Vickery and Wunsch-Vincent, 2007). In the first stage, according to Cortada (2002:62-64) 'during and after the World War II', Johnny von Neumann, an immigrant working in the United States, 'advised the U.S. Army and other American government agencies about the use of computers and other calculating devices'. With his involvement, 'the first functioning digital computer' called ENIAC was 'built in the United States, which become operational in 1946'. Over a few decades of development, 'in the second half of the 1970s, a new class of machines appeared that in time we called personal computers'; and it was from then on that the use of computers was getting increasingly popularized in various fields of American society and of the rest of the world. For the second stage, in 1969, ARPANET, 'the first multi-site computer network' (Lambert, et al., 2005:94) was established 'by the U.S. government for its own communications with the academic and defense establishment

within the United States' (Cortada, 2002:99); and that has become the original form the modern Internet we have today. More importantly, 'In 1989, Tim Berners-Lee invented a global hypertext program that allowed people to communicate, collaborate, and share information using the Internet' (Lambert, et al., 2005:1); and with further development, the WWW was eventually created and completed and became increasingly popularized over the 1990s (Berners-Lee, 1999). After that point, arguably, some people believe that since the second half of the 2000s, the Internet or the WWW has been further developed due to the creation of some new web 2.0 technologies, such as RSS and video streaming, and that is supposed by some people as the third stage of information technology revolution, at which interactivity of communication over the Internet becomes largely improved (Micek & Whitlock, 2008; Loewenstein, 2008; Burgess et al., 2009).

2.1.2 The Idea of an Information Economy

Due to the increasing impact of the information technology revolution, there has been a new economy emerging in the last quarter of the twentieth century. According to Tapscott (1996:6-7), 'in the new economy, information in all its forms becomes digital - reduced to bits stored in computers and racing at the speed of light across network … the new economy is also a knowledge economy based on the application of human know-how to everything we produce and how we produce it. In the new economy, more and more of the economy's added value will be created by brain rather than brawn.' Negroponte (1995:11) uses a metaphor to describe the new economy, by featuring its

‘shifting from processing atoms to processing bits’. To explain it, from their point of view, the economic activities are becoming all based on digital information rather than raw materials; and information technologies will eventually replace heavy machines, playing the central role in driving the economic growth in the future (Jonscher, 1999). In addition to this, as Toffler (1981:178) argues that, ‘The computer…can be asked by us to “think the unthinkable” and the previously unthought. It makes possible a flood of new theories, ideas, ideologies, artistic insights, technical advances, economic and political innovations that were, in the most literal sense, unthinkable and unimaginable before now. In this way it accelerates historical change and fuels the thrust toward Third Wave social diversity.’ Bell (1973:2) describes it as an ‘post-industrial economy’, by which he believes that, information or knowledge will replace the physical products, becoming the key indicator of economic growth; therefore, human being are entering a brand-new age that is completely different from the previous ones, such as the agricultural age or industrial age. They call it an information age or a knowledge age.

‘Machlup’ was one of the first scholars to categorize knowledge and information in separate from the general industrial system. ‘His identification of information industries such as education, law, publishing, media and computer manufacturing, and his attempt to estimate their changing economic worth, has been redefined by Marc Porat’ (Webster, 2002:12). According to Porat (1978:32), in the new age, ‘the major arenas of economic activity are the information goods and service producers, and the public and private (secondary information sector) bureaucracies’. Bell (1980: 531&545) further developed

the point; he argues that 'knowledge and information are becoming the strategic resource and transforming agent of the post-industrial society … just as the combination of energy, resources and machine technology were the transforming agencies of industrial society'. Therefore as a result, the socio-economic structure, including the relations of production, will be transforming as a part of the revolution; and those who master information or knowledge are expected to take over the society. Hereby the society would be reclassified based on the relationship between the 'info-rich' and the 'info-poor' rather than between capital and labour (Haywood, 1998; Negroponte, 1995). In other words, from their point of view, the classification of the society seems no long based on the accumulation of capitals; rather it would be based on the accumulation of information or knowledge, which is supposed to be theoretically easier to achieve. Accordingly the social hierarchies that worked well in the past would be abandoned in the new context (Naisbitt 1984:281; Masuda 1985:625; also see Bell, 1976), and the 'evil' socio-economic system of exploitation, such as capitalism, may gradually fade out from human history (Bell 1980:504; Stonier 1983:8; Masuda, 1985:621).

2.1.3 Skepticism on the Information Economy

It is obvious that Bell's idea about the 'post-industrial society (PIS)' (1973:467) or 'information society (IS)' (1976:ix)[4], has influenced a number of social thinkers during and after the 1980s; and many of the followers insist that, by holding on to the

[4] In the 'Special Anniversary Edition' of his work *The Coming of Post-Industrial Society*, Bell adds a new forward to bridge the idea of PIS with 'information society', saying that 'the postindustrial society is an information society, as industrial society is a goods-producing society'.

information technologies, human society will eventually be carried into a brand new age, in which the growth of national wealth will be most, if not all, based on the exchange service of information via the new technologies. They also believe that, by following the route, social structure will be reorganized; capitalism will be expelled from the grassroots dominated society; and the people will be liberated from the previous economic fetters, and so forth (Bell, 1976). However, the reality may be ironically disappointing to these people. In fact, over years of development, although information technologies are ubiquitous today, capitalism does not show any symptoms of disappearing. On the contrary, the existing social system is enhanced in many ways and becomes more invisible and flexible; the situation of labour who are supposedly benefiting the most from the 'social change' is getting even worse; the gap between 'the rich' and 'the poor' becomes even more broad due to their different capabilities or eligibilities to access the communication technologies and services (Mosco, 1996 & 2004). So what is wrong with the Bell's PIS? As Frank Webster (2002:33) argues, 'he is undeniably correct in his perception of increases in the part played by information in social, economic and political affairs. However, Daniel Bell is profoundly mistaken in interpreting this as signalling a new type of society – a "post-industrial" age. Indeed, PIS is unsustainable once one examines it in the light of real social trends – i.e. when the "analytical concept" is compared to the substance of the real world, it is found to be inapplicable. Further, PIS is sustainable as an "ideal type" construct only by adopting a particular theoretical starting point and methodological approach to social analysis which is shown to be faulty when one comes to look at real social relations'.

Indeed, as May (2002:1-2) argues that, 'while we may be living through a period in which the form and practices of our lives are changing in many ways, the underlying substance of our socioeconomic system remains largely the same … Most of us still need to go to work, where there remains an important division between those who run the company and those who work for it, not least in terms of rewards'. To explain it, although the role of information technologies has unprecedentedly enhanced the world today, people are still living in a historically continued world on the basis of materials; and the underlying substance of our socioeconomic system, therefore to a large extent, remains unchanged in its radical sense. Nevertheless, as Smith (1991:72) argues from a different angle, the value of PIS or IS may not really exist in its praxis but in its relationship with praxis if being taken as 'Hegelian's idealism'[5]. In that sense, what the idea of PIS or IS really expresses should be rather understood as a rationale, toward which certain forms of power can be adopted to act upon the process to achieve a kind of reality or realistic status in the end. In other words, the discussion about IS, PIS, or whatever it is called can be seen as an ideological dynamism rather than a fact itself. On certain level, such kinds of dynamism can help to build a very close tie between the ontological objective of the idea and its praxis; and the praxis should play the dominant role in the act to realize the objective if it is assumed to be existing anyway. By holding this view, Cohen and Zysman (1987:261) point out that, 'there is no such thing as a post-industrial economy', although it has to be admitted that 'to the extent a socio-economic shift was occurring'. However, it is really 'not a shift from industry to

[5] See Hegel's 'What is rational is real, and what is real is rational' (Bernstein, 1994).

service or knowledge', but maybe a 'transition from one kind of industrial society to another' (Cohen and Zysman, 1987: 260, cited in Barney, 2004:7).

2.1.4 Towards a New Economy: Change and Continuity

It is obvious that the information technology has played a revolutionary role in the process, by which the global economy is changing in many ways (Dizard, 1985; Carnoy, et al., 1993; Kofman & Youngs, 2008). One of the main features of the change is that most of the economic activities are now becoming increasingly based on the exchange of information and knowledge via the new communication tools; and this has led to the result that 'the spread of national, international and genuinely global information exchanges between and within banks, corporations, governments, universities and voluntary bodies indicates a similar trend towards the establishment of a technological infrastructure that allows instant computer communications at any time of day in any place that is suitably equipped' (Webster, 2002:10; also see Connors, 1993; Reich, 1992, 2001). In addition, it is undeniable that the role of information or knowledge is unprecedentedly highlighted in the socio-economic development of human history. In the new development trend, there has been a fast growth of the information service and the relevant information works based on weightless 'ideas, knowledge, skills, talent and creativity' (Leadbeater, 1999:18); and this is helpful for creating a more sustainable future of socio-economic development that has been arousing increasing attention in the world today (Mansell & Wehn, 2000). Apart from that, the traditional rigid ways in

which the industrial society is organized, or to say the classical Fordism, have been to certain extent undermined; instead 'flexible specialization' becomes predominant in the rules (Piore and Sabel, 1984:252; also see Lash and Urry, 1987, 1994). Last but not least, more profoundly, the pervasive and creative use of information technologies has spurred the development of a new economic culture, in which a kind of recentralized consumerism and social needs are orientating the new trend of the socio-economic development in the information age[6].

Although it is true that the world is being changed in many ways due to the revolutionary impact of information technologies, it does not necessarily mean that, we are going to have a completely different economy disembedded or discontinued from the basis of the preceding stages of socio-economic development. As Toffler (1981:6) indicates, 'although it seem that industrial economy and informational economy are assigned by many people in different levels of social economy, it is also true that every updated economy must be based on the rolling of their ancestors; it does happen on the first two revolutions, so does it in the information technology revolution'. To explain it, for instance, the manufacturing-based material production and distribution is still an essential element of the national economy, even though the activities of information- or knowledge- processing through the use of ICTs have become the major determinant in the value generating process of the economic growth. That is to say, on the one hand, the increasing use of ICTs can help to largely improve productivity and profitability of

[6] For understanding the consanguinity between 'social needs' and 'market', please refer to Smith (1937, 1976).

the industrial economy. But nevertheless on the other hand, the processing of information technology itself can create some great value that is seen as a new growth point for the national economy[7] (Castells, 2000c). In another way, information is not just about information itself but also about the ways in which it is being processed in order to help make sense of the 'social totality' of the world (Golding and Murdock, 1991:15; Mosco, 1996:27). As Castells with Catteral (2001:3) claims, 'this information age has never been a technological matter. It has always been a matter of social transformation, a process of social change in which technology is an element that is inseparable from social, economic, cultural and political trends'. In that sense, the information economy should never be simply understood or interpreted as a merely information-based economy; rather it is an information-processing based economy, with which the socio-economy has, to a large extent, retained its continuity in the development process for now and for the future.

2.2 Development of an Informational Economy

After clarifying the relationship between ICTs and socio-economic development, we can see a clear new development trend in the world today. Due to the profound impacts of the information technology revolution, the 'industrial economy' has been transforming into an 'information processing' based economy, with which the revolutionary invention and widespread application of ICTs had spurred the evolvement

[7] I will talk about this in more details in the later sections of the chapter.

of a kind of new ‘technological paradigm’ centered on the use of the new technologies rather than the mere use of the traditional ‘industrial mechanism’ or ‘heavy machines’. As a consequence, both the scale and scope of economic activates can be unprecedentedly improved. While at the same time, the restructuration of capitalist mode of production has provided a dynamic power for the process of transformation; therefore ‘a structural convergence in the formation of a specific techno-economic paradigm’ is created. It is such a new mode of economic growth that shapes the main feature of an ‘informational economy’ (Castells, 1989:28). In addition, the ‘organizational forms’, which ‘reflect the old state of technology’ have changed in order to adapt to and be ‘responsible for the demand for the new technologies’; and ‘the organizational transformation of the mode of development, then, leads to the expansion of information technologies, whose effect triggers pressure for further organizational change’ (Castells, 1989:20). In specifics, there are at least four key aspects of development of the ‘informational economy’. Firstly, information technologies can be applied to effectively improve the productivity and competitiveness of industrial economy. Secondly, information platforms can be adopted to expand the scale and scope of economic activities on a global basis (Held et al., 1999). Thirdly, information networks can be equipped to integrate and upgrade of the organizations or the networks of industrial enterprises (Kling and Lamb, 2002). Lastly, information tools can be used to facilitate the flexibilization of ‘labor market structure’ and help to increase employment rate (Harvey, 1989:151). Now let’s take a closer look at each of the aspects for better understanding of the informational economic transformation.

2.2.1 Informational Transformation

Due to the increasingly widespread and pervasive use of ICTs in the world economy today, it sees an ongoing transformation of the industrial economy from its old mode of development to a new one, through which the productivity of economic growth has been vastly increased in terms of both labour inputs and production outputs (Uchitelle, 1999; Gordon, 1999). As Castells (2000: 92-94) explains, 'Gordon observed an upswing in productivity growth in the 1995-9 period, at about 2.15 percent per year, almost doubling the performance during 1972-95' (see table 2.1). And he argues that, although 'in a statistic vision of economic growth the conclusion would be that there is just one dynamic sector in the economy built around information technology … we know from history, and from case studies of industries and companies in the 1990s, that the uses of technological innovation come first in the industries which are at their source, then they spread to other industries'. In fact, this phenomenon can be understood as a direct consequence or a process of 'creative destruction' (Schumpeter, 1942:104; also see Aghion & Howitt, 1990) enabled by the use of information technologies. In the process, the great productivity potential endured in the industrial economy will get eventually 'unleashed by its producers' and being diffused 'in the economy at large' from ICT manufacturing, into manufacturing of a broader range, then into service activities' (Castells, 2000:90; also see OECD, 1998). More significantly, 'over timescales varying from field to field, the relatively simultaneous emergence of these various technologies, and the synergy created by their interaction, contributed to their rapid diffusion and

application, and this in turn expanded the potential of each technology and induced a broader and faster development of the new technological paradigm' (Castells, 1991:12-13; also see Gibbons, 1994). This new technological paradigm has perfectly echoed Bell's (1973:191) claim about PIS that 'technology … is the basis of increased productivity, and productivity has been the transforming fact of economic life'.

	% Increase at annual rate		
Sector	*1952-72*	*1972-95*	*1995-9*
Non-farm private business	2.63	1.13	2.15
Manufacturing	2.56	2.58	4.58
Durables	2.32	3.05	6.78
Computers	--	17.83	41.70
Non-computers	2.23	1.88	1.82
Non-durables	2.96	2.03	2.05

Table 2.1: Evolution of US productivity by industrial sectors and periods
Source: US Bureau of Labor Statistics as elaborated by Gordon (1999), quoted from Castells (2000a, 93)

However, the problem is that, although it is true that 'in the long term productivity is the source of the wealth of nations … [But], from the perspective of economic agents, productivity is not a [mere] goal in itself'. To explain it, 'firms and nations … [as] the actual agents of economic growth … do not seek technology for the sake of technology or productivity enhancement for the betterment of humankind'. Since 'they behave in a

given historical context, within the rules of an economic system, which will ultimately reward or penalize their conduct', then 'firms will be motivated not by productivity, but by profitability and growth of value of their stocks … And policial institutions … will be oriented, in the economic realm, toward maximizing the competitiveness' of their national economies for the exchange of the maximum of their political interests. Therefore 'profitability and competitiveness are the actual determinants of the technological innovation and productivity growth' (Castells, 2000:94; Kudyba & Diwan, 2002; Niosi, 1991). In practical terms, for instance, in the context of capitalism, 'markets for goods and services allow the forces of demand to influence what is produced, so that innovation in products and processes and the application of capital to the means by which they are produced are both rewarded' (Strange, 1994:64). This is because it the 'invisible hand' of market that fuels the economic growth and the demand of any means being use to achieve the goal (Smith, 1973:485). In that case, the formation of a new specific 'techno-economic paradigm at the very roots of our social dynamics' is triggered, in particular in the situation when 'social systems experience a structural crisis' such as that during the 1970s in the western world (Castells, 1991:21)[8]. As a consequence, the crisis has eventually led to the major restructuring process of capitalism in 1980s and the 'demise' of the Keynesian-Fordism; and has also fostered a seedbed for the technology innovation and organizational transformation in the 'post-Fordism' era, which is mostly recognized as 'flexible specialization' by theorists

[8] According to Castells (2000a:95), 'the real crisis of the 1970s was not the old prices shock. It was the inability of the public sector to keep expanding its markets, and thus income-generating employment, without either increasing taxes on capital or fueling inflation through additional money supply and public indebtedness'. This has been to a large extent caused by governments' misunderstanding or misuse of Keynesianism that was introduced as a capitalist model in the post-Depression era (also see Castells, 1980).

such as Michael Piore and Charles Sabel (Webster, 2002:73-75; Castells, 2000a:166; Amin, 1994:1-3)[9].

2.2.2 Global Transformation

While information technologies are widely equipped and applied to support the informational transformation of industrial economy, the global transformation of such an 'informatized' industrial economy is already underway in practice (Mutula, 2009:2; also see Kofman & Youngs, 1996, 2003, 2008). According to Henderson (1989:3), 'the emergence of the global option, would have been inconceivable without the development of information technologies, and particularly telecommunications … and [this] has enabled particular labour process, or sometimes entire production facilities, to be dispersed across the globe'. Therefore, the informational economy is also a global economy; and the activities of economic globalization become much more important than ever before. In fact, although related, the idea of a 'global economy' is somewhat different from its previous version as an 'international economy', because in the previous time, the world economy was not able to perform and cooperate as a unified entity due to the scattered time and space (Castells, 2000e).

As Dicken (2007:79) describes, 'for most of human history, the speed and efficiency of transportation were staggeringly low and the costs of overcoming the friction of

[9] For the organizational transformation, I will give a separate discussion late in the section 2.2.3.

distance prohibitively high. Movement over land was especially slow and difficult before the development of the railways. Indeed, even as late as the early nineteenth century, the means of transportation were not really very different from those prevailing in biblical times'. Now, with the effective support of information technologies, for the first time, the world is becoming 'an economy with the capability to work as a unit in real time, or chosen time, on a planetary [basis]' (Castells, 2000a:101). For instance, 'with electronic communication media, however, within an instant, the most novel ideas can reach around the globe, or news of events in one continent can drastically affect financial markets around the world. On a daily basis, over one trillion dollars flows around the world on these electronic networks' (Kennedy, 1993:51). However, one point has to be stressed again here, 'technology does not drive choice; choice drives technology' (Cohen and Zysman, 1987:183). In other words, it is the social enforcement powers (governments and enterprises) that can trigger the occurrence and development of such a global transformation; without the powers, it could be hard to make a happen.

2.2.3 Organizational Transition

As mentioned earlier in this chapter, while the transformation of industrial economy is processing under the driving of capitalist restructuring on a global basis, the transition of the organizational structure is taking place as well. As Castells (2000a:164) states, 'the rise of the informational, global economy is characterized by the development of a new organizational logic which is related to the current process of technological change,

but not dependent upon it. It is the convergence and interaction between a new technological paradigm and a new organizational logic that constitutes the historical foundation of the informational economy'. One of the main trends of such a new organizational logic is 'flexible specialization' (Piore and Sabel, 1984:28) or 'flexible accumulation' (Harvey, 1989:147), which means that the traditional mode of mass production, consumption and management of goods or services, which is representative in the Fordism era, will be replaced by or undergoing a transition into a more flexible and a more customized mode of organization (see figure 2.1). Under the new situation, enterprises or small firms (either within or between the firms) will have to build a kind of new organizational form or relationship, in order to effectively adapt to the new context; otherwise they will be under the risk of possibilities being eliminated in the market competition. In the process of the transition, it is obvious that using new communication tools or methods to improve information processing or knowledge management is crucially important, because it will help to ease the tension in the complicated management of the works (Atkinson and Meager, 1986; Harrison, 1994; Mosco, 1996; Tuomi, 1999; Castells, 2000a; Castells, 2001; Beynon and Nichols, 2006). Another trend of the new organizational logic, as being 'emphasized by analysts in recent years, is … the resilience of small and medium firms as agents of innovation and sources of job creation' (Castells, 2000a:167; Weiss, 1988; Clegg, 1990). However, although 'it is true that small and medium businesses appear to be forms of organization well adapted to the flexible production system of the informational economy … it is also true that their renewed dynamism comes under the control of large corporations

that remain at the center of the structure of economic power in the new global economy' although this may not be always true (Castells, 2000a:168; OECD, 2002).

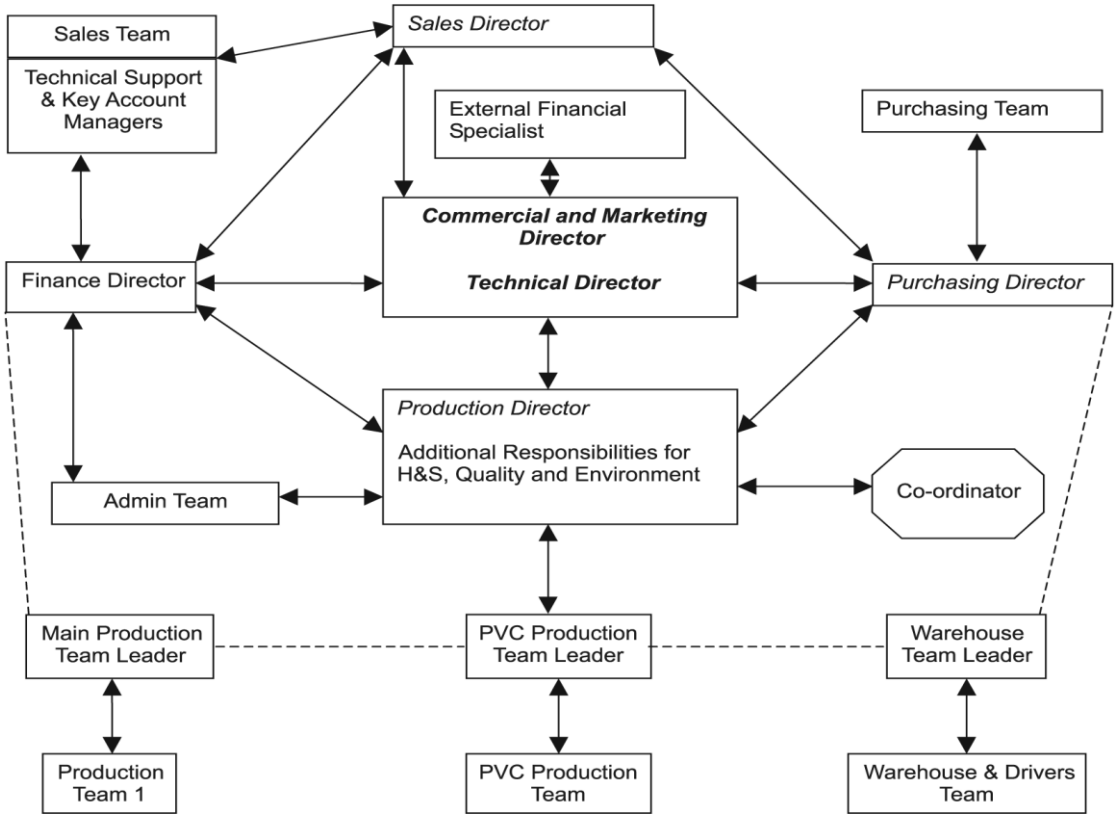

Figure 2.1: Organization structure of a high-tech small firm
Source: Macpherson et al. (2003:267)

2.2.4 Transformation of Work

When looking at the transformation of industrial economy, there is another important area should not be missing from the discussion, which is the transformation of employment and occupational structure. In fact, the process of work and the role of labour are usually considered to be in the central position of socio-economic structure and nation's wealth (Smith, 1776; Ricardo, 1817; Marx, 1876; Harrison and Zeitlin,

1985; Anxo and Storrie, 2001; Wills et al., 2009). According to Castells (2000a:216), 'the technological and managerial transformation of labo[u]r, and of production relationships, in and around the emerging network enterprise is the main lever by which the informational paradigm and the process of globalization affects society at large'. In fact, due to the increasing use of information technologies in industrial production and the dramatic rise of producer services, there is an emerging trend for increase in the percentage of better educated employees with techniques or skills making use of information technologies. According to Mossberger et al. (2008:27), '72 percent of Americans who are employed and have more than a high school education use computers at work, and 58 percent of employed Americans with more than a high school education use of Internet on the job. This compares with 35 percent of workers with a high school education or less who use computers at the workplace, and 21 percent of less educated employees who use the Internet at work'.

Apart from that, it is believed that making use of new communication technologies, such as online employment system, can help to improve capability and rationality of global labour market reallocation. As Webster (2002:77) indicates, it is 'just as outsourcing depends upon computerized communications which enable organizations to achieve continuous observation of suppliers and distributors without employing large numbers of staff in-house, so too is a global corporate strategy feasible only on the basis of a sophisticated information network'. As Henderson (1989:3) argues, the 'global option … would have been inconceivable without the development of information

technologies, and particularly telecommunications' (also see Littek & Charles, 1995).

2.3 Emergence of Information Industry

With the increasing use of information technologies, new kinds of industries or a new economic form has been emerging since the second half of the 20th century (Schiller, 2000). Since one of the most prominent features of the industries is processing of information or knowledge through ICTs, it is also referred as an 'information industry'[10] (Morgan, 1994; Puhl, 2004). According to Castells (2000:148), 'the US … has been the birth place of most revolutionary breakthroughs in information technology'; and therefore it is the US that is 'the place where entire industries spun off from these innovations' (also see Schiller, 2000:2-36). After that, due to rapidly expanding needs of information technologies over the globe, the new information industry is becoming increasingly widespread to other regions and countries, from North America to Europe, from developed countries to developing countries (McChesney, et al.,1998; also see Schiller, 2000:38-88). In fact, information technologies have become very impressive in their contribution to the world's economic growth since the early 1990s; some clear evidence has shown that the information industry is becoming one of the most important gears to the growth of the world economy throughout the 21st century. For instance, according to OECD (2004a:78), 'the contribution of ICT capital to Gross Domestic Product (GDP) growth has strongly

[10] For more about current development of 'information industries', please refer the official website of SIIA (2009).

increased since the first half of the 1990s when it amounted to only about 0.25 percentage points on average. In relative terms, the contribution of ICT capital to GDP growth increased from about 16% of total GDP growth to about 20% from the first to the second half of the 1990s' (see figure 2.2). According to Castells (2000:148) 'the new economy took shape first in two key industries which not only innovated in products and processes, but applied these inventions to themselves, thus spurring growth and productivity, and, through competition, diffusing a new business model throughout much of the economy'. To explain it, what makes the new economy outstanding is its self-regeneration capability, by which it is expected to have great vitality through its continuous renewal of itself. These industries are '(and will be for a long time) information technology and finance'.

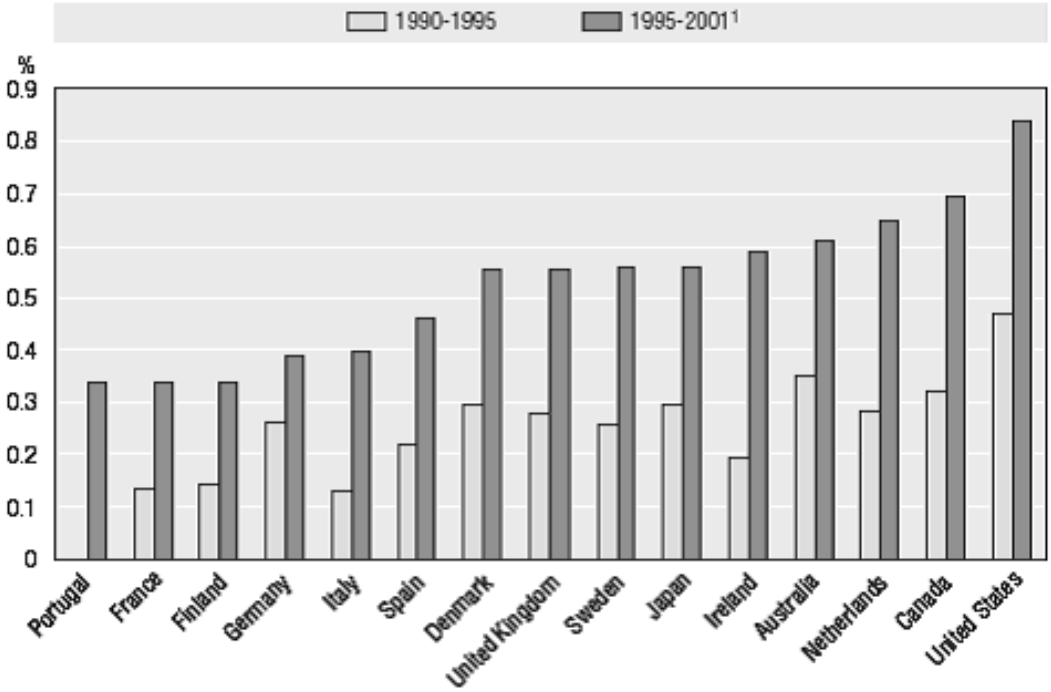

Figure 2.2: The contribution of growth in ICT capital assets to GDP growth
Source: OECD (2003)

2.3.1 Telecommunications Industry

Among all the sectors of information industry, telecommunications industry is one of the most important and also one of the earliest (even earlier than the development of computer industry, i.e. telephony and fax service)[11]. According to Schiller (2000:2), 'during the mid-1950s, near the beginning of the digital computer era, U.S. government agencies and educational institutions possessed perhaps three-quarters of the nation's several hundred computer installations … By the mid-1960s, manufacturers, insurance companies, utilities, and retailers were operating two-thirds of a greatly enlarged base – some 35, 000 installations – of computing facilities' (also see Schiller, 1982). This has helped to build a solid foundation for the boom of the US telecommunications industry in 1970s and 1980s, while there was a neo-liberal movement spreading out from the US telecommunications industry to the rest of the world. In fact, throughout the twentieth century, the telecommunications system was strictly under the control of the state government in the US; 'federal and state regulation served several ends. Foreign ownership of the strategic industry … was deemed inimical to U.S. national sovereignty'.

However, as Schiller (2000:6) points out, 'a critical watershed was reached in 1980. In its *Second Computer Inquiry*, the Federal Communications Commission (FCC) then decided that even regulated telecommunications companies, the core of the nation's

[11] For the origins of the telecommunications industry, please refer to Brock (1981) and McMaster (2002)

telecommunication infrastructure, would be permitted to establish subsidiaries that could bypass existing regulatory strictures.' This can be seen as the beginning of the US telecommunications liberalization. And then the impact began to quickly 'extend beyond the theater of U.S. domestic telecommunications' and spread out to other countries (Schiller, 2000:7 & 37). With the increasing popularization of the Internet during the 1990s, the development of telecommunications industry began to mainly base around the Internet related firms, providing Internet infrastructure and access service (Frieden, 2001). These firms include 'telecommunications companies, Internet service providers, Internet backbone carriers, companies providing final access, and manufacturers of end-user networking equipment' (Castells, 2000a:150). This leads to a further deregulation movement of the industry in the US around the mid-1990s, which was in particular marked in 1996 when the *Telecommunications Act of 1996* was issued by the FCC (Black, 2002); then the industry entered a flourishing period.

2.3.2 Software Industry

Along with the development of computers and the boom of telecommunications industry, there was another important sector of information industry quickly arising during the same time period in the U.S. and later in the Europe (Mowery, 1996), though it could be sometimes confused with the 'computer industry' that is mainly dealing with computers and related devices manufacturing (Campbell-Kelly and Aspray, 2004). This is the software industry; sometimes also referred to as the 'computing industry'

(Ceruzzi, 1998, 2003). According to Steinmueller (1996:26), originally 'the development of computers during and immediately after World War II was directed toward scientific and technical rather than business objectives. Like their electromechanical business machine precursors, early computers were programmed by rewiring and thus were highly specialized to particular information processing tasks', such as that in the universities and government sectors. 'An important early demonstration that computers could be used for purposes other than scientific computation was the development of the SAGE air defense system whose software requirements led to the founding of the System Development Corporation in 1956'.

Since then, certain computer system producers, such as IBM began to provide the programming service to some 'new general-purpose computers' by reinforcing 'links between computer producers and users, and laid a foundation for the reuse of software in future machines'. 'By 1965, IBM as well as its competitors including Burroughs and Control Data, had stimulated a market for programming services, software products, and professional services of $500 million in annual revenues'. This is usually considered as the early shape of the software industry in the U.S., and also in the world (Campbell-Kelly, 2002). In recent times, the software industry has been spreading quickly over the world, not only to Europe but also to some important emerging markets such as India and China under their governments' support (see figure 2.3) (Commander, 2005; Franda, 2002); such new development trend has been seen either as opportunities or as threads to the whole industry (McManus, et al., 2007; Preeg, 2008).

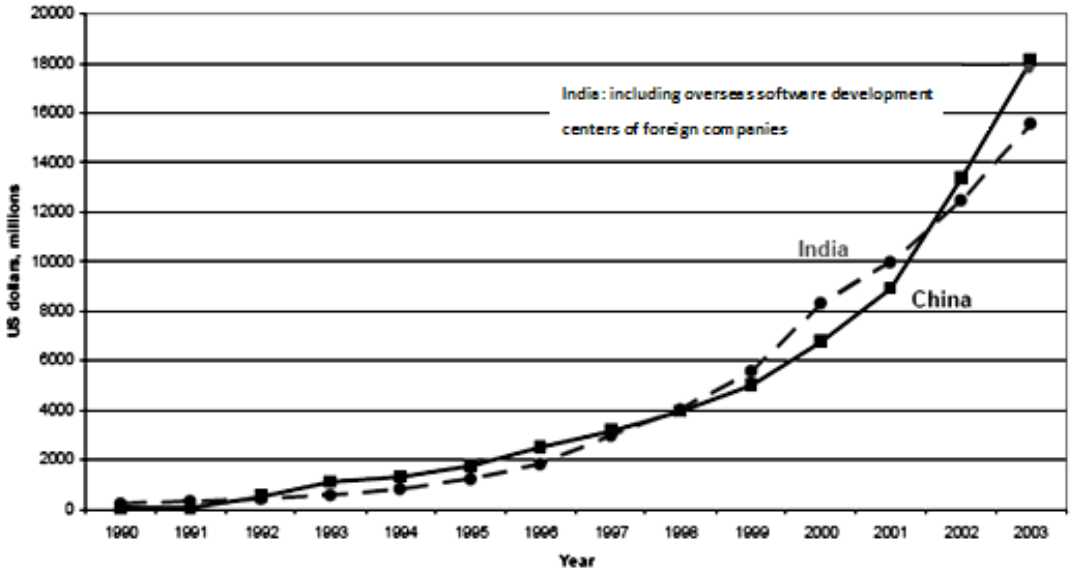

Figure 2.3: China and India Software Services & Products Sales Revenue (in USD)
Source: RIS (2007)

2.3.3 Electronic Commerce

With the fast development and increasing popularization of the Internet during the 1990s, a brand new business sector was gradually emerging in the information industry (Kalakota and Whinston, 1997; Castells, 2001). Since one of the key features of the business is based mainly around the commercial activities conducted via electronic devices and new communication technologies, it is usually recognized as 'electronic commerce' or simply 'e-commerce' (Westland and Clark, 1999:592; Loshin et al., 2003). According to Castells (2000a:151), e-commerce may be the most promising industry among and 'present the future' of the Internet-based information industries, due to its fast pace of growth and increasing capacity to create job opportunities around the world (Goldstein and O'Connor, 2002; Shaw et al., 2000). Although the specific forms or models of e-commerce could be really varied and changing so fast depending on the

relevant fast evolving global market needs[12], two key areas have been growing extraordinarily fast and in success. One area is called Business-to-Business (B2B); while another area is Business-to-Customer (B2C). To explain it, B2B refers to 'electronic trade or partnering between organizations', such as e-Bay and Alibaba; and B2C means trade between organizations and their market ends, such as Amazon and eToys, etc. The market distribution of them today is that the volume of 'B2B transaction is estimated to be approximately 90%' of e-commerce transactions; while B2C 'takes about 10%'[13] (Koh and Maguire, 2009).

Actually the origin of the e-commerce industry can be traced back to the development of Electronic Data Interchange (EDI). According to Schneider (2008:655), 'EDI was the first form of electronic commerce to be widely used in business -- some 20 years before anyone used the term "electronic commerce" to describe anything'. According to Higgins (1992:52), 'EDI refers to the electronic or computer-to-compute transmission of standard business documents such as purchase orders, invoices, and bills of lading between suppliers and customers' (also see examples in Moynihan and McLure, 1996). In fact, even at the current stage of development, many B2B enterprises are still using EDI methods for business and other relevant information exchange (Bussler, 2003; Noia and Buccafurri, 2009). Since the early 2000s, e-commerce has experienced a booming period, in which North America and Europe are the two largest markets, even

[12] The recorded forms of e-commerce until now include, but are not limited to, B2B, B2C, B2B2C, G2B, G2C, G2B2C, P2P, etc. As Castells (2000a:151) points out, 'the speed of development of the new industry was without precedent: one-third of the 3,400 companies surveyed in 1999 did not exist in 1996'.

[13] However, in the U.S., B2C dominates the major proportion of e-commerce. For example, in 2000, B2C accounted for 88% of the overall US e-commerce exchange; and this number was expected to rise to 91% in 2003 (Balnaves, et al., 2001:18)

though this has been in the face of intensive competition or challenge from the fast rising markets in the Asia-Pacific economic region (UNCTAD, 2004, 2008; IGI, 2009).

2.3.4 Electronic Finance

Besides e-commerce, there is another new emerging business sector of the information industry since the 1990s; and it has seen exceptionally fast growth in the first ten years of the new century. This is 'electronic finance' or 'e-finance', which is usually seen as another successful hybrid of the new technology development and traditional business services (Cronin, 1998; Banks, 2001). According to Castells (2000a:152), 'the financial world was transformed in the 1990s by institutional change and technological innovation … The roots of the transformation of finance are to be found in the deregulation of the industry and the liberalization of domestic and international financial transactions throughout the 1980s and 1990s, first in the US and the UK, then, gradually, in most the world' (also see Soros, 1998; Friedmann, 1999). As Strange (1998:24) describes, 'by the mid-1990s, computers had not only transformed the physical form in which money worked as a medium of exchange, they were also in the process of transforming the systems by which payments of money were exchanged and recorded'. In fact, the fast development of e-finance could be firmly tied up with the new global expansion of international trade and investment during the 1970s and 1980s (Catells, 2000e). As Castells (2000a:96) explains, 'to open up new markets, linking in a global network valuable market segments of each country, capital required extreme

mobility, and firms needed dramatically enhanced communication capabilities. Deregulation of markets and new information technologies [in particular in the U.S.] … provided such conditions'. This has therefore explained the reason why, 'by 1995, what had rapidly grown as a clearing system between US banks had become the largest international clearing system, with 142 domestic and foreign banks using the system to clear roughly 200,000 transactions a day worth in total $1.3 trillion' (Strange, 1998:24).

Although the new technology innovation has brought some huge commercial interests and opportunities, on the other hand, it has also created huge unknown risks if the extremely mobilized 'big casino' (Strange, 1997:2) is suddenly out of control. For instance, as Egusquiza and Miguel (2002:80) warns, 'the application of new technologies in banks' production and distribution processes is expected to improve bank productivity and efficiency but, at the same time, it also leads to changes in the level and structure of the risks faced by banks. The introduction of new techniques in the production and distribution of banking services does not involve any change in the categories and definitions of the risks traditionally associated with banking activity. Yet it does introduce certain changes in the way such risks are generated, as well as opening up new channels through which banks can be exposed to risks that might have a negative impact on their net worth.' In fact, this has ironically, from a certain respect, reflected the current 'financial turmoil' since 2008 (Dodson, 2008).

2.4 Challenges and Opportunities

Although it seems that the development of the information economy has made some remarkable progress over the past few decades, it should not be ignored that there are still many challenges and risks ahead (Kehal & Singh, 2005; also see Kogut, 2004). In practice, sometimes the challenges of the information economy could be really ambiguous and various depending on the different and changing social contexts and situations. Therefore, to clearly understand and get to know how to effectively overcome the challenges is assumed to be strategically important, in particular for those decision makers or stakeholders whose 'businesses' are involved. Generally it is believed that there are two key challenges recognized as the most common problems by many countries, in particular developing countries, in the world today. One of the biggest challenges is the continually enlarging global 'digital divide' between 'the rich' and 'the poor' (Mosco, 1996:212; Castells, 2001:247; Brynjolfsson & Kahin, 2002: 8; Baskaran & Muchie, 2006:23); while another one is the increasing difficulty of 'Intellectual Property Right' (IPR) protection over the Internet (Lee & Davidson, 1995:45; Alikhan, 2000:89; Wiseman, 2002:80). For the 'digital divide', it refers to 'the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access ICTs and to their use of the Internet for a wide variety of activities. The digital divide reflects various differences among and within countries' (OECD, 2001a:5). For the IPR protection over the Internet, it refers to the activities to protect the 'author's rights' to 'the making, only

by the author or with his authorization, of copies of the concerned literacy or artistic work, for example, a book, a sculpture, a painting, a photograph, a motion picture' over the new communication means, such as the Internet (Alikhan, 2000:11). Certainly while being aware of the challenges, we should also give attention to the opportunities of the information economy, because the opportunities will be essentially helpful for creating the new potential for development. One of the major opportunities is undoubtedly the continual growth of the international market including both external and internal market, because this is closely related to the scale of business and profit-making; while another opportunity is the 'improving technology innovation', because it will help to create an 'uncontested new market space' that makes the traditional ways of competing 'irrelevant' to profit-making for business owners (Kim and Mauborgne, 2005:4)[14].

2.4.1 Problem with the Digital Divide

For many of the devotees of the information society, they would rather hold to and insist upon a view that through wide equipment of ICTs, the old, capital-based inequality in the human society will eventually become reduced or even vanish from social history (Bell, 1973; Stonier, 1983; Sussman, 1989; Drucker, 1993; Friedman, 2007). As Naisbitt (1984:281) claims, 'we are beginning to abandon the hierarchies that worked well in the centralized, industrial era … The computer will smash the

[14] According to Kim and Mauborgne (2005:4-5), innovation of technology in the process of production and distribution will eventually help to create a 'new market space', in which rules of competition have not yet been created. The authors have used the term 'Blue Ocean'to describe the new market space, so as to have it in contrast with the already very crowded 'red ocean'. I'll give more discussion about this point in the section 2.4.4.

pyramid … with the computer to keep track, we can restructure our institutions horizontally', because 'no dictator can survive for any length of time in communicative society as the flows of information can no longer be controlled from the centre' (Stonier, 1983:203). From the claims above, I can detect a message that, information, with its technology overcoat, has become a rationale for creating a structural discontinuity of the physically evolving society, through which the social inequality that is previously embedded in the economic society can be equalized by simply gearing up the new turbomachine. Therefore, a new standard of class division can be created, between those who can access the digital information and those who cannot (Feather, 2004:111).

However, in practice, there is no clear evidence to demonstrate that, vast construction of the new communication infrastructure can really help to reverse the critical situations between 'the rich' and 'the poor'. On the contrary, 'OTA found that changes in the U.S. communication infrastructure are likely to broaden the gap between those who can access communications and use information strategically and those who cannot. Moreover, the people most likely to be adversely affected will be those for whom the new communication technologies are held out as a means to improve their circumstances – the poor, the educationally disadvantaged, the technologically isolated, and the struggling small business' (Mosco, 1996:213; OTA, 1990a:243; also see Servaes, 2003; Khor, 2005). This situation has even increased the complexity of the gaps between those who can access to the information and those who cannot, and created a kind of new class division between 'information wealth' and 'information

poverty' (Feather, 2004:115). Actually what I am arguing here is that the biggest challenge of the 'digital divide' in the global information economy today is not really about struggling with the question whether people can access the new information technologies or not; rather it should be focused on whether people can make use of and more importantly make better use of the technologies for development, because only those who know how to make strategic and effective use of the new technologies to meet the social needs at the bottom will win the game; and I guess this is the only way for bettering off the situation of the global 'digital divide' today (Kanter, 2001).

2.4.2 Difficulty of IPR Protection

Apart from the 'digital divide', the increasing difficulty of IPR protection over the new technologies is now considered as another major challenge hindering the global development of the information economy today (Vaver, 2006; Schell, 2007). According to Shi (2008:23), IPR is a term 'used to describe the legal status and protection that allows people to own intellectual properties -- the intangible products of their creativity and innovation embedded in physical objects -- in the form that they own physical properties'. In the digital age, it refers to the legal ownership of the information or knowledge contained in or processed through the new technologies, including both hardware and software. As Tian (2008:66) addresses, 'along with rapid technological development and the knowledge (new economy), the IPR plays an increasingly important role in the creation of business fortunes', because most of the value of the

business today is possessed or captured in the form of information or knowledge that is carried by the relevant technologies.

More importantly, IPR is 'justified on the basis of the recognition of individual creativity'. Therefore, to protect IPR should be also considered a very important activity to protect individuals' knowledge works or intellectual efforts (May, 2002:73). Due to the 'intangible' feature of the new economy and 'free flows' of information in the digital age, it becomes extremely difficult to measure and carry out activities to protect IPR, since sometimes it is very hard to use the current (traditional) legal methods to effectively recognize and justify the original authorship of a new information- or knowledge-product (Yu, 2007:420). For example, violation of IPR in the software industry has been a very common problem in the world for a few decades (OTA, 1990b; OECD, 2004b). 'By 2008, the losses are estimated to cost the US economy nearly $1 billion in tax receipts, $4.5 billion in wages, and 175,000 jobs' (Bird and Jain, 2008). It can be imagined that one of the direct impacts of this is that, software investors are gradually losing their interests to make more efforts; that will undoubtedly harm the development of the industry in a long-term perspective.

2.4.3 Growing Market Opportunities

Having looked at the two key challenges to the progress of the information economy, now let's pay some attention to the opportunities as it closely relates to the future

possibilities of the development. One of the major opportunities would be the continually expanding ‘global market’ (OECD, 2000:70; APEC, 2001:133). As Castells (2000a & 2000d) argues, either firms or governments will be driven by the increasingly broadening market. For firms, their highest interest is to seek profit-making opportunities and to expand their market reach around the globe. For governments, they are more likely to ‘be oriented, in the economic realm, toward maximizing the competitiveness’ of the nation states for the exchange of their political interests. This is also the reason why the world’s authorities are often so closely associated with the global markets (Strange, 1988 & 1998).

Generally it is believed that there are at least three major markets at the current stage of the world economic development, namely North America, European Union, and Asia-Pacific region (Dicken, 2007; Held and McGrew, 2007; Maull, et al., 2007; Youngs, 2007). Although in the face of many challenges, the European Union (EU) has already become one of the largest economies in the world (WTO, 2009; BBC, 2010). According to Amadeo (2007) in 2007, the EU had overtaken the US, becoming the ‘world's largest economy’, of which ‘the EU's economy produced $14.4 trillion in goods and services, while U.S. GDP came in at $13.86 trillion … [though] the U.S. still has the largest economy of any single country’. As one of the fastest growing economic regions, Asia-Pacific shows an impressive economic performance over the recent decades. According to IMF (2006), ‘Asia's growth prospects remain bright. Some modest rebalancing of growth is likely, as exports moderate with slowing global growth

and domestic demand, in particular investment firms. China is becoming an increasingly prominent driver of growth in the region, and Japan's[15] continued expansion is also contributing to buoyant economic activity'. Certainly, apart from the three major markets, other markets have also showed some good growth potential. For instance, according to ATPC (2005:6), in Africa, Foreign Direct Investment (FDI) has grown steadily fast, with 'global inward FDI flows rising from US$59 billion in 1982 to [a] peak of US$1,491 billion in 2000'. In Latin America, in 2008 the FDI even climbed 24% to US$ 89.862 billion (ECLAC, 2008:2).

2.4.4 Improving Technology Innovation

Apart from the 'market opportunity', 'technology innovation' can be seen as another important opportunity for the development of the information economy, because innovation is always taken as the core drive of technology progress and so of its impact of any kind on social development (Dizard, 1982; Forester, 1985; Hall and Preston, 1988; Saxby, 1990; Steil, et al., 2002). As Castells (2000a:31) indicates, 'what characterizes the current technological revolution is not the centrality of knowledge and information, but the application of such knowledge and information to knowledge generation and information processing/communication devices, in a cumulative feedback loop between innovation and the uses of innovation'. So in that sense, I should

[15] Japan is in a contradictory position at the current stage of its development; the Japanese economy used to be closely tied up with the western countries, in particular with the US; however, since early 2000s, in particular since the Hatoyama cabinet took over the country in 2009, it seems that the Japanese economic policy emphasis shows a new trend to tighten up its relationship with other Asian countries, such as China (Paul, 2010).

understand the current techno-social revolution to be an ongoing process not just about innovation itself but also about the innovation of innovation. ‘As a result, diffusion of technology endlessly amplifies the power of technology, as it becomes appropriated and redefined by its users’. Therefore, for the first time ever in history, ‘users and doers may become the same’ or together, acting the role, as ‘a direct productive force’, in determining the ‘production system’. And it is in this way that it becomes possible an ‘uncontested new market space’ is created. Kim and Mauborgne (2005:4-5) define it as a ‘Blue Ocean’ in contrast with the traditional/old way of competition, or the ‘Red Ocean’, in which the money-based ‘competitive rules of the game’ are already known.

Although it is difficult to capture empirical evidence to prove the precise contribution of technology innovation to the growth of national economy, from the relationship between technological progress (it can be usually reflected in the growth of R&D investment) and GDP growth we can still sense the strong tie of technological change with economic performance. According to OECD (2000b:8), ‘the relationship between technological progress, innovation and growth appears to have changed in the 1990s. The ways in which organisations interact in an economy have been affected, with networking, co-operation and the fluid flow of knowledge within and across national borders gaining in importance. Some countries in the OECD area have thus far been better able to respond and benefit from the change than others. The United States is of particular interest because it has made sizeable gains in MFP[16] although it is already

[16] MFP stands for Multi-factor Productivity. MFP gains are, to a large degree, ‘the result of technological developments coupled with smarter ways of working' (2000:7).

one of the most productive and technologically sophisticated countries' (see figure 2.4).

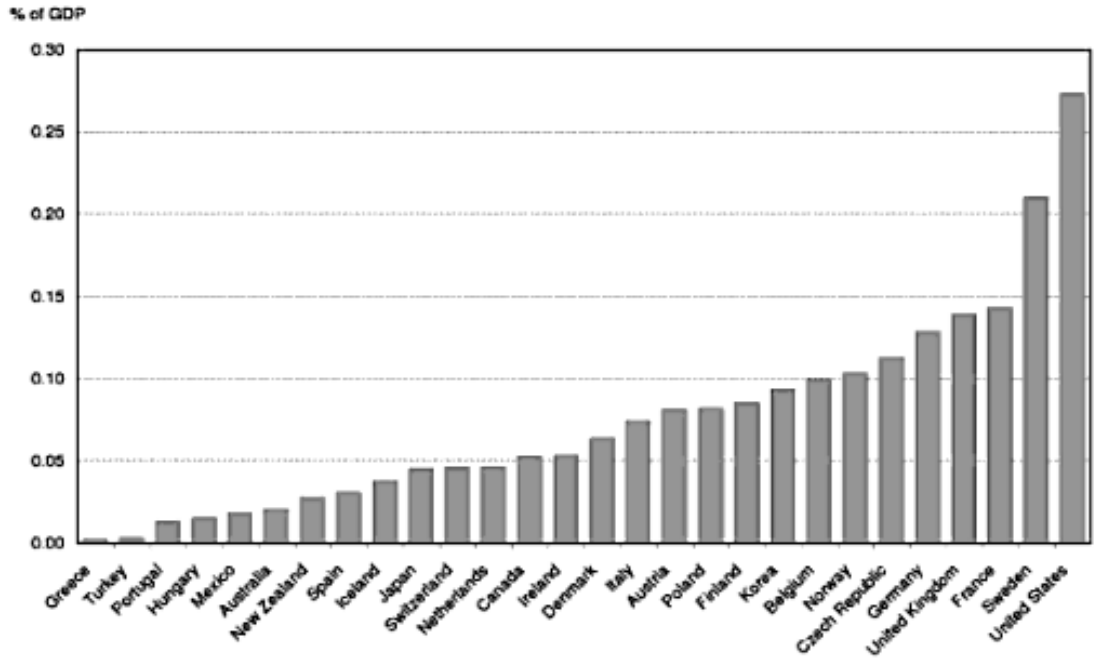

Figure 2.4: Direct government funding of R&D as a percentage of GDP (1999)
Source: OECD (2001b:65)

Summary

In this chapter, I have provided a detailed discussion about the concept of an information economy in four sections, which are respectively 'ICTs and socio-economic transformation', 'development of an informational economy', 'emergence of the information industry', and 'challenges and the opportunities'. It argues that, the rise of an information economy is derived from the joint effects of the information technology revolution and the ongoing capitalist restructuring. In other words, the development and increasing application of information technologies have spurred the rise of a new mode of economy. Being radically different from the previous mode of development that is

mainly based on heavy machines and raw materials, the ‘new economy’ is more centered on the processing of information or knowledge via the new communication technologies. On the one hand, it has helped to facilitate the transformation of the industrial economy and create a unique techno-economic paradigm namely the informational economy; while on another hand, it stimulates the emergence of new kinds of industries namely the information industry that is expected to make enormous contributions to the world economy in the 21st century. It seems that the progress of the information economy has made some really impressive achievements to date. The two key challenges, namely the ‘digital divide’ and ‘IPR protection’, are indeed causing troubles for development. However, while being aware of the challenges, we should certainly give more attention to the opportunities, because it is the opportunities that are helpful for creating a better future. It is all these logical points above that have made up the essential meaning of the idea of an information economy. In the next chapter, I will shift my focus of discussion to studying how information technologies or information networks have been profoundly impacting on the spatial restructuring of the information economy; and what are the essential factors or components for creating the idea of a ‘digital city’ as the new spatial formation of socio-economic development.

Chapter 3

The Emergence of Digital City

While information technologies have been profoundly impacting the process of socio-economic transformation, the spatial form of the economic society is also undertaking unprecedented transformation in the meantime; and this has created a new structure of urban space today, in which free flows of information become one of the most prominent features. Since both the formation and the operation of the new urban space have to be based on the use of the latest digital communication technologies and related devices, this is also, in recent times, recognized as the emergence of a 'digital space' (Castells, 1985; Scott, 1988; Sassen, 1991; Mitchell, 1995; Graham and Marvin, 1996; Castells, 1996; Scott, 1998; Cuthbert, 2003; Aurigi, 2005). In fact, as Castells (1989:348) indicates, under the revolutionary impact of the new ICTs, the socio-economic space of human society is gradually transforming from the 'creation of place' to the 'creation of space' itself, as he believes now it is the 'information flows' rather than the 'material flows' that dominate the major economic activities. Therefore, as Castells (2000a:440) argues that the place we are living in today is more like a 'space of flows' rather than just a 'space of places' as it used to be for thousands of years.

In this chapter, I will carry out my discussion in four sections, which are respectively 'time-space restructuration', 'functional transformation', 'material construction', and 'regulation of space'. For the 'time-space restructuration', I want to have a critical

analysis about the time-space relationship and how the 'time-space compression' has been revolutionarily changed due to the use of new communication technologies. Then I will shift my focus to the 'functional transformation' of the urban areas and indicate the four aspects of the new city formation, including 'advanced economic centers', 'high technology poles', 'functional cities', and 'metropolitan regions'. After that, I will start to talk about the four components in the 'material construction' of the new urban space, including 'circuit of electronic exchanges', 'information node and hub', 'information managerial elites' and 'green ICT infrastructure'. At last, I will have a general talk about 'the regulation' of the digital space, namely the Internet Governance (IG), because IG is usually seen as the basic ruling method in the new digitized urban space.

3.1 Time-Space Restructuration

It is generally believed that in the human society, most, if not all, of the economic activities are associated with space and time either directly or indirectly; therefore space and time are usually considered as the most fundamental and material dimensions of the economic society (Castells, 2000a). However, in history, 'space' or 'spatial distance' has been always seen to be one of the biggest barriers to the development of capitalist production relations; therefore, Marx (1973:539), in his Grundrisse, points out that, one of the key missions of capitalist development is to 'annihilate space with time'. As Mosco (1996:173) explains, 'this refers to the growing power of capital to use and improve on the means of transportation and communication, to shrink the time it takes

to move goods, people, and messages over space, thereby decreasing the significance of spatial distance as a constraint on the expansion of capital'. Such a point of view has been actively responded by many social thinkers. As Lash and Urry (1987:84-86) argues, the relationship between time and space are very complex and intertwined to each other; therefore, rather than annihilating space, capital reorganizes it, in order to have it best fit the needs of capitalist development. This is perfectly in accordance with Harvey's (1989:240) standpoint on 'time-space compression', by which it means that it is the organizational feature of time on space that is necessary to overcome space, but not the time itself. This idea has been well developed by Castells (1989:126) to demonstrate his viewpoint on the new time-space organization being driven by the informational capitalism; he calls it 'space of flows'. It is also by this logic that the meanings or the functionalities of a place that is carried by the free flows of information become unprecedentedly highlighted. And then it is possible that the contents or the specific significance of a space is able to separate from its physical place, so that a 'placesless power' can be created (Castells and Henderson, 1987:7). Accordingly the feature of time is changing as well, becoming increasingly flexible and manageable till its utopianist status that is considered by Castells (2000a:460) as the 'timeless time', by which it 'may take the form of compressing the occurrence of phenomena, aiming at instantaneity, or else by introducing random discontinuity in the sequence. Elimination of sequencing creates undifferentiated time, which is tantamount to eternity' (Castells, 2000a:494; also see 'time-geography' or 'time-space geography'[17], Giddens, 1984:111).

[17] Time-geography is derived from the idea of 'time-space geography that was raised by Swedish geographer, Torsten Hägerstrand, who was the first thinker to stress the temporal factor in spatial human activities.

3.1.1 Theory of Space

Before I begin to discuss the substantial transformation of the time-space relationship, I think it is very necessary to have a brief talk about the social theory of space, because this is usually where the whole discussion starts from. In fact, a meaningful debate about 'space' as a social concept does not have a very long history; one of its original points can be traced back to Marx's works to discuss the intrinsic nature of capitalism (Marx, 1876), or maybe to Durkheim's understanding of space as one of the causes of division of labor (Durkheim, 1893; also see Giddens, 1973). According to Giddens (1990:64), space can be understood as an expressional form of 'social relations', in which social activities in 'distant localities' can be linked up to one another in a given time, in order to meet certain specified social needs, such as socio-economic interests (see figure 3.1). Under a specific social system, such as capitalism or socialism, 'space' (in its physical sense) could be seen as a structural barrier that hinders social development. Therefore, the key agents of such a system would usually take certain measures, including utilizing tools or technologies, to overcome or avoid the barrier in order to ensure the maximized achievement of their interests within the system. As Castells (2000a:440) argues, 'space is the expression of society … spatial forms and processes are formed by the dynamics of the overall social structure'. In this sense, I understand that under the capitalist structure, the market is the origin of the dynamics; while in a socialist structure, the achievement of certain social goals including the market provides the force. From a materialist perspective, Harvey (1990:204)

understands ‘space’ as a product of social practices, through which ‘social life’ can be reproduced within a given time. This is echoed by Castells immediately by saying that, ‘space is the material support of time-sharing social practices’, by which he means that ‘space brings together those practices that are simultaneous in time. It is the material articulation of this simultaneity that gives sense to space vis-à-vis society’ (Castells, 2000a:441). Thus, development of space makes sense to the development of society.

Figure 3.1: *Market: the centre of economic and social life*[18]
Source: Medina (n.d.).

[18] ‘The word “market” takes its origin from Latin merkatus, merkati “to buy”. In the traditional societies, the market was always the centre of economic and social life. It is a regular gathering of people for the purchase and sale of provisions, livestock, and other commodities; an open space or covered building where commercial dealings are conducted’. Classically, this is the social meaning of the space (Medina, n.d.).

3.1.2 Flows of Information

In fact, within the space, neither social relations nor social lives can exist in the vacuum of social meanings that is presented in the form of information; therefore the flows of information should be considered as one of the crucial logics of social interactions in the space (Castells, 1985). To be specific, as Castells (2000a:442) indicates, 'our society is constructed around flows: flows of capital, flows of information, flows of technology, flows of organizational interactions, flows of images, sounds, and symbols. Flows are not just one element of the social organization: they are the expression of processes dominating our economic, political, and symbolic life'. However, in the past, due to the limit of communication technologies, information was for a long time an appurtenant to space; the flows of information were rather restricted by the physical distance between places. This is the reason why the scale of social interactions before was always very limited (McLuhan, 1962; Crowley and Heyer, 2007). With the rapid development of transportation and communication technologies during 19th and 20th centuries, such a situation was to a large extent improved; this could be taken as one of the key reasons why a much wider range of social interactions, such as international trade, became possible over the period (McLuhan, 1967). Since the second half of the 20th century due to the invention of information technologies, the capability and interactivity of flows of information have been further improved. Therefore, theoretically flows of information will eventually break away from the restriction of space, so that the interactions of social activities can be carried out without any spatial restriction around

the globe. This is also the theoretical basis, on which McLuhan (1964:93) defines the future world as a 'global village'. Then 'social and spatial distances are no longer homologous' (Beck 1999: 104; also see Graham and Marvin, 1996; Urry 2000, 2007).

3.1.3 The Space of Flows

Rather than taking a general view of the social change, some social thinkers, such as Giddens (1990) and Harvey (1990), would prefer to look at the spatial development from a structuralist perspective, as they all show their particular interest in the transformation process of the time-space relationship. As Harvey (1990:284) argues, the process of spatial transformation in the contemporary period can be seen as a result of 'time-space compression' that has been taking place for centuries but gaining particular momentum only since the early 1970s, due to the increasingly intensive use of the new communication technologies including computers and the new emerging information networks around that time. To be specific, in the past time, it wasn't an easy thing to do when someone wanted to travel to another place over a long distance, because simply it would have taken too much time. However, nowadays with the support of information technologies, in particular telecommunications networks, the social distance between the physical places can be dramatically reduced into 'zero miles' (i.e. Google Earth); this has definitely created a new experience of social activities. As a result, the structure of the previous social space has been now transformed. Castells (1989:348) has to certain degree developed the idea; and he further indicates that the new structure of the

social space is based on the free flows of information. Therefore it should be considered as a ‘space of flows’, in which a ‘real-time’ ‘network’ is seen as one the most prominent features of the new structure (also see Castells, 2000b). In addition, Castells believes that, the ‘network’ shape of the new space is not necessarily evenly distributed; rather it has been dynamically circulating around powers, so that a ‘power-geometry’ (Massey, 1992:65) is being created even though it could be changing over time (also see Massey, 2005:183). This has also explained the reason why the process of globalization is also a process of regionalization (Castells, 2000a:110-116; Cohen, 1993) (see figure 3.2).

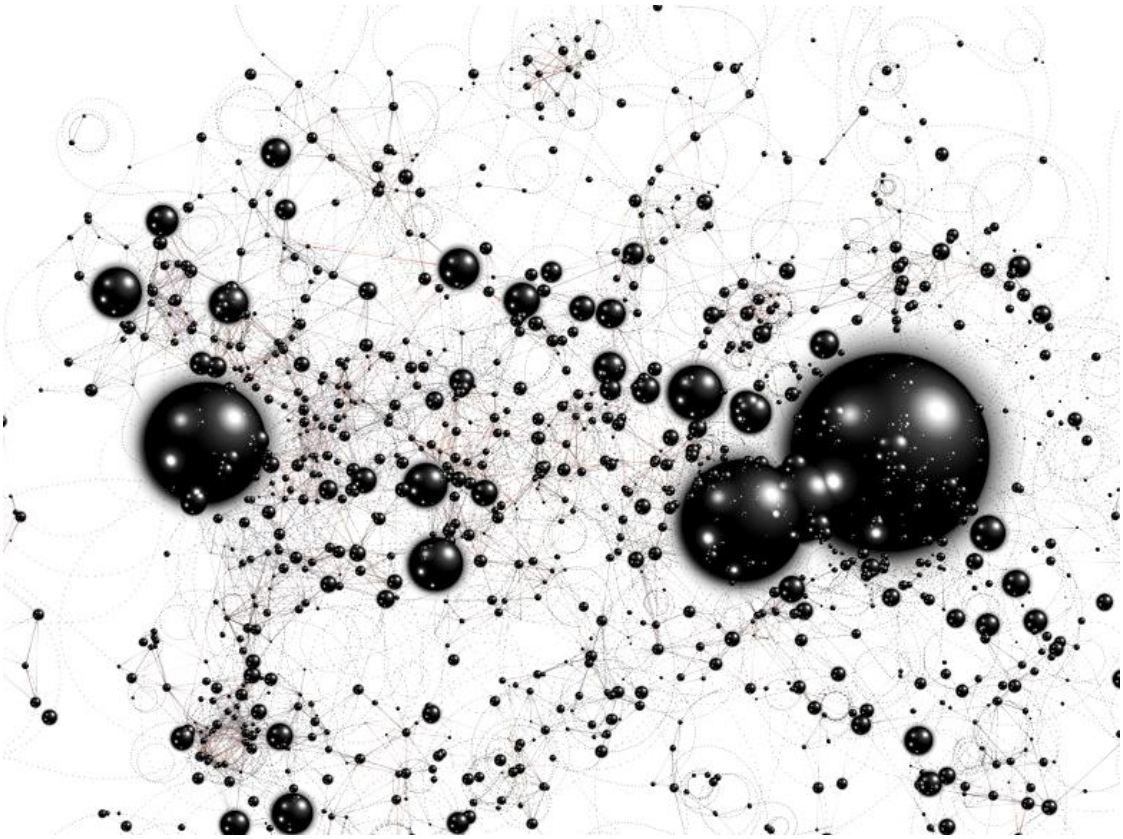

Figure 3.2: Conceptual picture of the Space of Flow (in accordance with my mind)
Source: Gallery of Computation (2004)

3.1.4 The Time of Flows

As it has been argued above, in the new spatial logic, flows of information are taking place in ‘real-time’ due to the placeless feature of space. So theoretically, it seems that time is becoming timeless if considering its intrinsic connection with space. However, if the argument is continued in this way, then we will suddenly realize that we are in a dead end, because in the real world, time is inarguably an objective existence; no one can really erase time from the universe. So does it mean that time remains unchanged in the new spatial logic? If the answer is yes, then how could we explain the ‘real-time’ phenomenon in the space of flows? But if the answer is no, we need to find out how time has been changed and what are the consequences of the change in terms of its impact on our social lives. With these preset questions, Castells goes directly to Leibniz's differential philosophy, ‘space being an order of coexistences as time is an order of successions’ (Leibniz’s correspondence with Clark, quoted from Castells, 2000a, 494:n78). After understanding this, Castells (2000a:494) gives a very good annotation to the meaning of ‘timeless time’ by saying that, ‘timeless time … occurs when the characteristics of a given context, namely, the informational paradigm and the network society, induce systemic perturbation in the sequential order of phenomena performed in that context. This perturbation may take the form of compressing the occurrence of phenomena, aiming at instantaneity, or else by introducing random discontinuity in the sequence. Elimination of sequencing creates undifferentiated time, which is tantamount to eternity’. In other words, as the sequence of things, time can be

reorganized. This process has to be under support of certain time management techniques including but not limited to the use of information technologies[19]. It is in this sense that the value of time becomes maximized. This scientific view is rather important to the decision makers of enterprises and governments, in particular when we make strategic plans to promote the development of the enterprises or the nation states. Actually, a very good practical example which comes to mind could be the making process of the Chinese 'Five-Year Plans' (Chow, 1987:74)[20].

3.2 Functional Transformation

With the increasing development of electronic communication and information systems, some people start to worry about the meaningful existence of the city; some of them predict that, in the future, the city will undergo an irresistible trend toward vanishing from social history due to the empowerment enabled by the new ICTs on the separation of functionalities from their original localities (Garreau, 1991). In other words, from their point of view, the spatial proximity between social development and city existence will become gradually disassociated as a consequence of dramatically increasing use of teleworking or telecommuting. Therefore, it is the end of place, or the 'geography of nowhere', that is the real cause of the end of cities (Kunstler, 1993:9; also see Rae, 2003). However, as Castells (2000a: 428-429) has pointed out, although it shows some

[19] Other techniques include kan-ban system (just-in-time or Toyotism)(Aoki, 1988:35), scientific management (Taylorism) (Taylor, 1947:4), Plan-Do-Check-Act Circle (PDCA or Shewhart Cycle) (Deming, 2000:88), etc.

[20] As a developing country, if China follows the traditional sequencing mode of development, it will take at least the same amount of time as most developed countries have done over the past 100-200 years for industrialization. In order to vastly increase the efficiency of China's development, I believe that the Chinese government has made a good use of the national 'Five Year Plan' as a time management technique.

evidence that people are increasingly tending to work and manage services from their home, it is not necessary, or too far, to say this is the end of the city. ‘Because workplaces, schools, medical complexes, consumer services outlets, recreational areas, commercial streets, shopping centers, sports stadiums, and parks still exist and will exist, and people will shuttle between all these places with increasing mobility precisely because of the newly acquired looseness of working arrangements and social networking: as time becomes more flexible, places become more singular, as people circulate among them in an increasingly mobile pattern’. In other words, the city is not really declining or showing any symptoms to decline in the realistic world that is already filled up with information systems; on the contrary, with the support of the richness in people’s use of ICTs, the contemporary form of cities has become much more mobile, flexible and precise in their functions as the residence of people in the new age (see the example of visitlondon.com). Yes, the city is experiencing a functional transformation rather than a disappearance; and thanks to the new communication technologies, the social dimension of the human space that we are living in now has been unprecedentedly reinforced (Batty and Barr, 1994; Graham and Marvin, 1996).

3.2.1 Advanced Services Centers

As I have argued, in the space of flows, most of the economic activities are organized on the basis of the flows of information and the processing of the flows. Therefore, in the economic processes, ‘advanced services’ are undoubtedly the most important

because they are usually seen as relating to the core interests of the economic development and the strategic support to the growth of Gross National Product (GNP) (Castells, 1989:195-196; also see Mollenkopf and Castells, 1992). In addition, since advanced services are always closely related to or circulated around the industrial producers in the informational global economy, it is also sometimes reorganized as the 'producer services' (O'Loughlin and Friedrichs, 1996:7&213; Sassen, 2001:359). According to Castells (2000:409), 'advanced services', include 'finance, insurance, real estate, consulting, legal services, advertising, design, marketing, public relations, security, information gathering, and management of information systems, but also R&D and scientific innovation, are at the core of all economic processes, be it in manufacturing, agriculture, energy, or services of different kinds. They all can be reduced to knowledge generation and information flows'. In the processes, ICTs, such as 'advanced telecommunication systems', have played a strategically important role, as it makes all the 'scattered location' based advanced services sectors interconnected around the globe (Graham and Marvin, 1996; Sassen, 2002; Brenner and Keil, 2006).

As Graham (1994:416-418) points out, the flows of advanced services are not something that exist in the air, rather its social matter is actually organized in certain spatial patterns; and such patterns are composed of and characterized by a few locational points that are usually considered as the advanced services centers. As Castells (2000a:410) indicates, on the one hand, these advanced services centers are 'pervasive' and 'located throughout the geography of the planet, [but] excepting the

“black holes” of marginality’. While on the other hand, ‘there has been a spatial concentration’ of the ‘upper tier’ of the services in only ‘a few nodal centers of a few countries’ (also see Daniel, 1993). These key nodal centers are seen by Sassen (1991:5) as the ‘global cities’, among which New York, Tokyo, and London are at the top layer in the development. While in the meantime, Castells (2000:410-411) believes that ‘other centers are important [as well], and even more pre-eminent in some specific segments of trade’. For example, “Hong Kong, Osaka, Frankfurt, Zurich, Paris, Los Angeles, San Francisco, Amsterdam, and Milan are also major centers both in finance and international business services’. Another reason for which these advanced services centers are seen as ‘global cities’ is their high mobility in processing the information that is strategically important to the markets in the global network. Furthermore, these cities are also where corporate headquarters are based due to the better support of the needed services (Sassen, 2006; Brenner and Keil, 2006).

3.2.2 High Technology Poles

With the fast development of high-technology manufacturing and related services over recent decades, it has seen the formation of a new spatial logic and the rise of a new type of industrial space. In this new space, sectors of electronics firms or IT companies are separated in different locations according to their different specificities. However, with the support of advanced communication technologies, such as advanced telecommunications systems, the services of these different sectors can be effectively

reintegrated as needed, so that a higher level of technological cooperation between or among the sectors can be achieved. This new logical space is considered by Castells (1988:211) to be a 'new industrial space' (also see Hall, 1985; Scott, 1988; Henderson, 1989; Scott, 1998; Barnes and Gertler, 1999). As Castells (2000a:417) clarifies, the new industrial space is characterized by the 'technological and organizational ability to separate the production process in different locations while reintegrating its unity through telecommunications linkages, and micro-electronics-based precision and flexibility in the fabrication of components'. To explain it, due to the specified needs of development, different functional sectors of high-technology manufacturing and services are separated in different locations but loosely connected around the globe via the highly efficient communication systems. Therefore, the new industrial space can be seen as a placeless space but connected with its own internal logics if needed. To be specific, for example, for an IT company like Microsoft or IBM, it is not necessary for their market sector and R&D sector to be placed in the same location, as long as these two sectors can cooperate well with each other when there are needs. Teleconferencing is usually one of the key means of communication they would use to organize and associate the business activities for instance (Maier, 2004; Gibbs, 2007).

Certainly these separated sectors of IT companies are not really dispersed anywhere without consideration. Rather they are gathering in certain areas in a certain 'locational pattern' which is of 'decisive importance' to the technological innovation development. This specific 'locational pattern' is called by Castells (2000a:419), along with his

colleagues, the ‘milieux of innovation’; and the specific areas that the specific pattern is located are named as ‘technopoles’ or to be clearer, ‘high technology poles’, by which it refers to ‘a specific set of relationships of production and management, based on a social organization that by and large shares a work culture and instrumental goals aimed at generating new knowledge, new processes, and new products’ (also see Castells and Hall, 1994). As Castells continues to argue, ‘what defines the specificity of a milieu of innovation is its capacity to generate synergy; that is, the added value resulting not from the cumulative effect of the elements present in the milieu but from their interaction’. To explain it, a ‘technopole’ is usually somewhere having a highly innovative environment, in which electronics firms or IT sectors are located. This brings huge benefits by sharing the resources, including human resources that are significantly important for the innovation development of the firms. As Castells also points out, ‘the leading technopoles’ are usually ‘contained in the leading metropolitan areas’; and one of the essential elements in support of the ‘technopoles’ is ‘the concentration of a large number of highly skilled scientists and engineers’ that are usually ‘from a variety of locally based schools’. This is a key reason why Silicon Valley has become one of the top leading ‘technopoles’ in the world (Saxenian, 1985; Lécuyer, 2007) (see figure 3.3).

Figure 3.3: Graphic map of high-technology companies at Silicon Valley
Source: Salasevicius (2007)

3.2.3 The Informational City

As argued in the beginning of the section, rather than declining, urban areas in the contemporary age is experiencing a functional transformation. Some areas become 'advanced services centers'; while some other areas become 'technology poles'[21]. But what has not been argued yet is the transformation of the specific form or shape of the

[21] In some metropolises, there could be both, within or around the larger areas. See typical examples of London, Paris and Tokyo (Knox and Taylor, 1996; Brenner and Keil, 2006; Massey, 2007).

urban areas. Actually according to Castells (1989:6), there is indeed a new urban form emerging in the information age; and he calls it the 'informational city'. As Garreau (1991:4-7) indicates, from the experience of the US, it sees a rise of some 'Edge Cities' in the American metropolitan areas. As he describes, there are at least five criteria, on which the edge cities are judged. Firstly it needs to have 'five million square feet or more of leasable office space – the work place of the Information Age'. Secondly it needs to have '600,000 square feet or more of leasable retail space'. Thirdly it should have 'more jobs than bedrooms'. Fourthly it should be 'perceived by the population as one place. At last, it 'was nothing like "city" as recently as thirty years ago'.

Other than simply agreeing with Garreau, Castells (2000a:429) points out, the development mode of the new urban areas should not be standardized; 'as the industrial city was not a worldwide replica of Manchester, the emerging informational city will not copy Silicon Valley, let along Los Angeles'. As he argues, being facilitated by the highly efficient telecommunications networks, the new urban areas, which are composed of and closely connected among a few clusters of work and living places, should be built on the basis of its specific functions. Therefore, the informational city should not be simply considered as a fixed form; rather it is an ongoing process; 'a process characterized by the structural domination of the space of flows'. Furthermore, Castells (2002:372) also criticizes the hierarchical conception of a 'global city' that was originally initialized and popularized by Sassen (1991); he argues that, 'what characterizes our society is its structure in networks and nodes, not in centrality and

periphery', because in the information age, no city is entirely global or entirely local. Taking a more moderate tone, I would say that, even though there are hierarchies existing in the new space, such a hierarchical system would be rather fluid and temporary depending on their function settings and within a given time period. After all, no one can deny that Copenhagen was the top globally focused place during, and maybe for a time after, the period of the Copenhagen climate conference in 2009.

3.2.4 The Metropolitan Region

As argued above, in the new spatial logic, there is no fixed form for the urban development; so what we have today in the information age is a rather open structure of the urban areas, in which the processes of information flows are functionally dominating the space. One of the inevitable consequences of such a mode of development is that major cities and their circulating areas in one larger region are becoming increasingly associated with one another regarding certain specific functions; and this will eventually usher an integration process of the whole region into a 'metropolitan region' (Castells, 1978:27; Castells, 1985:100; Castells, 2010: xxxiii) or an agglomeration of 'mega-cities' (Castells, 1996:403' Castells, 2000a:434; also see Hubbard et al., 2004:226). As Castells himself explains in Susser's (2002:394) editorial work, a metropolitan region is not simply a collection of a few large cities; rather they are 'urban constellations scattered throughout huge territorial expanses, functionally integrated and socially differentiated, and around a multi-center structure'.

What is also very interesting about the phenomenon of a 'metropolitan region' is that its formation is usually considered to be a spontaneous process of interaction rather than a result of planning. Therefore, it does not have clear boundaries within or among the regions (Susser, 2002:374). In fact, 'within the metropolitan region the social character of places is nonlinear, since their connection and integration are established through the space of flows, rather than through proximity' (Stalder, 2006:164). One of the typical examples given by Castells (2000a:436-437) is the 'metropolitan region' of the 'Pearl River Delta' in China (see figure 3.4). This is also seen by him as one of the most promising emerging 'metropolitan regions' in the 'twenty-first century'[22]. In specifics, this region is composed of Hong Kong and a few major cities in Guangdong province, such as Guangzhou (Canton), Shenzhen, Huizhou and Zhuhai. What makes the Region so outstanding is that each of the key nodal cities of the Region has its own clear role of division of labor, with Hong Kong playing the role as the financial center (towards the outside of the region), Shenzhen as the financial center (towards the inside of the region), Guangzhou as the trade center (towards both outside and inside of the region), and Huizhou and Zhuhai as the manufacturing centers of the region (CCID, 2009b; also see Woo, 1994; Yeung and Shen, 2008).

[22] According to a recent report on China's regional development, by 2008, of the 'Delta', the GDP of Guangdong province itself (excluding Hong Kong) had already surpassed that of Saudi Arabia, Argentina, and South Africa, being ranked the 1st among all the Chinese provinces and the 16th if placed among the G20 countries (CASS, 2010).

Figure 3.4: Sketch map of the Pearl River Delta Region
Source: HKTDC (2003)

3.3 Material Construction

We are living in a material-based world, even though it has been already fully surrounded and maybe predominated by the intangible flows of information. According to Castells (1996:442-448), 'flows are not just one element of the social organization: they are the expression of processes dominating our economic, political, and symbolic life. If such is the case, the material support of the dominant processes in our societies will be the ensemble of elements supporting such flows, and making materially possible their articulation in simultaneous time'. Therefore, 'the space of flows is the material organization of time-sharing social practices that work through flows', by which the

material structure is composed of and supported by a set of 'purposeful, repetitive, programmable sequences of exchange and interaction between physically disjointed positions held by social actors in the economic, political, and symbolic structures of society'. To explain it, the 'space of flows' is not placeless; rather it is materially based and organized with its own internal logics, and physically connected by a set of specific locations that is structurally dominated through a careful and strategic design of arrangements. Basically it is believed that there are at least four prominent factors or features of the material construction of the 'space of flows'; they are respectively the 'circuit of electronic exchanges' as the basic infrastructure of the whole place or region, the 'nodes and hubs' as core exchangers of flows, the 'information managerial elites' as the operators of the directional functions of the space, and the 'green ICT' infrastructure as the key determinant of the development sustainability (Webster and Robins, 1986; Graham and Marvin, 1996; Castells, 1989 & 1996; Black, 1997; Susser, 2002; Worthington, 2009). Now let's take a closer look at each factor of the material construction, in order to further embody the physical shape of the 'space of flows'.

3.3.1 Circuit of Electronic Exchanges

Unlike in the traditional industrial world in the past, in the information age, the regional places in particular the urban areas, are mostly built upon electronics-based infrastructure. This composes the first material element of the space of flows, a 'circuit of electronic exchanges', which mainly include 'micro-electronics based devices,

telecommunications, computer processing, broadcasting systems, and high-speed transportation – also based on information technologies' (Castells, 2000a:442). In the new space, the physical construction of information systems and related communication infrastructure becomes essentially important, because it is the communication of flows of information that dominates the major economic activities and the creation of social wealth. More importantly, 'this infrastructure does not just transport digital information around the world, but it is also the foundation of the accelerated movement of people and goods. Consequently, it is made up of information networks, but also of high-speed transportation links through air, land, and water' (Stalder, 2006:148). In specific, apart from the high-speed Information networks, the transportation and communication system under control of UTCS, and the busy networks of airports are the two very best examples to explain the idea (Hanson and Giuliano, 2004: 36; Weiner, 2008:160; also see Davies, 1991:17-18). According to Bell (1994:30), 'UTCS is an acronym for Urban Traffic Control System, and is a truly centralized traffic control algorithm … being performed on a large mainframe computer'. Its main function is to ensure that the urban transportation and communication will work corporately and flexibly under any complex and emergent situations (Dickey, 1983; Gifford, 2003; also see NRC, 1983). For the network of airports, it refers to the main channels connecting the major cities in the world, in order to facilitate the accelerated global movements of goods, people, and services (Knox and Taylor, 1996; Sassen, 2002; Taylor, 2004). As a result, all such efforts have been flexibly correlating with one another, creating a giant and effective mobile global information infrastructure, the circuit of electronic exchanges.

3.3.2 Information Nodes and Hubs

Information infrastructure is indeed very important, because it has facilitated the flows of information and improved the mobility of the relevant social resources. However, it is found that the flows of information and the exchanges of social resources are not placeless and aimless; rather they are connected and circulated around certain specific places or points that have 'well-defined' social meanings and physical characteristics. 'Some places are exchangers, communication hubs playing a role of coordination for the smooth interaction of all elements integrated into the network. Other places are the nodes of the network; that is, the location of strategically important functions that build a series of locality-based activities and organizations around a key function in the network'. It is these certain points of an area that together compose the third material support of the space of flows, 'information nodes and hubs' (Castells, 2000a:443). As Stalder (2006:148) explains, 'The massive, material infrastructure of the space of flows is highly maintenance intensive and requires advanced knowledge services to work efficiently. Hence the network is not evenly distributed, but clustered in notes and hubs … In such places, multiple services are provided and consumed, thus creating critical mass for a self-sustaining ecology capable of continuously (re)producing the material basis of the space of flows'. 'The interlocking clusters of financial and administrative services created and managed in global cities are the best analyzed example'. To give an example, London is renowned for its financial services; however the business sectors of London's financial service are not really dispersed everywhere in

the whole region of the Greater London. Rather they are clustered in a ‘Square Mile’ area (see figure 3.5), which is usually referred as the ‘City of London’; and now the area has become one of the most influential financial centers in the world (Diederiks and Reeder, 1996). As Clarke (2008) introduces, one of the key reasons, for which the City of London have achieved such a great success, is that it has effectively integrated and utilized the financial resources of the whole country. In that sense, the City of London has already become a very intensive information hub that is able to process all the available financial resources as one unit in a strategic way (Davidson, 2008).

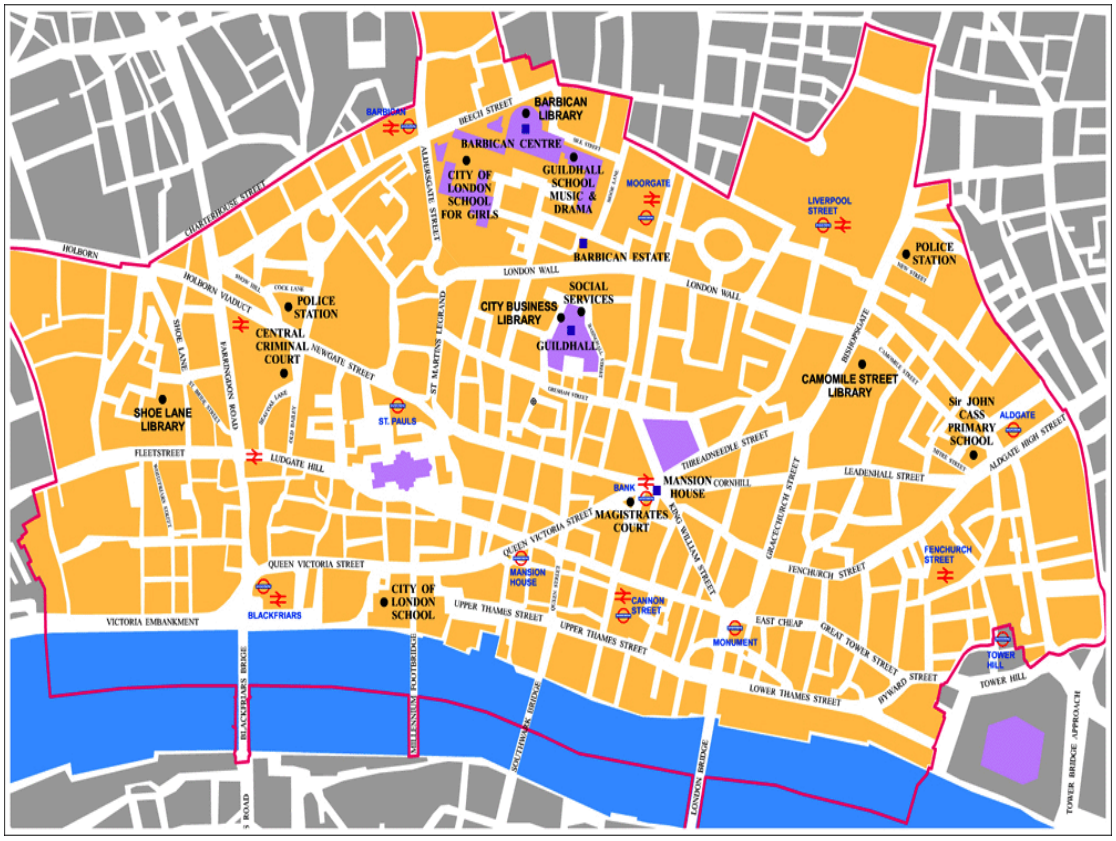

Figure 3.5: Graphic view of the ‘Square Mile’ of London
Source: The City of London (n.d.)

3.3.3 Information Managerial Elites

Although having had the 'information infrastructure' and the structural 'nodes and hubs', it seems that the whole 'space of flows' cannot operate automatically without input of human force. As Castells (2000a:445) observes, 'the space of flows is not the only spatial logic of our societies. It is however, the dominant spatial logic because it is the spatial logic of the dominant interests/functions in our society ... It is enacted, indeed conceived, decided, and implemented by social actors'; and the so-called social actors are human beings. However, in practice, not everyone can be seen as a social actor engaging in the operation process of the space. There is nothing to do with class; but only a small number of people who have mastered specialized knowledge and skills can be adopted to manage the works well. It is such a small number of people that are considered by Castells as the 'managerial elites', which refers to those people who are able to use their specialized knowledge and skills to dominate and strategically control the exchanges of the most information resources in the global network society. It is also this small number of people that are seen as the third important material element of the 'space of flows'. Arguably, as Castells figures, the 'dominant, managerial elites' usually occupy a special territory that are separated from the territory of other social groups, in order to create a high barrier of entry; 'they define their community as a spatial bound, interpersonally networked subculture'. While on the other hand, the 'elites' have created a distinctive lifestyle, in order to unify 'the symbolic environment of the elite around the world'. This is the reason why we can see 'the construction of a (relatively)

secluded space across the world along the connecting lines of the space of flows: international hotels whose decoration, from the design of the room to the color of the towels, is similar all over the world to create a sense of familiarity with the inner world, while inducing abstraction from the surrounding world; airports' VIP lounges, designed to maintain distance vis-à-vis society in the highways of the space of flows … All these are symbols of an international culture whose identity is not linked to any specific society but to membership of the managerial circles of the informational economy across a global cultural spectrum' (also see Elmhorn, 2001)[23].

3.3.4 Green ICT Infrastructure

Due to the material construction of the 'space of flows', there is a fast increasing trend of massive adoption of ICTs around the world, in particular in those big cities. Although this is helpful for the development of an information economy, certain new environmental problems that are caused by the increasing use of ICTs have been gradually appearing; and such problems have been potentially affecting the sustainability of social economic development worldwide. Therefore, how to effectively avoid the problems while trying to maintain the fast pace of the spatial construction has become one of the heated topics of discussion in many countries today (OECD, 2009a). In fact, over the past few decades, ICTs have to a certain degree played a very positive role in environmental protection, as the use of the new technologies has successfully

[23] In fact, I can only in part agree with Castells on this point from a global empirical perspective, because it is not necessary that all the managerial elites with different culture backgrounds should share similar kinds of views.

helped to reduce the reliance of economic growth on inefficient and high polluting industrial production and consumption. However, in recent years, there is increasing evidence showing that, due to the fast development of information infrastructure, the ICT-related construction is increasingly considered to have huge potential to become another source of environmental pollution, as there is a rising trend of ICT-related CO2 emissions in the world today (Velte et al., 2008; Harris, 2008; OECD, 2009b; Tessema et al., 2010). For instance, according to JISC (2009), 'ICT in UK higher and further education has a large carbon footprint. It is estimated that in the sector there are one and a half million computers, 250,000 printers and 240,000 servers which collectively produce 500,000 tonnes of CO2 a year and in 2009 cost the sector around £116m in ICT related electricity bills'. 'This is in addition to the fact that much ICT equipment contains toxic substances such as lead and mercury, much of which enters the environment via the dumping of obsolete equipment' (Yousif, 2010). In order to deal with the new problems, some countries have carried out their own activities to try to reduce the impact of ICT-related pollution, of which development of 'Green IT' and construction of 'Green ICT infrastructure' has attracted increasing attention in the international community. For example, in 2008, the Danish government has issued the 'Action Plan for Green IT in Denmark', in order to promote the green development and application of ICTs in the country (MSTI, 2008). Another example is that in 2009, the Korean government developed its own 'national green IT strategy', through which they planned to make more investment in the development and use of Green ICTs (ITIF, 2009). Such kinds of activities will help to reduce the risks caused by the new problems,

so that the sustainable development of an information economy can be achieved.

3.4 Regulation of Space

It is inarguable that in the new space, the flows of information are supposed to be freer in terms of the continuous improvement of communication technologies and for the sake of 'freedom of expression' (Berger, 1980; Bosmajian, 1988; Pascoe, 1992; Magee, 2002; Zeno-Zencovich; 2008). However, as the 'communication infrastructure' rather than merely the 'computer screen' (Comer, 2007; Youngs, 2009), the digital space itself still have to be to some degree regulated, which is very much like the roads and traffic lights in the industrial world today, because it closely relates to the overall quality of the communication channels, in which the information is carried and mediated as the 'strategic resource' of social and national development (Bell, 1980:531; also see Naisbitt, 1984; Babe, 1994; Brown and Lauder, 1992). It is this rationale that has ushered the development of 'Internet Governance' or IG (Kleinwächter, 2007; Benedek et al., 2008; Bygrave &Bing, 2009). According to WGIG (2005:4), 'Internet governance is the development and application by Governments, the private sector and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures, and programmes that shape the evolution and use of the Internet', 'This working definition ... acknowledges that with respect to specific issues of Internet governance each group will have different interests, roles and participation, which in some cases will overlap'. To explain it, IG should be rather seen as an agreement or commitment

that is made between or among any of the stakeholders, including rule makers, business owners, public groups, cultural or religious communities, social powers, etc.; therefore it should look after the benefits of each of the stakeholders. Otherwise, it should not be taken as a complete achievement of IG. In addition, what also has to be pointed out is that, although it is hard to reach the goal, IG should rather be taken as an effective and objective means or measure, but not as an ideological tool or goal, for maintaining, protecting and developing the existing social, cultural and political institutions, regarding the already diversified global legal system. Therefore, literally, any activities that are trying to go beyond this point, either within or across the boundaries of nation states, should not be really considered as the conceptual domain of IG no matter what the social backgrounds are (Mueller; 2004; Goldsmith and Wu, 2006; Malcolm, 2008).

In order to deal with some new rising problems facilitated over the Internet, such as cyber-terrorism, domain hijacking, child abuse online, and internet pornography, etc., it is seen that there are at least four aspects of reasons, for which IG has been developed over the recent years (Grewlich, 1999; Spinello, 2002; Paré, 2003; Spinello, 2006; Sassen, 2006; Akdeniz, 2008; Chadwick and Howard, 2009). The first aspect of reasons is undoubtedly for protecting economic interests. The Internet, as a brand new social resource, is becoming increasingly important to national economic development, since many business sectors or enterprises have been making pervasive use of the new communication tool for maintaining the service information of their daily business management. However, recent years have seen an increasing number of criminal

activities, including cyber theft and business hacking, being conducted. Therefore, effectively regulating the Internet space will help to protect business owners from potential risks to their online activities (Adediran, 2002; Mathiason, 2008). The second aspect of reasons for developing IG is related to the maintenance of social order and state security (Keith and Lin, 2006; Deibert, 2008). For maintaining social order over the Internet, it refers to the government's or any organizations' responsibility to use necessary and moderate measures to make sure that public order is protected from any risks or threats caused by extremist activities or terrorist attack (Chadwick, 2006; Banerjee, 2007). For state security, it deals with the security issues significant to the new digital boundaries between nation states in order to make sure that the boundaries will not be violated for any reasons (Youngs, 2007; Chadwick and Howard, 2009). After that, the third aspect of reasons of IG is for respecting and protecting cultural or religious diversity around the globe (Malcolm, 2008; Kleinwächter et al., 2009). To explain it, although the world has been considered as a much more globalized village than ever before, there are still vast differences between cultures and religions; and such difference or diversity should be given enough respect especially in the highly globalized world today. Last but not least, in practice IG is usually undertaken by politicians or political bodies as a new method to maintain the existing political institutions or political economy systems, because it seems that no government would be willing to give up their privileges as the rule makers of society and as the controller of the masses, even if in the new age (Thierer and Crew, 2003; Loader, 1997).

Basically there are at least four layers of measures or activities, through which IG is carried into practice, which are respectively the layers of ‘information infrastructure’, ‘Internet domain names’, ‘information contents’, and ‘Internet users’. Firstly, the most basic measure, by which a government or an enterprise would make use of to regulate the Internet space, is to take control of the information infrastructure, although the measures through which such activities are carried into practice are varied depending on different situations. According to Drake (1995), under the policy of the High Performance Computing and Communication Act of 1991 (HPCA) and the framework of NII, information infrastructure is strictly under control the US government. Even though private sectors are allowed to participate in the development of US information networks, the information backbones are firmly grabbed in the hands of the US government (also see NRC, 1997). As Gore (1991) says, ‘rather than holding back, the U.S. should lead by building the information infrastructure, essential if all Americans are to gain access to this transforming technology ... high speed networks must be built that tie together millions of computers, providing capabilities that we cannot even imagine'. Apart from that, registration and use of Internet domain names is under control of authorities as well. In instance, for the time being, although still remaining disputed, both the main root server (DNS) and the main distributor of domain names (ICANN) are firmly under control or have close ties with the US government. This has raised huge concerns about national security among the international community, such as in the EU and China (Joshi, 2005; Gross, 2008). Theoretically, without cutting off ties, all the activities over the Internet will remain under U.S. supervision. Aside from

that, censorship over the Internet is common everywhere in the world from the West to the East, in particular in the countries that have a strong collectivistic or patriarchal tradition. For instance, in the Arabic world, censorship is very normal. Speaking in a neutral manner, this has to be understood as a part of their patriarchal religious tradition (Abdulla, 2007). At last, surveillance of Internet users is an even more common phenomenon around the globe today. For this reason, both the FBI and CIA have received quite a lot challenges for their disputed surveillance activities over the US Internet and beyond (Altheide, 2006).

Summary

In this chapter, I have provided a systematic analysis of the idea of 'space of flows', which is believed to be the essential meaning of 'digital space', in four sections, which are respectively 'time-space restructuration', 'functional transformation', 'material construction', and 'regulation of space'. Basically it argues that, while ICTs are making revolutionary impacts on the substantial transformation of the national economy, the structure of the economic space is reorganized too. In the process, flows of information, rather than materials, becomes the essential element, because in the new space most of the major economic activities, including both production and distribution, are organized around information (or knowledge) and the processing of information. Also it is in this new spatial logic that it is possible for the functionalities of a place to be infinitely released. This new space is called the 'space of flows', which is seen as the key

structural form of the new organizational logic; and time becomes relatively timeless due to the placeless feature of the new space. In practice, during the process of transformation, the structural formation of urban areas is reorganized; and the urban functions become redefined. This is why we can see the emergence of some new places as ‘advanced service centers’ or the ‘technical poles’. It is also by this process that the urban areas become more function-based and more interactive and networked with their surrounding areas, so that the frames of a few mega-cities can be created. Certainly, throughout the development, material construction is strategically important, because it is the physical shape of the new space; and the phase ‘material construction’ refers to the four key components including, ‘circuit of electronic exchanges’, ‘information nodes and hubs’, ‘information managerial elites’, and ‘green ICT infrastructure’. Last but not least, ‘regulation of space’ is important to consider, as it relates to the scale and scope of the new space, within which the economic activities can be conducted.

Chapter 4

Research Methodology

Unlike the natural sciences, the social sciences refer to a very complex scientific study of human behaviors, which could be very capricious and changeable. Therefore the ways in which social scientists conduct research have to be very flexible and adjustable to various specific research areas and topics they engage in. Actually it seems that some researchers (including myself at the early stage of the research work), find it rather difficult to precisely define and differentiate the terms of 'methodology' and 'method' (Bryman, 1996). Therefore, I think it would be necessary to delineate a clarification of these two knowledge points prior to any further discussion in the rest of the chapter. According to Mackay and Reynolds (2001:53), 'A methodology is an approach or perspective which encompasses notions of what we can know about society'. So it is not necessary to consider methodology as a specific measure as to how research should be conducted; rather methodology only provides the guidelines, by which researchers can properly approach their research objectives (Remenyi and Williams, 1995). In that sense, methodology can be understood as an 'epistemological stance' (Gray, 2004:16), as a holistic structure or a procedural framework, through which researchers can properly design and conduct their research works for the purposes of answering the questions of their research projects. This is somewhat unlike a 'research method' that mainly deals with the practical ways in which the research data are collected (Wagner, 1997; Pöchhacker, 2004). In brief, methodology can be described as 'a process,

principle or procedure', by which researchers 'approach problems and seek answers' by using the proper research methods, in terms of the main goals and key objectives of the research work (Bogdan and Taylor, 1975:1; also see Wagner, 2003; Neuman, 2006).

In this methodology chapter, I want to give a discussion about how I have designed and conducted my research 'process' for meeting the research 'goals' and 'objectives' of the project. The work is structured into four sections. Firstly, I will clarify my research strategy through indicating its nature as a case study, and how this strategy has been carried into practice through my research questions, research approach, and the specific research methods. In this section, I will also provide some details about the timeline and specific procedures of my fieldwork. Secondly I will take a closer look at each of my research methods, in order to indicate the ways in which my research fieldwork has been conducted and how the research data have been collected step by step. Specifically, there are two research methods or data collection methods adopted in my fieldwork, which are respectively 'documentary analysis' and 'in-depth qualitative interviewing'. In detail, for 'documentary analysis', I will discuss the three steps I took for conducting the 'analysis' that includes 'asking questions', 'selecting documents', and 'collecting knowledge'. After that, I will also discuss the problems in conducting the process of 'documentary analysis'; and how I have solved the problems or improved the situation. For 'in-depth qualitative interviewing', I will also discuss three key steps, by which I conducted my 'in-depth interviews', including 'preparing interview questions', 'selecting the Interviewees', and 'organizing the interviews'. Then I will also discuss

the problems I had in the process of my 'in-depth interviews' and how I have solved problems using certain tactics. Finally, in the last section of the chapter, I will give a discussion about the 'integrative analysis' procedure; this is an analytical process in terms of the data I have collected. I will discuss how I have made efforts to turn the raw data into a set of coherent and integrative content for helping to work out my research findings. Now let's begin from the discussion of my research strategy.

4.1 Research Strategy

Obviously this project is a 'case study' because both Beijing and China are parts of the world in terms of the development of an information economy. Although the information technology was invented in the U.S., its impact on economic growth has widely diffused around the world since the second half of the twentieth century (Leadbeater, 1999:16). Today although China is still undergoing the process of industrialization (this situation is very typical and common in the developing world), under the distinctive national situation, China has created its own unique model to develop the information economy; and the successful story of China is believed indeed valuable to inform many other countries in the world, in particular developing countries (Hu, 2001:5). In other words, although it is argued that wide adoption and application of information technologies have been widely generated based on a mature industrial economy (Castells, 2000:99), China's experience tells that these new communication technologies could be also well applied by developing countries to enhance their

ongoing processes of industrial development (Wang, 2002:10). As the capital city of China, Beijing has been always leading the way in the new practice. In 1999 such efforts were further promoted by Liu Qi, the ex-mayor of the capital city, through launching an official project called 'Digital Beijing'. Actually the project of 'Digital Beijing' itself could be rather ambiguous, since it involves the digitization construction of all the related aspects of Beijing's development, not just limited to the economic, but also to other aspects such as the social, cultural, and political development. It is supposed that economic development is the groundwork of all the other aspects of development; therefore, the economic aspect is taken as the only focal point in this research work. Accordingly I have set two objectives for my research work, Firstly, through the research I want to find out the basic political rationale for the development of China's information economy over the recent decades; and how such rationale has been turned into practice through the case of Beijing's development. Secondly, I want to investigate and examine any practical problems and difficulties of the development; and how such problems or difficulties can be improved for a better development of China's information economy in the future. After clarifying the objectives, now let's turn to look at the specific questions of the research work.

4.1.1 Research Questions

In fact, it seems to me that 'research objectives' are more like the 'directions' for conducting a research project; and to clarify the research questions is rather important,

because without the questions it would be very hard to specify the targets of the ‘directions’. Therefore, after having addressed the research goals and objectives, a group of research questions should be designed and prepared to help initiate the fieldwork of my research project. In addition, the research questions should be correlated to one another, so that a coherent sense of answers can be generated through the research work. Apart from that, I also believe that properly phrased questions could help to make the right choices on the data collection methods; and proper data collection methods will then help to seek valuable answers to the research questions. Therefore, before collecting the data, the detailed research questions should be asked as a priority. Essentially I have posed three research questions to facilitate my research work. The first question is ‘what kind of information economy is being supported in China and why’. The second question is ‘how and how well is the information economy developed in Beijing’. The third question is ‘what are the major problems and difficulties challenging the development of China’s information economy through the case of Beijing’. To explain it, for the first question, I want to clarify the details of the key policies made by CCG in support of the development of China’s information economy, and the motives in which such policies are conceived. For the second question, I will have a look at the ways, in which the policies have been carried out to support Beijing’s digital economic development; and how the specific progress has been achieved to date. Then for the third question, I will shift my focus to examining any problems or difficulties that exist in the development process, so that such information will be used to set up further objectives of China’s developing information

economy. After clarifying the research questions, I realize that I have adopted an interpretivist view of my research approach. This is important, because different views of research approach will directly affect the decision-making on the data collection methods afterwards. So let's take a moment to find out what the 'interpretivist view' is.

4.1.2 Research Approach

Basically there are two views on a research approach. One is called 'positivism'; and another is called 'interpretivism' (Walliman, 2005:202). Generally, it is believed that the positivist research is the founding research method of social science study, for which the early sociologists, like Emile Durkheim, intended to study social science as 'analogous' to natural science (Meštrović, 1993:46-49; also see Hamilton, 1995). As Durkheim (1938:32-33) indicates, 'our method is objective … It is dominated entirely by the idea that social facts are things and must be treated as such'. According to Cassell (1997:124), the 'positive model … has an assumption that here is an existing truth in the world, which can be revealed through scientific method, where the focus is on measuring relationships between variables systematically and statistically'. But interpretivist research is a rather different view compared to the positivist research paradigm. According to Mackay and Reynolds (2001:57), 'interpretivism starts from the position that making sense of social change involves understanding the thinking, meanings and intentions of those being researched'. To give an example in the field of information studies, 'positivists might record measures of e-mail use, to show the

growth of the communication medium. They can tell us little, however, about the significance of e-mail communication. They are unlikely to explain whether e-mail is different or the same as other forms of communication, why people communicate more or less by e-mail, or how we should understand e-mail communication, for example, in comparison with telephone calls. To answer such issues and to make sense of e-mail communication, we need to explore the interpretations of e-mail users'. According to Berger (2000), the most representative interpretivist research methods are interviews, historical analysis, ethno-methodological research and participant observation and so on. Certainly there are still some weaknesses in the research works by interpretivists. One of the most important weaknesses, as Mackay and Reynolds (2001:59) indicate, is that, 'interpretivists make no claim[s] of generalization from the small number of settings which they have investigated in depth'. Therefore, although there is a richness of depth in the interpretivist research approach, it is nevertheless hard to ensure the validity and representativeness of the findings and the related implications.

As mentioned earlier, the research approach adopted in this project is rather of an interpretivist approach; this is to a large extent determined by the research objectives and the research questions of the project. Actually, as I have already claimed in the previous sections, this research project is mainly about evaluating and examining the meaningful development of China's information economy. Therefore the work needs to be focused on a goal to understand the in-depth meanings of the development and any related social motives and rationales lying behind the development, rather than merely

reviewing the 'superficial' statistical data about the development. In fact, this has been already clearly reflected in the ways I posed my research questions. Certainly it may be true that due to the limitation of the availability or accessibility of the resources, including documents and interviewees, the quality of my research results might be to some extent limited[24]. But I still think I should act as an interpretivist viewer when look at China's developing information economy, because under China's special national situation, the development itself is seen as an outcome of the government's subjective orientations rather than a direct and objective result of market activities (Harvey, 2005). Certainly, my interpretivist approach does not necessarily mean that I will abandon using positivist measures to help me achieve the research goals. Rather, in order to improve the validity and accuracy of my research findings, I have made use of a certain amount of statistical data and visual images to support my discussion, although some of such 'supports' are secondary data I borrowed from the relevant reports of either government institutes or Non-Government Organizations (NGOs).

4.1.3 Research Methods

Although closely related to the concept of 'research approach', 'research method' is actually a different term because it is mainly referred to as something dealing with the detailed measures for data collection (Stake, 1995; Yin, 2008). According to Padgett

[24] It is believed that when conducting policy-based research works, the more and the higher levels of policy information the researcher can approach, the better it is for the analytical results. However, due to my 'current status', it is hard to approach a great deal of 'high-level' policy information, even with my affiliations with certain organizations having close ties with GI and NGO (I will discuss more of this in section 4.3.4)

(1998:1-2), there are two different kinds of research methods, namely ‘quantitative methods’ and ‘qualitative methods’; and both of them have advantages and disadvantages in social science research work. For the ‘quantitative methods’, as Creswell (1994:7) argues, they are based on the use of ‘a deductive form of logic’ to examine the relationship between hypotheses and social phenomena; ‘the intent is to develop generalizations that contribute to the study or theory and one that enables better prediction, explanation and/or understanding of a phenomenon. These findings are enhanced if the instruments used are valid and reliable’. As for the ‘qualitative methods’, it refers to ‘where inductive logic prevails’, as Bryman (1988:23) indicates, ‘data emerges from informants rather than being identified before the research by the researcher. This provides valuable information, which leads to an explanation of the phenomena’. In that sense, ‘quantitative methods provide a wide but shallow emphasis, whereas qualitative methods give a narrower but more detailed focus’. As Wagner (1997:63) indicates, the quantitative methods tend to be ‘related to logical positivism, the traditional empirical research paradigm of natural sciences, while qualitative research relates to the phenomenological, hermeneutic research tradition that originated in the social science’. In practice, quantitative methods usually refer to those research methods dealing with numbers or numeral evidence, like ‘contents analysis’, ‘questionnaire survey’, ‘experiments’, and so on; while qualitative methods would care more about meanings, like the methods of ‘documentary analysis’, ‘in-depth qualitative interviewing’ and ‘historical analysis’ (Berger, 2000; Silverman and Marvasti, 2008).

In my research work, I have adopted two qualitative research methods for data collection, because in this project, I am more interested in collecting meaningful information, rather than numbers, relating to China's developing information economy. The two research methods are respectively 'documentary analysis' and 'in-depth qualitative interviewing'[25]. Actually these two research methods are interdependent on each other; 'documentary analysis' based on policies and regulations can provide the basis for my in-depth interviews; while 'in-depth qualitative interviewing' will help to further advance the comprehensive understanding of the relevant policies and regulations. In more detail, for the 'documentary analysis' in this project, it is primarily about collecting, sorting, and analysing the policy information, in order to work out some basic knowledge of the policies and regulations; the results can be used to prepare the specific interview questions so as to improve the interviewing quality in the next stage of my fieldwork. According to my own experience, some interviewees, especially the interviewees with a political background would not be interested in struggling with interviewers about theoretical or any general questions; rather they tend more to show interests and respond to those questions relating to the specific policies. Therefore, 'policy reading' before interviewing this group of people would seem to be especially important; otherwise it could be very likely that I would not easily get the exact answers I wanted. As for the 'in-depth qualitative interviewing' in this project, its main aim is to reveal the 'undiscovered stories' behind the policies. Through interviewing with the authorities from government and enterprises, policymaking and implementation

[25] In this section, I will only give a brief introduction to the two research methods I have adopted. In the following two sections, I will have a more detailed discussion about each of the methods separately.

processes were expected to be clarified; and this would then help to further look into the depth of the relevant policy information made to support China's information economy development. In practice, I planned to interview three groups of people. They were respectively the officials from the relevant national departments of CCG, the local authorities from BMG, and the representatives from a selection of involved ENTs[26].

Arguably, the way that I used to collect data could also be considered as a method called 'triangulation', which means that more than one method is taken into the process of data collection, in order to improve the accuracy of research findings (Lindlof and Taylor, 2002; Chauri, 2004). According to Mackay and Reynolds (2001:60), researchers 'commonly deploy a variety of methods when they are doing research; such use of multiple methods or sources in social research is often referred to as triangulation'. In fact, there could be various reasons for researchers to make use of more than one method in their research works. For instance, the data collection method could be sometimes 'biased' and 'value laden' with researcher's own perspectives; it may also contain 'blind spots' not recognized by the researcher (Banister et al., 1997:145). Therefore, to make use of the method of triangulation is to 'improve the reliability' of data collection, and to 'support the coherence and comprehensiveness' of arguments; through combining techniques and methods into one study, 'the inconsistencies can be counterbalanced, since 'the data can be compared, and similar findings from different methods or sources may support the validity and comprehensiveness of an argument'

[26] I will give more detail on each of the groups in the section 4.3.

(Mackay and Reynolds, 2001:61; also see Seale, 1999). As discussed earlier, the two methods I have used are ‘documentary analysis’ and ‘in-depth qualitative interviewing’. In terms of the idea of ‘triangulation’, for ‘documentary analysis’, its purpose was to collect the basic information from the key official documents and provide some basic analyses, in order to ensure the objectivity and accuracy of the policy information; while for ‘in-depth qualitative interviewing’, its main aim was to gain insight into the contents of the policy information, so that more supportive meanings of the policies could be revealed through the in-depth and qualitative interviews.

Apart from ‘documentary analysis’ and ‘in-depth qualitative interviewing’, practically I have involved another ‘method’ to support my research work, in particular to support a background analysis I conducted prior to my main research fieldwork. This ‘method’ is called ‘desk research’ (Jackson, 1994:1). Actually, ‘desk research’, being taken as a research method, is rather popular in business studies or marketing research, because it is cheap, time effective, and can help to gain a large amount of information in a comparatively much shorter time (Birn, 2002; Crouch and Housden, 2003). The purpose of conducting such ‘background analysis’ in this study was to help to build a contextual framework for my research findings, because without it, readers, especially those from a different social or political background, may feel difficult in understanding or digesting the information delivered through my research work, since China has its own special situation in the development of an information economy. In practice, for conducting the ‘desk research’ in this work, I have used two types of data, namely

primary data and secondary data. For the secondary data, on which most of the 'desk research' is based, I have used both Chinese and English references. However, for certain information that I could not find references for or could not ensure accuracy of the sources, I had to either find out the relevant documents or conduct special interviews, including telephone interviews, with my colleagues in China. For example, when I was seeking the information about China's institutional reform, I could not find any valid source to refer to; instead I had to conduct interviews with MC1. Actually another advantage for using such kinds of primary data is that all the information is rather updated; and this has to a certain degree improved the accuracy of my background study, and also the accuracy of my research findings where related.

4.1.4 Timeline and Procedures

After clarifying the research goals, objectives, questions, approach, and the detailed data-collection methods, then I could start to conduct my fieldwork. Actually in order to set up a systemic and effective mechanism to drive the progress of my fieldwork, I have taken at least four main stages or phases to conduct my fieldwork. The first stage is called the 'documentary analysis' stage, at which I searched for and looked over a number of relevant policy documents, in order to collect the basic policy information to support my arguments. The second stage is called 'in-depth qualitative interviewing', at which I conducted some face-to-face interviews, in order to find out the in-depth information behind policymaking and implementation processes. The third stage is

called the ‘integrative analysis’ stage, at which I combined and analyzed the data I had collected from the first two procedures, in order to achieve the final outcomes of my research findings. Although it looks like each of these stages can make progress independently on their own initiatives, they are actually closely interrelated to one another, composing a coherent process of work flow. For instance, quality ‘documentary analyses’ can provide a good support to ‘in-depth qualitative interviews’; and well conducted ‘in-depth qualitative interviews’ can help to improve accuracy of my ‘integrative analysis’. In practice, there was actually another ‘stage’ of my fieldwork, which I would call the ‘data repairing’ stage. At this ‘stage’, I had to conduct some extra fieldwork, in order to fill in the data that were missing from my premier research results. Now I shall explain each of these stages in more details, so that the timeline and specific procedures of my research fieldwork will become more explicit (see table 4.1). After that, in the next two sections, I will begin to discuss the specific processes, in which I conducted my fieldwork with regard to the two research methods in steps.

Timeline	Procedures
2005 – 2006	The first stage of my fieldwork is called 'documentary analysis' stage. At this stage, I firstly took over 6 months (from October 2005 to April 2006) to search for and look up quite a number of policy documents over the Internet in order to achieve some basic policy information for each knowledge area of my research work. Then according to the basic policy information collected, I began to design and develop each of the research areas, so that an overall framework was built up and ready for further fieldworks. Although it looks like this stage of my research work is relatively easier, it was actually much rougher than I thought it would be, in particular at the beginning of the searching process, because I had to conduct quite a lot of extensive searches for each of the research areas due to the limits of my relevant knowledge.
2006 – 2007	The second stage of my fieldwork is called 'in-depth qualitative interviewing' stage. At this stage, I took over 4 months in total (respectively from July to August 2006 and from February to April 2007) to conduct my interviews in Beijing. Usually I had to make appointments with my target interviewees at least 1-3 months in advance before the interviews were conducted, through using my 'guanxi agents' in the two organizations I was affiliated with (one organization is an influential Chinese NGO has close ties with NDRC; another organization is a reputable IT & e-business legal consulting company). The interviews were arranged rather randomly subjecting to the availability of the interviewees. Some of the interviews were even rescheduled for 2-3 times before the final decisions regarding time and place were made for the meets.

2007 - 2008	The third stage of my fieldwork is called 'integrative analysis' stage. At this stage, my work is mainly focused on the process of matching and integrating all the data I had collected from both 'documentary analyses' and 'in-depth qualitative interviews' into the different specific research areas regarding their relevance. It is undoubted that this stage is one of the most important as well as the most complicated procedures among all the three stages so far, since that I had to cope with the different kinds of information fragments, and synthesize them into larger images in order to make a set of coherent meanings that will be used to work out my research findings. Actually this stage took place at the same time as I started wring up the research findings part of my thesis, though it has to be considered independently on its own.
2008 - 2009	The last stage is called 'data repairing' stage. Actually it is not unusual that, after collecting and integrating the data, some important information or key messages are found missing out from the research outcomes. In that case, I have to conduct some extra fieldworks, in order to 'repair' the missing data. Usually in this situation, I would prefer to do more 'documentary analyses' for the additional data collection, because it is much easier and more feasible to do comparing to conducting more interviews. But if in the special case that I had to collect very important messages from the interviewees, either I chose to use 'telephone interviews' instead or I had to conduct new interviews with other relevant people, because it is very hard to manage 'revisits' with the same interviewees only for the missing data of my research work.

Table 4.1: Timeline and procedures of my fieldwork

4.2 Documentary Analysis

Documentary Analysis is usually considered as a very common qualitative method when doing social research; it helps to decode the messages that have been encoded in texts; 'when documents are put forward for consideration in schemes of social research they are approached in terms of what they contain. That is, the focus is principally on the language embodied in the document as a medium of thought and expression' (Prior, 2004:76; also see Bloor and Wood, 2006). When doing research in policy analysis, documentary analysis has become one of the most popular methods (Yanow, 2000). It is not only because most policies and related information are recorded in the form of documents; but more importantly because what is recorded are not just policymakers' words or languages but also their thinking and logic of decision making. In practice, in my research work, through looking into the important policy documents, the key information to support China's development will be revealed; and this is very helpful for creating the initial structure for my further research and analysis. Specifically, I've referred to a number of documents for my analysis, which include government papers, official announcements, committee reports, and minutes of official talks. Official websites are interviewed too, because there is also some very important information, such as statistic data and news stories, which are significant to my research work. For more details of the documents being referred to, please see the attached Appendix A.

4.2.1 Asking the Questions

Before commencing any actual steps of documentary analysis, I think it is very important to make clear what kind of information I was really looking for through working with varieties of documents; and to what degree I wanted the information to be related to my research analysis. In consideration of this, I created a 'question-asking' mechanism to facilitate my 'documentary analysis' process, which means that through asking some 'orientating questions', I could effectively target the documents I needed for my documentary analysis. Unlike the questions for the interviews, the 'orientating questions' here are used to ask the researchers themselves, in order to help researchers to more effectively find the information they think more useful for generating the valuable answers to the analysis. In other words, asking the questions is very much like setting up specific goals for searching information from documents; otherwise, the searches might become inefficient or even aimless sometimes. However, this process is different from making hypotheses or any related ideas, because making hypotheses is more reliant on presetting the outcomes of the answers. But what I really need here is to create a pathway to the answers, rather than the answers themselves, because I think there is no way to get the answers before even having the questions. Therefore the questions being asked here tend to be more open with some kind of inherent logic of thinking. For instance, I may ask a question like, 'which kind of policies can best represent the officials' position in support of China's software industry, and what is the logic making such a connection'.

4.2.2 Selecting the Documents

Being driven by the 'question-asking' mechanism, I firstly started to browse over the internet through Baidu.com (the most powerful search engine for Chinese information), intending to find out documents that I would think might contain more useful policy information for analysis. I am grateful for the Internet, because there is such a great amount of information I feel is relevant to my research work. But it is never an easy job; this is also because of the sheer amount of information on the Internet. I had to compare and contrast all those documents containing similar policy information, in order to finally select those most representative policy documents. Actually one of the hardest things I found, during the process, was that most of the policies made by the policymakers had very little to do with theoretical knowledge; rather it seems that the policymaking itself is mainly based on the actual facts or the real experiences of the policymakers. I think this is maybe in accordance with the fact that most of the Chinese policymakers are holding on to one of Chinese Communist Party's (CCP) most well-known Marxist guideline thoughts, 'Practice is the Sole Criterion for Testing Truth', which was initially raised by Deng Xiaoping in 1978 (Yu, et al., 2004:15). Therefore, it made it very difficult for me to search for any actual policy documents that would exactly match up with the abstract theoretical terms like 'information society' or 'information economy'[27], since there is always distance between theories and practice due to the different ways the ideas are generated. In such cases, I had to be 1) very clear

[27] This is very different from the situation here in the European countries for instance, as we usually don't have much difficulty in finding official documents titled with terms like 'information society' or 'knowledge economy'.

about every specific knowledge point relating to my research study, and 2) very patient to look through every specific detail in the policy documents, in order to do the 'matching up' in my brain before making any selections.

4.2.3 Collecting the Knowledge

After having selected the documents, the next step is to work with the documents and collect the useful information or knowledge relating to my research objectives and questions. Actually I think it is a bit misleading to simply call it 'collecting of knowledge', because in such a way, it makes it more look like a quantitative method to deal with document data collection such as content analysis, even though there are indeed quantitative trunks of information having been collected. Maybe I should use 'analytic collecting of knowledge' instead, because it really depends on the researchers' high-level understanding, perception or even sensitivity about the information contained in the purposefully made policy documents that were carefully selected at the previous stage of my fieldwork. In addition, it is also different from the passive meaning of 'information analysis', because I had to repetitively test the information with the questions preset through the 'question-asking' mechanism, and ask myself, 'is this the information you want?'; 'why do you want the information?'; 'can the information help you the answer the question?'; 'what can you do next with the information?'. In other words, if selecting of documents is seen as an objective process, then collecting of knowledge is supposed to be considered a more subjective and complicated process,

because the researchers have to hold more subjective manners such as knowledge comprehension, standpoint, and so on, while getting engaged in the fieldwork[28].

4.2.4 Challenge and Resolution

I think no one would doubt that, policy-based documentary analysis is a 'tough job', not just because of the workload and complexity of the investigation process itself, but also because of its high requirement on the researchers' extensive knowledge. There is no certain united form to use for conducting policy analysis in particular in different social and national contexts, because it is such social and national contexts that are actually where the policies are based at. That is a real challenge for the conduction of policy analysis. To be specific, for instance in my case, without having gained some knowledge about the policymaking backgrounds and the overall policymaking system of CCG, it would be very hard conduct the analytical works. In fact, at the early stage of my documentary analysis, for example, I even felt hard to understand the relationship between industrialization and informatization in China's development context. In order to deal with the challenge, I had to conduct a lot more background searches in order to understand the development histories of China's industrial economy and information industry; this was really time-consuming. Apart from that, to gain some knowledge about China's policymaking system is important as well. In fact, due to China's special political environment, the structure of the Chinese policymaking system is very

[28] I'm not saying that selecting of documents is not subjective, but if compared to collecting of knowledge, selecting of documents is much more objective, because it's less depends on researchers' personal understanding and willingness of the their needs for the answers.

complicated. Sometimes, different official departments and local bureaus have their own policies and regulations to deal with similar kind of issues; some of policy areas overlap with one another and make it even harder for researchers to decide which policy documents are more valuable to use. To deal with such challenge, apart from looking up some explanatory information, I even conducted some 'special interviews' with my colleagues from the organizations I was affiliated with. I find this is very helpful.

4.3 In-depth Qualitative Interviewing

In-depth qualitative interviewing is another very common qualitative research method in case studies. As Yin (2008) indicates, this is because it relies on in-depth investigation into the initiatives or factors, on which a case study is established. Through looking into the qualitative details, an interviewer will be more likely to generate some original meanings through asking the right questions. As Marshall and Rossman (2006:101) argue, 'qualitative, in-depth interviews typically are much more like conversations than formal events with predetermined response categories. The researcher explores a few general topics to help uncover the participant's view but otherwise respects how the participant frames and structures the responses'. Actually this is another reason why in-depth qualitative interviewing has become one of the most commonly adopted methods by the researchers conducting case-study-based research. From a behaviorist perspective, Berger (2000:111) describes it as a 'conversation between a researcher (someone who wishes to gain information about a subject) and an

informant (someone who presumably has information of interest on the subject).' He thinks that 'interviewing is a work essentially about information obtaining; therefore, interviewing should be primarily emphasized on the approaches, in which more information could be received'. This is why all the interviews need to be properly designed in different forms of structures. However, as Fontana and Frey (1994:47) argue, similar to other aspects of qualitative research there is no defined parameter or guidance to point the researcher to the one 'best way' of interviewing (also see Fontana and Frey, 1998; Seale, 1998; Flick, 2002; Denzin &Lincoln, 2005).

In this project, in-depth qualitative interviewing would be rather important, because only through in-depth interviews with policymakers and policy implementers, is it possible to understand the process and effectiveness of policymaking. For instance, if I want to find out the reasons why CCG makes certain regulations to rule the Internet, I will have to conduct in-depth qualitative interviews with those who are actually involved in the process of making such regulations; otherwise it would seem very unlikely that I would collect answers high in validity. To interview the representatives from the ENTs whose businesses are involved is important too, because I need to know how they would respond to the policies and the implementation of the policies as they are after all the business owners. Apart from that, in order to conduct effective in-depth interviews, making plans is really important, because I think whether the interviews are planned well will directly affected the quality of the collected data. Such planning has to be closely related to the documentary analysis from the previous step of my

fieldwork, so that both methods can work well with each other in order to generate more valuable and coherent sense of meanings. To explain it, from documentary analysis, it is becoming clear what policy information is related to which area of China's information economy; and through in-depth interviewing, it is emerging what meanings are delivered through the policy information, and why the policymakers want to deliver such meanings through the policy information.

4.3.1 Selecting the Interviewees

In order to conduct effective qualitative interviews, one of the most important things to do is to select the 'right' interviewees, because if the interviewees are not eligible and informative enough on the areas being discussed, the interview quality could be very low. Proper selection work could help to improve the 'believability' of the interviewees, which means that 'what you have been told is on the mark and that you have not been deceived by your interviewees' (Rubin & Rubin, 2005:71). That is to say, for interviewers, they have to be very sure about the 'quality', such as the status or positions, of their interviewees; otherwise, the data they collect may risk validity problems. In fact, there are three groups of people whose interests are closely related to China's developing information economy. They are respectively, CCG, BMG, and ENTs whose business or investments are involved in or related to the development. Actually owing to the different perspectives, the ways that people from these three groups look at China's information economy could be very different from each other. To

be specific, for the government agencies, what they tend to focus on is the substantial impact of information technologies on the economic performance as a part of China's national development. Therefore, from their 'macro-' perspective, the development itself has to fit into the current national and political situation. But for ENTs who would rather place 'profit making' and 'risk avoidance' as the most important things, they are more interested to look into the practical problems and difficulties in development, since they always believe that 'solving problems' is the 'root' of development. My real purpose of interviewing some people selected from these three different groups is that I want to bring together the related information from these people, so as to find out their 'conflicts' with each other; and it is such 'conflicts' that will help to create the 'ideas' for the future trajectory of China's information economy development. In another way, I would describe my interviewing process as coordinating a virtual 'round table', where different participants will give their own different information; and the key ideas of my research findings are generated from the overlapping areas of information, either in the form of contradiction or in the form of complementarity (see figure 4.1).

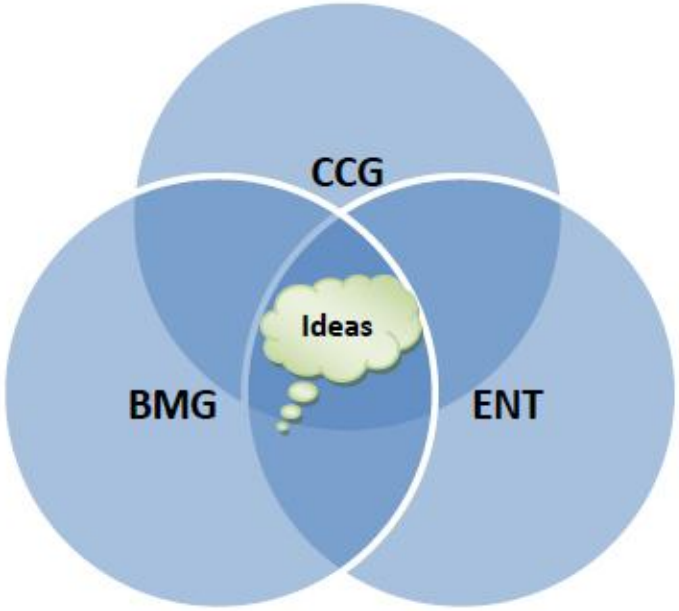

Figure 4.1: Graphic view of the virtual 'round table' (between CCG, BMG and ENT)

To be specific, the first group of people I want to interview are those officials who make the policies to support China's information economic development. Through interviewing these people, I want to find out the motives for the transformations or the changes in the views of CCG on China's information economic development over the past decade and the directions, in which the transformations or changes will keep going over the next ten years. In addition, by interviewing this group of people, I also want to know all the political forces that have played parts in the policymaking process, since by being aware of such forces I would be able to understand the transformation from a more comprehensive perspective. The second group of people I plan to interview are the officials who are responsible for the policy implementation in Beijing. By interviewing this group of people, I want to receive some firsthand authoritative information about the development of Beijing's information economy. In detail, the first

thing I am interested in would be how Beijing's local government has readjusted the ways the policies are implemented in order to have them better adapt to Beijing's distinctive local situation. The second kind of information I want to receive are the problems or difficulties in the development of Beijing's information economy; and how the local government has conducted activities to deal with the problems and if there are any further plans to keep driving the development. The third group of people that I want to do interviews with are the representatives from the involved ENTs. With these people, I want to find out the practical problems affecting the development of China's information economy, as well as the development in the case of Beijing. Some of my interviewees are senior staff from the traditional ENTs but in the process of digital transformation. With these people I want to find out the difficulties occurring in the digital transformation of their business. Other representatives are those senior staff from Internet service companies. This group of people are expected to help me find out their initial problems in running the new digital businesses in China and their ideas of the related policies. For more details of the interviewees, please see the attached Appendix B. Actually for the purpose of protecting the private information of my interviewees, I have decided to make use of anonyms instead of their real names and working positions. But their work places are intentionally left open so that readers will feel easy to link up the interviewees and the information they give for the interviews[29].

[29] I have used four groups of anonyms, namely CG, BG, ET, MC, to replace the private information including names of my interviewees. To explain it, I use CG 1,2,3… to replace the names of the interviewees from the Chinese Central Government; I use BG 1,2,3… for interviewees from the Beijing Municipal Government; I use ET 1,2,3… for interviewees from enterprises; and I use MC1 for the interviewee from China Information Industry Association.

4.3.2 Preparing Interview Questions

After selecting the interviewees, the next step is to prepare interview questions. Despite having had the research questions, it is obviously inappropriate to 'throw' the 'big questions' directly to the interviewees or 'conversational partners', because 'it is too abstract to elicit a meaningful answer' (Rubin and Rubin, 2005:152; also see Denzin and Lincoln, 1998). Preparing qualitative interview questions for a case study could be very 'complicated' and different from preparing a quantitative survey questionnaire, because most of the interviewees would expect to have their 'unique experiences, and special stories to tell' (Stake, 1995:65; Silverman, 2006). In my research case, preparing interview questions would be actually even more complicated, because most of the people I intended to interview had special backgrounds; they were either officials or enterprises representatives. Therefore I had to be very careful when I was preparing the questions; otherwise, it is possible that I would not tend to get the needed answers. In practice, the three main research questions are converted into eight specific interview questions in order to further clarify my research aims (please see Appendix C).

As listed in Appendix C, there are eight key general interview questions preset for the eight different specific fieldwork areas I was going to interview about. The purpose of doing this was to abstract the key points of each of my interviewing areas so that I could easily remember what to ask while conducting the interviews[30]. However these

[30] It makes interviewers look awkward and very unprofessional if they bring the written questions to the interview venues. It also makes the interviewees uncomfortable and they tend to give short answers to the questions.

eight questions were still not the final interview questions I would use for the practical interviews. Rather they were only taken as the basis or the main lines to help me conduct a group of more flexible interview questions when I was doing the interviews, because I had to make myself very adjustable in order to fit in the 'conversations' between me myself and my interviewees instead of simply having them giving some fixed and prepared answers[31]. The advantage of preparing interview questions in this way was that it would make the interviews more comfortable, relaxed, and more like some improvisational talks rather than intentional events[32]. However, unavoidably due to the unstructured feature and a lack of standardization of the way in which I prepared the interview questions, the validity of the questions themselves was to some extent decreased or affected. Such a contradiction is indeed a challenge that has to be born in mind by other researchers who also want to conduct in-depth qualitative interviews with people who have official or other authoritative backgrounds in China.

To give an example, when I was going to interview BG5 about how BMG had promoted Beijing's informatization for the local industrial economic development, apart from some necessary background information I didn't prepare any fixed interviews questions until the beginning of the 'conversation' between us (please refer to the second key interview question in the Appendix C). Since I knew that BG5 was one of the key participants to make the 11th Five-year planning for Beijing's local

[31] From the lessons before, I realized that only in such a way, the interviewees would be willing to effectively communicate with the interviewers. I will give more discussion about this in the next section (4.3.3).

[32] As mentioned, most of my interviewees were those who had special backgrounds; therefore, to make them feel relaxed and comfortable during the interviews was very important. Otherwise, they might tend to give short or cheap answers, because literally they didn't feel they had to answer every question if they were not happy about the interviews; after all, they didn't know much about me and my exact intention in conducting the interviews.

informatization development, I began the conversation by asking him to give some knowledge about Beijing's informatization development for the industrial economy in the 11th Five-year period and compare it to that of the 10th Five-year period. Then from his feedback, I picked up some useful information in order to generate more new questions; for example, I can remember that I asked BG5 why in the 11 Five-year planning period BMG stressed so much the 'producer services' rather than simply continuing to emphasize the 'information services'; and following up this question, I also asked him to give more detailed information about Beijing's development in the 'information services' and how Beijing's current development fitted in the whole policy environment of China's 'information services' development as a strategic decision.

In practice, aside from playing a role of 'main lines' to help me create more specific interview questions, the eight key interview questions were also useful to help me work out the 'interview outlines', which were essentially important when I was making appointments with my interviewees who all had authoritative backgrounds. Actually without the 'interview outlines', it was very unlikely that they would accept my interview requests. Briefly an 'interview outline' is a small paragraph usually requested by the interviewees for the interviewers to clarify their interview purposes and provide a rough guide of the main questions they would want to ask. In addition, apart from preparing the 'interview questions', I also had to prepare some other questions relating to my interviewees' background information. This was actually a 'tip', I would say, for improving the quality of my interviews, because according to my own experience, when

conducting an in-depth interview, researchers should never go straightforward to the interview questions at the opening, as it would freeze the 'atmosphere' of the interviews; and it might affect the rest part of the interviews. Therefore, I would suggest researchers to read some background information about the interviewees, and prepare some questions or discussion topics to help easing the tension during the interviews.

4.3.3 Organizing the Interviews

After having prepared the interview questions, the next step was to organize the interviews. Basically I have taken at least two major steps to organize my interviews, which are respectively 'making appointments' and 'conducting interviews'. Actually the reason why I want to stress the first step so much here is that it is never an easy job to make interview appointments with the people who have authoritative backgrounds in China, in particular with those who have the backgrounds of government and enterprise. In practice, before any of my interviewees accepted my appointments, they usually wanted to know more about my background, so that they could make sure that accepting my 'interviews' would not affect them in any way. For instance, as one of my colleagues in China once told me, Chinese officials were usually very cautious being interviewed by journalists and the researchers having non-Chinese academic backgrounds, because they were concerned whether the interviewers would misinterpret or misuse the received information for certain purposes; while business owners were more cautious being interviewed by journalists and the researchers from other

commercial organizations, because they were worried if the interviewers would intend to 'steal' any 'commercial secrets' from the companies they were working for.

Actually I can remember that one of my interviewees clearly told me that, some journalists were not very professional and ethical when they did or after they did the interviews; what they wanted to do was nothing more than to create 'immediate effects' to attract public interest. So when they wrote the news reports, they would tend to 'surmise' or 'twist' some 'facts' from the information they derived from the interviews; and if such was the case, their reports would tend to be biased and valueless. Therefore, for my case, it would be very difficult if I had revealed my status as doing research in an overseas university, because simply they were not sure about my 'purposes' by conducting the interviews. Therefore, I had to find a 'legitimate' way to facilitate myself through the interview works. This is why I used my 'guanxi' or social networks to get myself affiliated with two organizations that have different backgrounds. One was a reputable IT legal consulting company; and another one was an influential IT industry related NGO[33]. With the new 'legitimate' status, then I could conduct interviews by avoiding the ethical problems. Actually even right before I began the interviews, some interviewees still wanted to double-check my interviewing qualification, as they knew sometimes some journalists did reach them in such ways[34].

[33] I will discuss more of this in the next section (4.3.4)
[34] At least a quarter of my interviewees double-checked my status in either direct or indirect ways.

While conducting an in-depth qualitative interview, the interview structure is another very important issue to look after, because unlike general conversations, 'interviews are structured conversations' (Rubin and Rubin, 2005:129). Therefore, the more carefully you structure the ways to conduct the interviews, the better answers seemingly you would receive from the interviewees. Actually according to my own experience, when researchers interview authorities or some influential people in China (I mean on the informal occasions), the more fixed the interview structure is, the less likely they will receive much information from the interviewees. I think the reason might be that those authorities who hold important positions do not usually feel that they have to give you too much information, because there are always 'risks' of telling something they should not tell, such as government or commercial secrets[35]. Therefore, in order to improve the quality of the works, I created a rather flexible or mixed structure (between fixed and open structures) for my interviews. In detail, firstly I would not usually go to the interview questions straightway when we both sat down, because it could make the atmosphere very uncomfortable as we both knew that we might refer to some information that should not be revealed to the public. Instead I chose to begin with a short conversation for warming up. This also could help to ease my nerve as well.

After the time for warming up[36], I would usually restate my purpose for conducting the interviews[37]. At this time, mostly they would ask me what the questions were; and then

[35] This is could also the reason why they are usually very cautious about any unofficial journalists' interviews.
[36] I would have to sense that when they were ready for the interviews
[37] Usually I would say, 'I'm at the moment involved in a research project at the organization (or the company), so I want to ask for some advice about some things I'm not very sure'.

I began the formal procedures of my interviews, asking the questions. Usually after a question, I would redirect them back to one or two previous points I didn't understand (or pretended not to understand) and left them more space for free discussion[38]; and usually at this moment, I would take occasions to insert some more specific but related questions, and make sure that everything I needed would not be missing from the interviews. For data recording, they did not mind if I wanted to write down their words on paper. But most of them did mind that if I wanted to use audio recorders, even though they did not have to tell you about this directly; this did raise a huge challenge for me to record data while conducting a few interviews in the beginning. In order to deal with the problem, I had to make my questions very detailed or specified so that I would be able to write down the key points. Actually most of the interviews were very short, normally taking no more than 5-6 minutes, so it didn't cause me too much trouble to sort the data after the interviews. I felt these kinds of interviews were really effective for the data recording in my research because I could easily remember the exact information delivered by the interviewees shortly after the interviews.

4.3.4 Challenge and Resolution

In fact, interviewing senior staff from government and enterprises is different from interviewing ordinary people, because they are more cautious about what they have to tell you. I find this is in particular the case when they are invited to attend unofficial

[38] They were usually very happy to do so, because they thought you had carefully listened to what they said.

interviews or private talks with someone who they don't know very well. In order to deal with the challenge, I had to use my 'guanxi' or 'social networking' to get myself associated or affiliated with certain organizations they trusted and were closely related to, so that it would become easier to have them accept my interviews (for the organizations, not for myself). This has also helped me avoid any related ethical problems, because I didn't have to 'lie' to them about my personal status. In addition, in order to help with easing the tension during interviews, most interview venues selected were public areas, such as restaurant or café, because it would make the conversations look more 'informal' and 'relaxing'[39]. One of the organizations I was affiliated with was China Information Industry Association (CIIA). In detail, CIIA is a very influential NGO under the supervision of the National Development and Reform Commission (NDRD)[40]. They mainly provide information services for China's information industry and the related informatization development in China. I was affiliated with their Media Center, as a part-time journalist and the overseas correspondent. The commercial organization I was affiliated with was a reputable IT legal consulting company called Beijing Deofar Information Technology Co Ltd.. Beijing Deofar is one of the earliest private companies in China conducting legal consultancy for information industry in China, in particular for electronic commerce related business. They have close relationships with many Chinese IT companies and some departments of the previous Ministry of Information Industry (MII)[41]. I was affiliated with them as a part-time

[39] Actually it would not be a wise idea to meet these people in their offices. 1). It is very complicated to get access into the official buildings. 2). It is impossible for them to accept your interviews in their workplaces
[40] This was also the reason why I was able to easily reach the officials from NDRC.
[41] Now it is the Ministry of Industry and Information Technology (MIIT)

research associate. Apart from that, I also established a good relationship with some other IT consulting companies, such as Atos Origin China and Beida Jade Bird IT Consulting Company. For example, Atos Origin is a French-based multinational IT consulting enterprise, their Chinese subsidiary has participated in many important IT projects in China, such as the information system integration project of 2008 Beijing Olympic Games and 2010 Shanghai World Expo. Apart from the work relationship, I have also established a friendship with ET5, their 'Asia-Pacific spiritual leader'.

I think there is another thing I should mention. When conducting the interviews with senior staff from government or enterprises (I call them VIPs), the researchers sometimes do have to be very active in leading the conversations; otherwise, the interviews could get terribly messed up, because it seems that these VIPs always have their own 'plans' about what to tell you, or what to not. To explain it, according to my experience, the VIP interviewees in China would usually tend to go two extremes when receiving interviews. Some of them behave like over actively and tend to manipulate the conversations; while some others tend to be rather passive, which means that they only provide very short answers to what you ask them. For the first kind of interviewees, they would usually want to lead the interviews; and it was very easy to slip away from the preset questions. At this time, I had to pick up some points from their talks and redirect the conversations back to the main questions. For the second kind of interviewees, they would usually tend to stay 'silent' during the interviews; and this would sometimes cause really embarrassing moments. In such cases, I would have to

pick some points from their answers, and ask more related questions to drive the conversations. It worked, because it made them feel like their words had been heard. It is just like what Stake (1995:64) says, 'most people are pleased to be listened to'. Apart from that, due to the subjective feature of in-depth qualitative interviewing, it is unavoidable that sometimes the data collected are really subjective to the interviewees' initial logic of thinking. For instance, officials are more likely to talk about the development in positive ways. In that case, I would have to direct the discussion to some specific examples relating to the problems; for example, I asked them to explain a problematic phenomenon in the development. I find it is sometimes maybe even necessary for the interviewers to set up certain kinds of 'traps' or use 'tactics', in order to gain the information they want from the interviewees. However, this might have brought the interviewers to the front of another ethical issue.

4.4 Integrative Analysis

After having collected the raw data (both from the documents and the interviews), the next step of my fieldwork was to analyze and integrate the data, so that a set of coherent lines of contents could be generated before I really started to write up the reports of my findings and implications. According to Gibbs (2008:1), 'The idea of analysis implies some kind of transformation. You start with some (often voluminous) collection of qualitative data and then you process it, through analytic procedures, in to a clear, understandable, insightful, trustworthy and even original analysis'. In other words,

generating analysis could be considered an essential process of 'imaginative and speculative' interpretation of what you have found out from the research work (Coffey & Atkinson, 1996:7; also see Denzin, 1997 and Giorgi and Giorgi, 2003). In practice, before I started to write up my research findings, I had already obtained at least four groups of data, which are respectively those derived from the documentary analysis, from the interviews with CCG, from the interviews with BMG, and from the interviews with ENTs. Therefore, the next thing to do was to analytically associate these four groups of data regarding their relationship or association in order to make some coherent sense of meanings that would be used to generate my research findings and implications. To explain it, although having been carefully designed, the four different groups of data were still, more or less, dislocated from each other; therefore it was my job to integrate or synthesize these data. It is undoubted to say that generating a sense of the collected data is a very important step for my research work, as it helps to further clarify the hidden messages. However, analysis itself is not unproblematic, as it is always risky that researchers misunderstand or misinterpret the meanings. Therefore, every step of integrative analysis has to be conducted very carefully. But it really depends on the different capabilities or subjectivities of different researchers.

4.4.1 Matching-up of Data

Through my research work, I collected two kinds of data, which were respectively the data from policy analysis and in-depth interviews. Therefore, it was important to match

up these two kinds of data very well, so that they could work well together and make coherent sense of meanings. It is not simply about remapping or reconnecting the points; rather I had to re-edit the information in order to have all the relevant points logically interrelated to one another. That is to say, all the data from policy documents had to co-relate with the data collected from the relevant interviews, so that the related messages could work well together regarding different topics of the discussion; otherwise the information would have to be re-selected anyway. For example, when I was working on the research findings in the part of 'electronic business', I had to re-select the words from the relevant policy documents, so that they would more precisely reflect the position of CCG in support of the development, because, after my interviews with the relevant officials, I found that 'to boost commercial flows of China's industrial products' should be highlighted and well reflected in the relevant policy. Then I came back to the records of my interviews, and carefully abstracted the contents to best explain the motives of such a decision. In addition, it is obvious that different stakeholders at different layers have different angles for viewing development. Therefore, the data collected from the interviewees from different groups could be different from each other. In specifics, for the interviewees from CCG, they would prefer to look at the development at a national level and pay more attention to the rationale and strategy of the development. For the interviewees from BMG, they are more practical; and ENTs are more realistic when they look at the development. Therefore, to what extent the data I had collected from different layers of interviewees can cope perfectly well with each other was very important, because if they didn't

match very well with one another, either I had to conduct more interviews to make up the data, or I had to conduct more document analyses to fill in the gaps.

4.4.2 Translation of Language

Language translation was another important step when I was conducting the analytical work, because I had to try my best to translate every single meaning correctly from Chinese, a very different language, into English; otherwise, very important meanings might be missing from the report. Actually, due to the different cultural and social backgrounds, the way Chinese language is expressed is more metaphoric if compared to other languages (Yu, 1998:10). This had created some big difficulties for my translating work, as I had to fully understand the meanings of the original Chinese words in the specific context, and then use English to express the similar meaning in a different way. For those I could not translate the meaning of directly, I had to use more descriptive words to frame the context, or even used footnotes sometimes. For example, I find it is very difficult to translate a Chinese phrase, 'You Suo Zuo Wei' (有所作为), because if you translate the language in a direct way, it means 'to do something useful'. It certainly doesn't make sense in the context of the discussion; therefore, in order to give a better meaning, I translated the phase into 'achieve a higher level of economic performance'. Another example that immediately comes to my mind is that when I translated Shou Du (首堵) . This is a joke created by Chinese netizens to tease or criticize the fact that Beijing has become the capital of traffic jams in China. Actually in

Chinese pronunciation , Shou Du (首都 or the capital of China) and Shou Du (首堵 or the capital of traffic jams) are slightly different from each other only in the accents of the second characters. In order to translate the joke in its clearest manner, I had to in particular provide a footnote to explain the difference between these two meanings.

4.4.3 Deconstruction of Ideology

Obviously, doing policy-related interpretive research in a country like China is different from that in the west, because the ideologies or social values are very different[42]. Therefore, it is important to overcome the limits of ideological differences while doing the research for this study, because it is attempting to use the western theoretical values to make judgments on or evaluate a socialistic economic value system; and this is indeed a challenge, especially for a researcher who has both educational backgrounds[43]. According to Feldman (1995:51), 'deconstruction is a process that rests on several assumptions. The first is that ideology imposes limits on what can and cannot be said. The second is that most authors write and actors act from within an ideology. Therefore their texts and actions are bound by the limits of their ideology.' In practice, the process of 'deconstruction' usually takes place in two kinds of situations, namely collecting of data and interpreting of data. For interpreting the data, including both text and interviews, I had to be highly aware to select evidence for both sides of the stories, in

[42] Although China is now an open country and has input a lot capitalist ideas from the west, it is still a socialistic country under the leadership of a communist party; and this determines that the ideologies between China and the west, that hold pure capitalist views of development, are predominantly different.
[43] Although for most time I was educated in China, my first degree was taken from a US university, my Master degree was earned at a UK university, and I'm doing the PhD research in the same university in the UK.

order to make the findings as objective as possible. As Manning (1992: 203-204) indicates, ‘deconstruction turns attention to how language creates some meanings and suppresses other meanings’. In other words, ‘deconstruction is a means to see words in context and to examine the effects of changing contexts on meaning’ (Manning, 1992:202). In practice, when I was working on the meanings of certain policies and the related policymaking processes, I also had to use western values to repeatedly test the validity of my research findings, in order to make sure that my research report would not have a one-sided outcome.

4.4.4 Repairing of Data

Repairing of data could be taken as another challenge of my research work, in particular when I found that I had missed some very important information from my interviews, because it always seems very difficult to make another appointment with the same interviewees only for the purpose of ‘correcting data’. In fact, although having designed the research questions very carefully, it is always unavoidable to miss certain very important information while doing the interviews. Sometimes it was because of my nervousness; but sometimes it was because of the strong dominance of my interviewees over the course of interviews. As discussed early, my interviewees always thought I should listen to them, because they were more authoritative than me. Therefore they would always try to lead the conversation in their ways even though I had tried to avoid the problem. In practice, if I missed any important data from an interview, either I had

to organize another interview with a different person, or I had to find out some other relevant information to fill the 'gaps'. For example, when I was analyzing the recorded data from the interviews with BG5 (Policy and Regulation Office, Beijing Municipal Office of Informatization), I found I forgot to ask questions about how Beijing's local Bureau responded to the policy of 'improving China's employment by using technology means'. Then I had to fill in the information through making an interview with BG7 (Policy and Regulation Office, Beijing Municipal Office of Informatization), who had a similar official background and was also eligible to answer the question.

Summary

In this chapter, I have discussed the methodology of my research. Basically there are three main research questions for the project. The first question is 'what kind of information economy is being supported in China and why'. The second question is 'how and how well is the information economy developed in Beijing'. The third question is 'what are the major problems and difficulties challenging the development of China's information economy' through the case of Beijing. In order to answer the research questions, I have adopted the interpretivist view as the main approach of my research work, through which qualitative data are collected and used as the key evidences to support my arguments. On the one hand, doing this can help to clarify the motives and subjective meanings of China's development; while on the other hand, it also helps to indicate any in-depth issues that might cause problems for development in

the future. Certainly, to adopt an interpretivist approach does not mean ignoring or giving up positivist measures; rather statistical data and visual images are also used as supplements to my analysis, because it would help to improve the validity and reliability of my research findings. In practice, for achieving the goal, I have looked at China's information economy development from the perspectives of three different layers of people. Firstly I have looked at the development at the national level, and investigated the reasons why CCG wants to support the relevant areas of the development. Secondly I have investigated BMG's activities to support of Beijing's development. Thirdly I have looked at how ENTs respond to China's development. For collecting the data, I have adopted two key methods, namely documentary analysis and in-depth qualitative interviewing. For documentary analysis, its main purpose is to collect policy information from the relevant key official documents, in order to provide the basic information for the further analytical work. For in-depth qualitative interviewing, it aims to gain insight into the contents of the policy information, so that more in-depth meanings of the policies can be revealed through the in-depth interviews.

Chapter 5

China's Digitization (Background)

> 'China has experienced a revolution in information and communications technology (ICT), in 2003 surpassing the USA as the world's largest telephone market, and as of February 2008, the number of Chinese Internet users has become the largest in the world. At the same time, China has overtaken the USA as the world's biggest supplier of information technology goods. However, this transformation has occurred against the backdrop of a resolutely authoritarian political system and strict censorship by the Party-state.'
>
> (Zhang & Zheng, 2009: i)

It is obvious that different countries have different national situations; and the different national situations will directly influence the specific choices of a country in the practice of its development. China is certainly not of exception. In fact, mostly China's economic development is facing the challenges of the incompletion of industrialization construction, therefore it is important that CCG can lay out a distinctive strategic planning for the development of China's information economy, so that the balance of industrialization and informatization can be properly managed to release the maximum value to keep the fast economic growth. However, how to properly deal with the relationship between informatization and industrialization has become a question or say challenge in front of the Chinese policymakers and anyone whose interests are related.

In this chapter, I would like to have a brief discussion about the history and current situation of China's digitization development. Most of the contents in this chapter are based on a 'background research' I conducted prior to the main research fieldwork; I have used both primary[44] and secondary data. The main purpose of writing this chapter is to draw a background picture of China's relevant development over the last two decades, and set up a 'context' to help people better understand my main research findings in the next two chapters. In order to have the background work more focused and easier to follow, I have only involved some key contents closely relating to my research project. In detail, I have divided this chapter into four sections. The first two sections, 'China's Economic Informatization' and 'China's information industry', are responding to the first part of my research findings (chapter 6); while the latter two sections, 'China's digital infrastructure' and 'China's information control', are designed to reflect to the second part of my research findings (chapter 7).

5.1 China's Economic Informatization

Due to a late beginning, China's industrialization construction has far not completed its course to date. This particular situation determines that there must be a different way, in which China deals with the relationship between industrialization construction and the new emerging informational or digital mode of economic development. With the continuity of economic reform, CCG gradually realized that through effectively use of

[44] Part of the primary data is borrowed from my interviews and is added up later when writing up the findings, because some of my interviewees would like to give some background information when they discussed the policies.

the information technology, the process of China's industrialization construction would become more efficient and accelerated. Therefore, CCG finally decided to integrate the use of information technology into China's industrialization construction, intending to realize a 'leap-forward' of China's national economy. Since then, an unprecedented social revolution basing on the use of information technology has been started in the history of China. In fact, a wider range of applications of information technologies in China started in the 1980s, shortly after the economic reform taking place in this socialistic country. At that time, it was the computer industry that initially realized that China's IT industry should make a transformation from simply manufacturing IT products to applying the IT products, as they believed, only through the effective use of computers and the related devices, can the development of China's computer industry become vibrated. Then the State Council of China (SCC) quickly organized a 'Computer and Large-scale Molectron leadership Group' in 1982, in order to regularly discuss and promote the application aspects of issues of China's IT industry. After that, the informatization construction in China finally got launched and gained huge momentum throughout the 1990s. In 1994, SCC further organized an Informatization Works Leadership Group (IWLG); this is the original of the Ministry of Information Industry (MII) since 1998, and the Ministry of Industrialization and Information Technology (MIIT) since 2008. It was also in 1994, CCG raised the idea of 'boosting the implementation of informatization construction; driving industrial development with informatization construction' that is the original of 'driving industrialization with informatization; promoting informatization with industrialization' (Lu, 2002:51-58).

5.1.1 China's Industrialization

In fact, the process of China's industrialization began in the 1900s; however due to destruction during the Second World War, the process of China's industrialization construction was seriously disturbed and reversed almost back to the beginning stage. This is the reason why, since the modern China was established in 1949, CCG has been paying most of their attention to China's industrialization (re)construction (Huai, 2006). On the one hand, China has been significantly lagged behind in the industrialization construction; while on the other hand, China has a huge demand for industrial production to support (re)construction of China's national economy. In addition, during the Cold War period, there was a huge demand of industrial production to secure China's national stability; this situation further stimulated the process of China's industrialization construction and accelerated the development of China's industrial economy (You & Tao, 2003:125). Although China's industrialization was boosted during the early stages of development, it was still fast lagged behind the industrialized countries, in particular when the process was seriously affected again during the Cultural Revolutions (1966-1976) until the late 1970s when Deng Xiaoping took over the leadership of China. As CG1 (Development Research Center, SCC) introduced, 'after Deng Xiaoping took over the leadership of CPC, he announced and launched China's economic reform, in order to stimulate the development. Thereafter, development of China's industrialization construction and industrial economy was again geared to the normal track'. 'In fact, over years of development, although China

has built up a relatively solid base of industrial system, accompanying the fast progress there is an increasing number of problems appearing out and constraining the further development of China's industrial economy. For instance, the development of China's industrial economy is still to a large extent based on a mode of vast input of raw materials and low-efficient output. This is the reason why CCG still insists on 'industrialization' as the core mission at the current stage of China's national economic development'. The process of China's industrialization is far from completed.

5.1.2 China's Economic Reform

Just like the most situations of the other countries in the world, development of China's industrial economy cannot take place without any impact of institutional changes. It should be noticed that the 'economic reform', has been profoundly driving and shaping the great progress of China's economic development. To explain it, as a socialist country, China is undergoing a process of economic reform; and it is this kind of institutional transformation that drives the further development of China's national economy. In fact, the beginning of China's digitization construction can be exactly fitted into this significant historical period. According to Harvey (2005:120), since the 1979, China has experienced an impressive economic reform. 'In December 1978, faced with the dual difficulties of political uncertainty in the wake of Mao's death in 1976 and several years of economic stagnation, the Chinese leadership under Deng Xiaoping announced a programme of economic reform.' In 1992, CCG further indicates

the objective of China's economic reform that was to construct socialistic market economic system, from which the relationship between the influence of government and market became increasingly clarified. However, in practice, due to passive impact of the long-term planned economy, the balance between the force of the government and market was still not set up yet. As Harvey (2005:120) indicates, 'while egalitarianism as a long-term goal for China was not abandoned, Deng argued, individual and local initiative had to be unleashed in order to increase productivity and spark economic growth.' Therefore, although socialistic economic system was improving, the driving force of market was really becoming stronger throughout the 1990s, though 'government direction' played the leading role in China's national economic development. According to Cao (2000:13), this is called by the officials as the 'socialistic market economy with Chinese characteristics' which means that 'to construct a form of state-manipulated market economy that delivered spectacular economic growth (averaging close to 10 percent a year) and rising standards of living for a significant proportion of the population for more than twenty years.' Since then, the development of China's industrial economy began to pick up pace; meantime, the application of information technologies in the industrial development increased as well.

In company with China's economic reform, another policy, called the 'open-door' policy was also issued by Deng Xiaoping in 1979, which further stimulated the development of China's industrialization construction. In fact, the process of

reconnection[45] of China's economy to the world economic system has been increasingly picking up pace since the 1980s, especially after the Deng Xiaoping's second 'south tour' in 1992, and has created huge benefits for both the country and the rest of the world. Although during the early period the connection to the world economy was restricted in certain scope and in certain areas, such a trend undoubtedly built a solid foundation for its further global mergence. Eventually, in 2001, China signed the agreement to enter the WTO as a member. In fact, from the specific expression of Chinese economic reform and open-door (改革开放), it is clear that, on the one hand, the 'market economy' or simply say the 'market' is the main focus of CCG in support of China's participation into the global economy. While on the other hand, the 'opening-up' of China's economy has to be a process according to the progress of the economic reform. In other words, at the current stage, development of China's economic globalization is still constrained on certain level because of the scope and level of China's economic reform. But it also has to be admitted that such a process has been increasingly accelerated by the agreement on the rules of China's WTO entry; and a more open Chinese economy is believed achievable in a near future. For the moment, it is clear that China's economic reform has already spread out into most if not all economic dimensions, such as production, trade, finance, and even science and technology. Actually China's entry into WTO in 2001 really should be taken as a notable landmark for China's economic reform, because it seems that of only since then, China has entered into the first flourishing period of economic globalization, during

[45] China used to be one of the important economic centers of Asia before the World War II, while at the time, China was under rules of KMT of China, (translated as the Chinese Nationalist Party, 1919-now in Taiwan)

which industrial production, such as mechanism manufacturing, has benefited the most. For example, China's manufacturing only accounted for 19% and 27% of the total exports in 1992 and 1996. But in 2001, the proportion of China's manufacturing exports has dramatically increased to 39%, and with such a high rate of export growth, China now has already become the 'World's Factory' (Zhu and Li, 2005)

5.1.3 China's Informatization Development

Due to the successful practice of the economic reform and the open door policy, China's economic development has achieved very remarkable progress since the 1980s. Since the beginning of 1990s, information technology has played an increasingly important role in China's economic growth; and this has helped China's economic development achieve even greater performance throughout the 1990s. However, although the invention and application of ICT is originally in the developed world, it seems that the motives of China's information economic development are not same as that of the developed countries. According to Lu (2002:32), the application of ICT in economic development in the developed countries, such as the U.S., Europe and Japan, is after the completion of industrialization; therefore, the mode of these countries' information economic development is considered as applying ICT to improve or transform the existing industrial economy. This is called 'technology driving' mode of development. However, the truth is that China has not completed its industrialization course yet. Therefore, China's information economic development is more likely of the mode

called ‘demand pulling’. That is to say the demand of industrial economic development or industrialization construction is seen as one of the key forces pulling China’s application of ICT in its economic development. Officially, China’s informatization construction started from the early 1980s; and there are commonly recognized four primary stages in its development. The first stage is named the ‘Preparing Stage’, from 1982 to 1993; then the second stage is the ‘Launching Stage’, which was from 1993 to 1997; after that the third stage is the ‘Spreading Stage’, which was from 1997 to 2000; and the latest stage is called the ‘Developing Stage’ that is from 2000 till now (see table 5.1) (Lu, 2002: 53-54; also see NDRC, 2005).

Preparing Stage (1982-1993)	During this period, the key objectives of China’s informatization works were mainly carried out around promoting the application of the electronic technologies, in particular the application of the LSI and computer technologies. The development emphasis therefore shifted from IT manufacturing to the application of information technologies so that the whole industry became vibrated It is usually considered as a very good preparation or starting point of China’s informatization development and China’s information economy.
Launching Stage (1993-1997)	At this stage, China’s informatization construction was officially launched with the start-ups of the ‘Golden Projects’, which involve the ‘Golden Custom’, ‘Golden Card’ and ‘Golden Bridge’. CCG, subsequently indicated the directing thought, which is ‘promoting the implementation of informatization projects; driving industrial development with informatization’. In 1996, the State Council established Informatization Work Leadership Group (IWLG), in order to promote and administrate the development.

Deploying Stage (1997-2000)	During this period, the initial developmental thoughts on China's informatization was finally shaped. In April 1997, State Council's IWLG held the first Nationwide Informatization Work Conference in Shenzhen. In the conference, the former vice prime minister, Zou Jiahua, made a speech, titled as *Keeping Hold on the Overall Situations, Enhancing Cooperativeness, and Actively Promoting the National Informatization Work*.
Development Stage (2000-2005)	Since the year 2000, CCG has formally written informatizatio into China's five-year plan, namely *the Tenth Five Year Plan* stressing that 'greatly promoting informatization of China's national economy is the new requirementon China's modernization construction'. Therefore, '[the government] should promote industrialization with informatization, in order to realize a leap-forward development of China social productivity.

Table 5.1: Four main stages of China's informatization development
Source: Lu, (2002, 53-54)

5.1.4 China's Institutional Reform

In order to further stimulate the construction of China's informatization, CCG has taken a few measures to deepen China's economic reform; one of the measures is to transform the organization of the government, so as to ensure China's political institution will better cope with the fast transforming economic system. In fact, in order to promote the construction of China's informatization, there have been at least three major institutional reforms of the relevant official departments since 1980s. The first time was to organize Informatization Works Leadership Group (IWLG) to promote the early informatization construction. The second time was to set up MII, in order to further stimulate the development of China's information industry during the 1990s. For the

third time most recently, Ministry of Industry and Information Technology (MIIT) was set up to incorporate the MII, The State Council Informatization Office (SCITO), Commission of Science Technology and Industry for National Defense (COSTIND), and some industry relevant offices of National Development and Reform Commission (NDRC); and one of the major objective for the reorganization this time is to improve the convergence of related social sources, in order to better accelerate the integration between fast developing industrial production and rapidly growing information industry in China, so that the application of information technology can reach a higher level of effectiveness (PDO, 2008). According to Hua (2008), the State Councillor and the Secretary-General of SCC, indicates 'the key functionalities of the new MIIT include drafting and organizing the implementations of industrial projects, policymaking and development standards; supervising the daily operation of industrial development; driving development and innovations of key technical equipment; administrating telecommunication industry; supervising and promoting construction of informatization; coordinating and maintaining information security'. In other words, as an administrative department, MIIT is basically responsible for planning, policymaking and standards setting in order to directing the industrial development.

As MC1 (Media Centre, China Information Industry Association) introduced, there are at least three radical factors driving the setup of MIIT. The first factor would be definitely to further promote the policy of 'Driving industrialization with informatization'. According to Hua (2008), China is now experiencing the most

important phase of industrialization. Therefore, ‘to keep promoting the convergence of informatization and industrialization, to keep making connections between high technologies and the traditional industries, and to keep driving the industrial development from ‘Big’ to ‘Strong’, is one of the key tasks [of China’s national economic development]’. In other words, the industrial economy is still the main body of China’s national economy at the current stage of development. However, in the meantime, China’s industrialization is experiencing an important historical period, in which there are so many problems restricting the sustainable development of China’s industrial economy. As MC1 explained, China’s industrial economy was still based on the lower end of industrial production and productivity was therefore relatively low; such kind of extensive mode of industrial production would directly lead to scarce of natural resources and environment pollution. ‘Applications of information technologies can, to certain extent, improve industrial production and increase productivity; and this process is recognized by CCG as “informatization”. That is one of the key reasons why CCG wants “driving industrialization with informatization”.’ In 2007, CCG began to attach even greater attention to task of ‘informatization’. According to the report from the Seventeenth National Congress of the Communist Party of China (2007), ‘Informatization Construction’ was first time written into the ‘New Modernization Requirements for Constructing the Elementary Phase of China’s Socialistic Country’, which is ‘Industrialization Construction, Informatization Construction, Urbanization Construction, Marketization Construction, Internationalization Construction’. This change has helped to radically build a rather solid theoretical base for the further

implementations of the policy ‘driving industrialization with informatization’.

The second factor to drive the setup of MIIT is that CCG wants to go further to improve the development of information industry. As we can see that, over the last 30 years of development, China’s information industry has become one of the most important ‘basic industry’, ‘backbone industry’, and ‘fore leading industry’ of China’s national economy. However, such a remarkable progress seems still based on huge revenue from information technology manufacturing. According to one of the latest reports released by CCID (2007a), among the total number of 7.77 million employees engaging in the electronic information industry, 6.75 million of them are from manufacturing sectors; and only 1.02 million employees are from software industry (CCID, 2007a). According to NDRC & MII (2006), CCG requires to accelerate the development of information services. As MC1 said, ‘it is definitely that to increase applications of information technology in the industrial production can effectively stimulate the information technology relevant services. It is therefore significant to set a department, of which one of its main functionalities is to stimulate the applications of information technology in the industrial production’.

The third key factor to drive the setting of MIIT is the request of CCG for deepening the economic reform, because institutional reform of CCG is one of the key parts of China’s economic reform (Shang, 2008). Actually China has experienced five institutional reforms over the past 30 years after economic reform in 1979; and each of

these five institutional reforms was set to meet a specific request of 'deepening economic reform' at the different stage of China's development. Since the 4th institutional reform in 1998, MII has played an important role in 'driving separation of government and enterprises' and 'breaking monopoly to protect market competition' of China's information industry. Although these tasks are still uncompleted, the new appearing institutional obstacles have already compelled CCG to have to force another institutional reform to solve the problems. Actually since 1998, there had been at least three departments in charge of China's industrial development, NDRC, MII, and SCITO; and the interest conflicts between/in each of these departments had been seriously undermining the competitiveness of China's market economy. Therefore CCG eventually decided to set up a new department to unify the relative functionalities of these old departments in order to create a better political environment for further development of China's informatization construction and the information economy.

5.2 China's Information Industry

While China's economic informatization is taking place, it has also stimulated the rise of a new industrial area, the information industry. Actually despite with a comparatively late beginning, China's information industry has achieved some remarkable progress over the last two decades. This is, on the one hand, reflected in the rapid growth of information technology industry; while on the other hand, reflected in the rapidly increasing use of the information technologies for the fast expanding industrial

economy in China. According to Fan and Zhang (2003:44), in 1992, the contribution of the information industry to China's GDP was still 1.84%; but in 2000, the rate had increased to 6.08%, even though most of the industry at that time was still based on IT manufacturing. Since the early 2000s, along with the dramatic increase of IT applications, growth of information services in China has achieved a great progress with 20% annual growth rate, among which the growth speed of Internet related information service, including digital content services, was evidently faster than the other services. For the moment, the development of China's telecommunications transmission services or telecommunications service is comparatively more mature than other areas is the field; but the Internet application services has been entering an flourishing phase. According to Lu, (2002), the development of China's electronic commerce since 1990s is notable as well. China's electronic commence development can be considered to consist of three stages. From 1990 to 1993, EDI started to be increasingly applied in China. From 1993 to 1997, China's 'WWW' started to be increasingly commercialized. From 1998 to now, China's online business started to gain momentum, and became really popular today. In fact, it has to be admitted that CCG has indeed played a very important role as driving the whole progress along the way.

5.2.1 China's IT manufacturing

Although the very origin of China's information technology manufacturing (IT manufacturing) can be traced back to the August 1958 when the first small-scale

vacuum tube computer, namely ‘Model 103’, was successfully manufactured after two years of research and development, it seems that the history of China’s IT manufacturing should be only taken into account since the 1982 when the Computer and Large-scale Molectron leadership Group was officially launched by the State Council for improving the development of China’s computer industry. In fact, before the Chinese economic reform, China’s IT manufacturing was in a very critical situation, because there was very little need of computers and IT facilities in a planned economy. According to Huai (2005:126), it was right at this difficult moment, the economic reform took place, and a dramatic scene started to appear from then on. In the early 1980s, just after China’s economic reform was carried out, China’s computer industry first realized that China’s computer industry should make a transformation form focusing IT manufacturing to IT application, because the realized that only through the effective applications of computers would it be possible to further simulate the China’s computer industry. Shortly after that, CCG that was under the leadership of Deng Xiaoping accepted the suggestion; then the State Council in specialty organized the ‘Computer and Large-scale Molectron leadership Group’ in 1982 for the purpose of regularly discussing and promoting the application issues of China’s IT industry. Actually as discussed earlier, this organization also played a very positive in driving the early development of China’s informatizaiton. In the March of 1986, Deng Xiaoping issued a ‘High Technology Exploitation Plan’, which is also called ‘863’ Plan, through which the government planned to invest 100 billion Yuan to boost the ‘high technology’ development, among which two third of the investment was used for the exploitation

the information technology related programmes (Lu, 2002; also see Huai, 2006). After that, China's IT manufacturing obviously gained momentum. According to one of China Science and Technology Statistics' reports, the electronic and communication industry had already become one of the 'first' industries in China by 1999[46]. The total economic output at that time had achieved to 5831 billion Yuan per year, and the sales were 5573 billion Yuan per year. The average increase rate from 1990 to 1999 was 32.1%. In 2007, the contribution of China's information industry had already counted for 7.5% of China's overall national GDP (Yang, 2007).

5.2.2 China's Software Industry

The development of China's software industry started in the early 1990s. According to Commander (2005:86), 'in the late 1980s, there were a couple of Chinese computer firms, including Founder and Legend, were authorized to commercialize software products. This allowed Founder to establish its early dominance of the market for Chinese language publishing systems'. At that time, 'Chinese programmers at the Institute of Software at the Chinese Academy of Sciences and other research institutes also began to develop simple information systems, typically by directly manipulating a database for a limited set of functions such as searching and reporting, or providing the ability to update information interactively'. Along with the continuously deepening reform of the market, it sees a booming period of China's software industry in the 1990s,

[46] In 1990, the electronic and communication industry was still ranked the 9th among all the industries in China.

during which the Zhongguancun area that was located in north-east Beijing became the very first functional place in China in 1988 dealing with software related business; and therefore, Zhongguancun area is sometimes ‘referred as China's Silicon Valley’ (Comander, 2005:79; also see Segal, 2003; Zhao, 2007:197).

According to a report by CSO Group (2007), by 2000, China’s software market had increased to 238 billion Yuan compared with 68 billion Yuan in 1995, among which 30%-40% of the market is accounted as basic software; and 60%-70% is accounted as application software (see figure 5.1)(also see Fan and Zhang, 2003). Apart from that, with the increasingly widespread use of ICTs, there has been a gradual expansion in the proportion of the software industry companies in China information industry. Basically the software industry involves those companies that ‘provide applied use of information systems, such as computers and telecommunications infrastructure’. Alongside the gradual improvement in telecommunications systems and increasing popularity of the Internet, ‘the software services based on the networks, including system integration (SI) and web design & maintenance, have been flourishing since the 1990s’ (Schiller, 2000:90-202; also see Castells, 2000a). Since the 1990s, there are many Chinese software companies, such as UFIDA Software and Beida Jade Bird Group, growing up and becoming well known internationally. By 2002, there had been over 6,000 software enterprises contributing to China’s software market (Fan and Zhang, 2005).

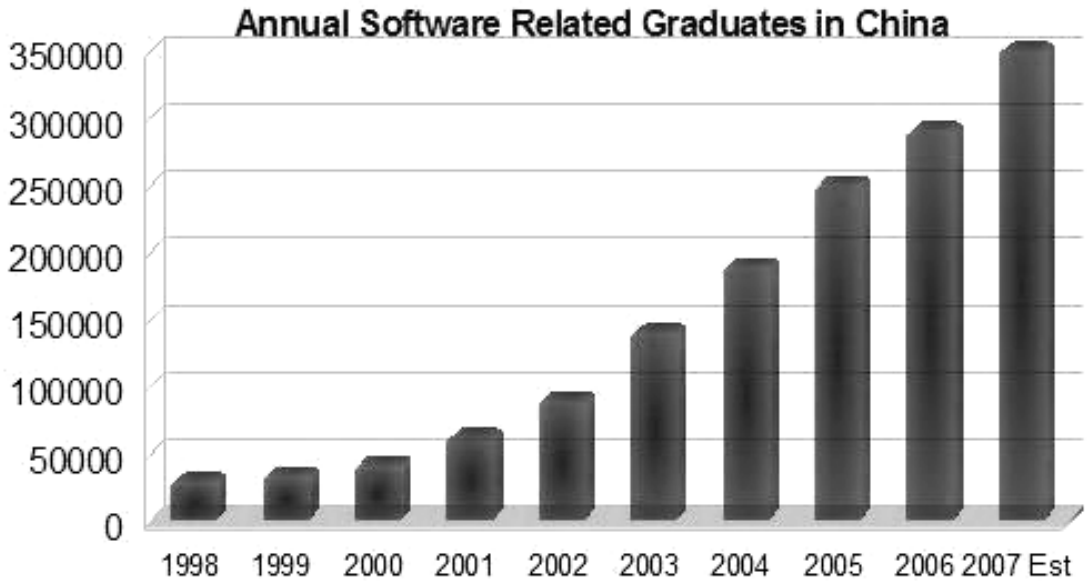

Figure 5.1: Growth of China's software market (1993-2007)
Source: *CSO Group* (2007)

5.2.3 China's Telecommunications Industry

Although the history of China's telecommunication industry can be traced back to the early 1980s, the whole industry only entered into a high-speed development phase since late 1990s while CCG finally decided to liberalize China's telecommunications market (Cui, 1999:214). Arguably there are two original points. One is the January 1997 when the Ministry of Post and Telecommunications (MPT) made a decision to separate China's postal services and telecommunication services; while another point is the March 1998 when the Ninth National People's Congress passed the project of the fourth structure reform of the State Council and decided to set up a Ministry of Information Industry to replace or incorporate the former Ministry of Post and telecommunications (MPT) and Ministry of Electronics. However, even after the market privatization, companies that own and control the backbone infrastructure such as China Telecom,

China Mobile and China Unicom are closely affiliated with the government, monopolizing the marketplace (Li, 2008; also see Li and Wong, 2001).

China Telecom 'is owned and controlled by the State and is the dominant backbone and fixed-line service provider in China'. China Mobile, which is also owned primarily by the State, 'has listed its assets on the Hong Kong and New York stock exchange, and operates the largest mobile network, spanning 13 provinces with over 35 million end users'. China Unicom, 'the second telecom operator, operate the largest commercial network (over 44 million subscribers), and is also a provider of mobile and fixed-line telephony services. All three of these companies operate with minimal competition as only a few telecom licenses have been issued'. For this reason, these companies are very profitable. As for Internet service providers (ISPs), 'or access resellers, who use China Telecom's network, there are literally hundreds of these types of companies both domestic independent and government owned entities'. Along with more completion and wider openness of the of China's networks, 'there has been an increasing number of Internet Service Providers (ISPs) organized in this country'. In Beijing, 'there had been over 30 ISPs by 1996 in operation'. The largest providers are domestic private companies, 'Capital Online and Capital Internet'. 'These ISPs are also partially owned by Beijing Telecom, a subsidiary of China Telecom'. 'Since the ISP market has low barriers to entry, and key access is controlled by government entities, the returns are generally very poor to ISP shareholders' (Li & Wong, 2001:41-51; Lu & Wong, 2003).

5.2.4 China's Electronic Commerce

The development of China's electronic commerce started at the beginning of 1990s and was boosted during the second half of the decade due to the introduction of the WWW and the Web Browser into China. At the early stage of the development, Chinese officials seemed having little interest in this development; and their attention mainly concentrated on the wholesale trade; therefore, electronic commerce for retailing gained little progress before 1997. After that, because of the increasingly pervasive use of computer and the Internet, electronic retailing was becoming increasingly important in the country. According to Fan and Zhang (2003:38), there are basically four stages of China's electronic commerce development. In the first stage, the function of the websites was primarily offing media content, which was very much like that of the traditional media. In the second stage, B2B, B2C mode of electronic business gradually emerged in China; and the e-market was further expanded. In the third stage, high-technology enterprise started to build networks between each other for some business strategies purposes. In the last stage, the traditional enterprises and government started to transform onto the Internet. Generally, in China, B2B has been developing very fast over the last ten years. According to one of the most recent statistical reports from iResearch, by 2007, the total amount of exchange value has mounted to 212.39 billion Yuan; the growth rate is 65.9% compared to that of the year 2006 (iResearch, 2008). Along with the rapid progress of electronic business in China, companies providing the supporting services have become increasingly active over the

country. According to CCID (2007b), the volume of trade through electronic business in China had broken through 1000 billion Yuan, which is 3.6 times more than that in 2003; the increase rate maintains as high as 50%-60% over last two years; and this record is expected to be broken by 1700 billion Yuan in 2007, among which the trade through B2B is 1690 billion Yuan at that time.

According to Castells (2000a:152), finance is one of the earliest industries making use of information technology, simply because financial services have made a very high standard of request for the 'mobility' and 'timeliness' of information processing over the global information age'. Therefore, modern financial services, as a brand-new area of the information industry, are becoming significantly important throughout the world. In China, in the early stage, electronic finance was always considered as a part of electronic commerce, because of the close relationship between these two business areas. China's modern financial services have been started out since the early 1980s. Following the speeding up of economic reform and openness, the development began to gain momentum around the mid-1990s. However, under the impact of financial crisis since 1997 and the pressure of WTO since 2001, China's financial industry has been being faced with some huge challenges. On the one hand, China has not established a complete modern financial system; on the other hand, the increasingly complicated financial environment across the globe has been shocking China's financial industry and bringing increasingly unpredictable risks (Kraemer, 2006; Calomiris; 2007).

5.3 China's Digital Infrastructure

In December 1993, in order to cope with the global trend of building the information highway, the State Council drafted and issued ‘National Informationalization 95 programme and 2010 Long-term Planning Guideline’ and officially launched the national economy of China's information technology start-engineering - the ‘three golden projects’, namely Golden Bridge Project (electronic service), Golden Gate Project (electronic customs duties) and the Golden Card Project electronic currency.’ The goal of ‘Three Gold Project’ is to build China's ‘information highway’. In addition to the ‘three golden projects’, there some more related project launched in the following years, including Golden Intelligence Project, the main part of the ‘Golden Intelligence Project’ is ‘China Education and Research Network Demonstration Project’ (CERNET), In 1994, 12 month after the State Planning Commission formally approved the implementation of the project. Led by the CERNET, 10 colleges and universities including Tsinghua University, Peking University and Shanghai Jiaotong University, participated in the construction tasks, including the national backbone, regional networks and campus networks. The network center was located at Tsinghua University. The ultimate goal is to achieve world-wide sharing of resources, scientific computing, academic exchanges and scientific and technological cooperation. These activities further stimulated the construction of China’s information infrastructure nationwide. But before we start to talk about the detailed construction of China’s information highway, I think it is necessary to take a general look at China’s regional development,

because this is the material basis of China' information infrastructure construction.

5.3.1 China's Regional Development

Along with the fast progress of China's national economy, the regional development seems becoming less capable to cope with the pace of the general economic growth over recent years. On the one hand, social resources, such as capital and markets, are unequally distributed among different areas of the country; while on another hand, natural resources, such as lands and eco-system, are seriously damaged due to excessive exploitation for the industrial use. Both the problems have been undermining the potential of China's sustainable economic development from a long-term perspective. As CG1 (Development Research Center, SCC) introduced, 'during the 1980s, China's "trichotomy"[47] mode of strategy for the regional economic development once played a very important role in driving China's fast development in the last two decades in the 20th century'. 'But since 1990s, the gaps between/within these three areas of China have been growing so fast; and the economic unbalance between the regions has become a serious problem that limits the sustainable development of China's national economy'. Apart from that, 'due to the regional imbalance of industrial development, the local economies of some provinces, such as those in western area of China, have been over relying on the heavy industry, so that their local environment has been severely destructed'. In order to improve the situation and to realize a 'harmonious

[47] Trichotomy refers to the spatial division of China's space into the 'eastern part', 'central part', and 'western part'

development of China's regional economy', CCG has restructured China's regional space into 'four development regions'[48], and 'eight economic regions'[49] (DRC, 2003; NDRC, 2006).

Among all the economic regions in China, 'Yangze River Delta', 'Pearl River Delta' and 'Bohai Rim Economic Circle' are the three most important areas, because these three areas covers 19 provinces and autonomous regions; their economic output in total has accounted for more than 60% of the overall national GDP; and their import of foreign capital has accounted for more than 70% of the whole country. Along with the increasing radiating capacity of the three economic regions to their surrounding areas, there are an increasing number of less-developed regions absorbed into these regions; and this has help creating even greater potential for their development (NBSC, 2008). As CG1 explained, during the early period of economic reform in the 1980s, the 'Pearl River Delta', which is led by Shenzhen and Guangzhou, became the first region in China achieving high-speed development. Then since in the 1990s, due to the 'strategic readjustment' of China's regional economy policy, the 'Yangtze River Delta', which is led by Shanghai and Hangzhou, began to pick up the pace of development. Since the beginning of 2000s, CCG has readjusted China's regional economy policy again; and now we can see that Bohai Rim Economic Circle or 'Jing-Jin-Ji' region, led by Beijing and Tianjin, has gained huge momentum and vitality for economic development over

[48] The four development regions are respective the 'optimally exploiting part', the 'emphatically exploiting part',the ' restrictively exploiting part', and the 'prohibitively exploiting part'

[49] 'Northern-East Comprehensive Economic Area, Bohai Economic Circle, Yangze River Delta, Pearl River Delta, Yellow River Middle Reaches Development Area, Yangze River Delta Middle Reaches Development Area, Greater Southern West Comprehensive Economic Area, and Greater Northern West Comprehensive Economic Area'

recent years; and 'Binhai New District' has become the third Special Economic Zone (SEZ) in China, after Shenzhen in 1980s and Pudong in 1990s (SCC, 2006). Beijing's development over this period is in particular outstanding.

As for Beijing's local economic structure, the services industry is one of the main supports of the local economy. By 2006, there is 71.9%[50] of Beijing's GDP derived from service (tertiary) industry, among which industrial services or producer services account for 42.6% (see figure 5.2 and figure 5.3). In this situation, Beijing's local government has decided to introduce even more preferential policies to attract industrial service companies, such as financial institutions, to make investment and run their businesses in the city. Apart from that, as BG11 (High technology Industry Sector, Beijing Municipal Commission of Development and Reform) said, Beijing's local government stresses that Beijing should maintain its top position in the development of high-technology industry among all the cities in China. Actually, along with services, high-technology industry is another backbone industry of Beijing's local economy. Zhongguancun, as one of the earliest high-technology industrial areas in China has become a very successful place, where many private Chinese IT companies, such as Lenovo and Baidu, have grown up to be international or multinational enterprises now. Based on the successful experience, Beijing's local government has decided to build more high-tech districts or IT based parks, such as Yizhuang and Wangjing[51], in order to retain Beijing's superiority in high-technology based industrial development in China.

[50] This number has reached 75.8% by the end of 2009 (Xinhuanet, 2010).
[51] Yizhuang is designed to be a high-techn manufacturing based area; while Wangjing is designed to be a wireless tech services center. There are actually a few other similar examples, such as Miyun and Tongzhou, etc.

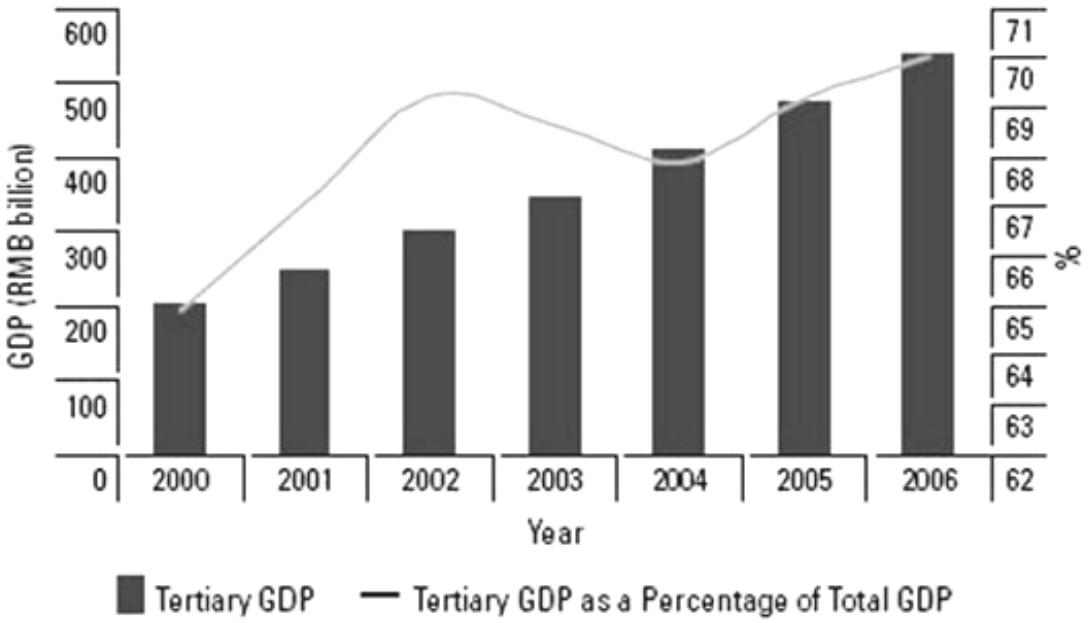

Figure 5.2: Growth of Beijing's tertiary contribution to GDP (2006)
Source: Data from BSB (2007a)

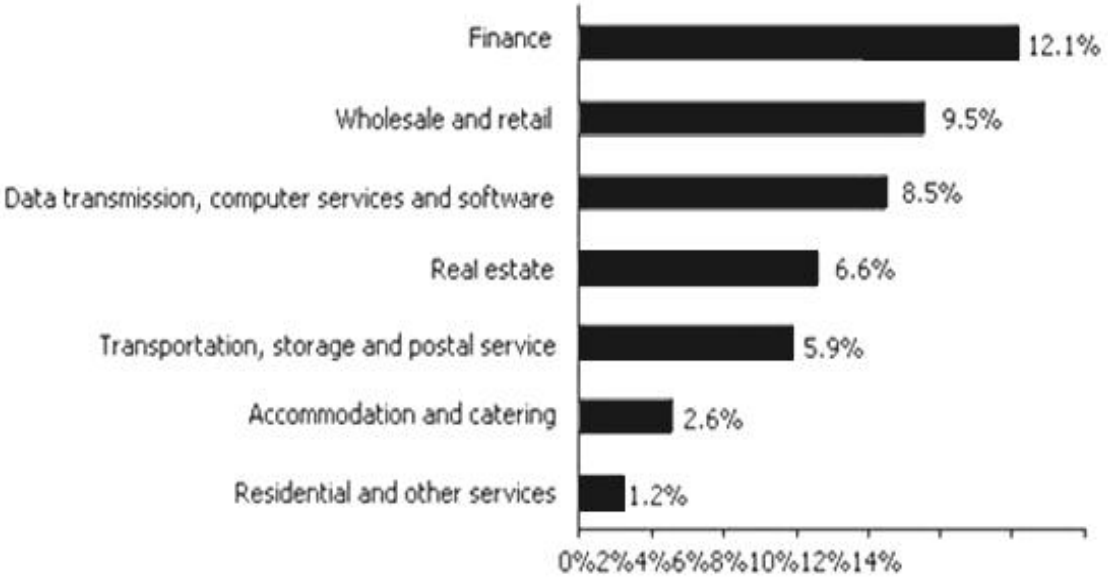

Figure 5.3: Structure of Beijing's Tertiary Contribution to GDP (2006)
Source: Data from BSB (2007b)

5.3.2 China's Information Highway

It is obvious that CCG is very clear about the importance of China's information infrastructure. As CG4 (Informatization Promotion Office, MII) indicated, 'information infrastructure is the most basic material of China's new modernization development', since that 'computers and the Internet has been playing an increasingly important role in China's economic development', therefore, 'information infrastructure has to catch up with the fast pace of China's economic development'. As mentioned at the beginning, the 'Three Golden Projects' have composed the framework of China's information infrastructure; so it is necessary to take a closer look at each of the projects, in order to understand China's 'information highway'. As CG4 introduced, 'Golden Bridge Project' is the main body of China's information superhighway. 'Golden Bridge Network is the country's economic information network, it is composed of optical fiber, microwave, programmable, satellite, wireless mobile and other means to form the air, ground integrated network structure, in order to establish a national public information platform'. It object to cover the whole country, and the State Council, ministries and private network linked with 31 provinces, municipalities, autonomous regions and 500 cities, 12000 and medium-sized enterprises and 100 cities with major enterprise groups as well as national key project linking eventually form a large trunk of electronic information highway, and interconnection with the global information highway. Apart from the main 'Golden Bridge Project', 'Golden Gate Project' and 'Golden Card Project' are another two inseparable parts of China's 'information highway'. According to Yan

and Pitt (2002:45), ‘Golden Gate Project’ stands for 'an EDI network linking all customs offices', while 'Golden Card Project' aims to 'create a bank credit card payment and authentication network'. After that, 'several new golden projects have been added in succeeding years’. ‘In the light of the importance of these developments for the national economy’, the State Council take charge of the projects directly; and even Ministry of Post (MPT) 'had no alternative but to cooperate'.

5.3.3 China's Information Networks

Construction of China’s information networks started from the beginning of 1990s. In the late 1980s, there were only a few computers in the academic and technical institutions connected to the Internet. ‘In 1987, the China Academic Network (CANET) was established to support research and education activities in computer science’. In 1988, CANET ‘began exchange e-mails with the global Internet indirectly via a link in Germany’. In 1991, ‘the institution of High Energy Physics (IHEP) began established a 64K high speed special network between the Stanford University and itself by renting the telecommunication services of AT&T’. This network was finally launched in 1993 with the permission of both Chinese and American government. After that there were an increasing number of networks, ‘such as the Networking and Computing Facility of China (NCFC), the China Research Network (CRNET) and the Chinese Academy of Sciences Network (CASNET), establishing in China’. ‘In subsequence, most of these networks were consolidated into two major national systems: (1) the China Science and

Technology Network (CSTNET), which was a product of interconnection involving 20 academic networks under the Chinese Academy of Science (CAS); and (2) the China Education and Research Network (CERNET), which was started by the State Education Commission for international links as well as for China's education, research and economic development' (Wong and Nah, 2001:31-32; Cui, 1999:211).

The telecommunication reform during the period furthermore facilitates the development. According to Wong and Ling (2001:32-34), 'the construction of China Unicom, as a milestone, finally ended up China's monopolized telecommunication market'. After that, there were an increasing number of players emerged in the market. They are 'China Telecom Fixed-line, China Netcom (CNC), Jitong, and CITIC etc'. 'By 2002, these telecommunication agents had laid down more than 2 million km of fiber optic cables, with a national coverage. By the end of 2000, there have been at least six major networks constructed, among which two of them are for public use and four for commercial use, that share the most part of China internet services market' (see table 5.2). China Telecom 'is the largest bandwidth provider in China, with over 1 million km of fiber optic lines deployed over 14 major trunk lines throughout the country'. China Unicom 'has built a 15, 000 km network connecting 25 cities and plans to expand the network to 47,000 km connecting over 200 cities'. China Netcom, 'with the help of the Ministry and Railways and the SARFT (State Administration of Radio, Film, and Television), is building a high-speed network that will cover 15 cities. CITIC Pacific, a Hong Kong based Chinese company, plans to put together a network consisting of 32,

000 km of cables that will reach 80% of the population'. With the deepening process of the market reform, there have been a lot more number of networks constructed rapidly.

Public Networks	
China Education and Research Network (CERNET)	CERNET (http://www.cernet.eu.cn) is the network of China's Ministry of Education, linking China's major education and research institutes. CERNET consists of three levels of networks: the national backbone network, local networks and campus networks. Linking over 300 universities and colleges, CERNET provides mainly scientific research and educational information. The speed of CERNET's backbone network were 512k bits/s and 2m bits/s, respectively.
Chinese Science and Technology Network (CSTNET)	CSTNET (http://www.csnet.net.cn) was established by the central government with loans from the World Bank. The Network Operation Centre under the CAS is in the charge of its operation and management. CSTNET is made up of two major parts, the NCFC and the internal network of the CASNET. CSTNET has extended to all the major cities in China. Currently, its major users include 123 research institutions in the CAS system and more than 120 affiliated organizations. Although CSTNET offers its services to the public, the majority of its users are provincial- and local- government agencies and state-owned enterprises. Even though some of these enterprises have Internet access, CSTNET is primarily not a business-related network.

Commercial Networks	
China Public Computer Network (CHINANET)	CHINANET (http://www.chinanet.cn.net) was started in 1994 by the Ministry of Post and Telecommunications (MPT). China Telecom has been in charge of its construction, operation and management. Its network access number is 163. CHINANET's network structure is divided into three parts: the national backbone network, local-access networks and the national Network Operation Centre and Network Information Centre (NOC & NIC). CHINANET has become China's dominant Internet provider, offering services in all major cities in China. As at end 1999, CHINANET had total bandwidth of 291 Mbps of Chinese connections to the global Internet backbone. Though China Telecom itself is the dominant ISPs operate by leasing CHINANET resources from China Telecom. But China Telecom's high leasing fees have effectively prevented these small ISPs from becoming significant players in the ISP business.
China Golden Bridge (CHINAGBN)	CHINAGBN (http://www.gb.com.cn) is operated by Jitong Communication Co. Ltd. Its network access number is 167. In January 1994, the state-owned Jitong was founded to operate the network, but did not launch its CHINAGBN services until September 1996 (9 months after CHINANET). Jitong is also the main ISP for CHINAGBN, offering IP telephony and other Internet services. The major objectives of the CHINAGBN are to establish a public economic information network, to interconnect the heterogeneous private network of multiple departments and sector, and to establish a computer information system for government agencies and private enterprises.

China Unicom Public Computer Interconnection Network (UNINET)	UNINET (http://www.uninet.com.cn), which is run by China Unicom, China's second telephone operator, has developed extensive cellular and paging services. The NUINET's network access number is 165. In southern China, Unicom is using its IP network, UNINET, for IP applications such as VoIP. It has plans to introduce basic and value-added data communications services and offer Internet access services on UNINET in 100 cities in 2000.
China Network Communications Public Interconnection Network (CNCNET)	CNCNET was established by the CAS, the state Administration of Radio, Film and TV, the Ministry of Railways and some related organizations in Shanghai. CNCNET, in future, will be run by the new China Network Communication (China Netcom), which is still at its planning stages. China Netcom will offer wholesale broadband access as well as local Internet service in major Chinese cities. Its network access number is 171. CNCNET will be connected to existing broadcasting and railway networks.

Table 5.2: Six major networks in China in the beginning of 2000s.
Source: Wong and Ling (2001:36-38)

5.3.4 China's Internet Development

The year of 1994 would be seen as a very significant year for the development of China's Internet[52]. According to Wong and Nah (2001:32), 'in April 1994, China formally entered the Internet age when CAS's Computer Network Information Centre (CNIC) set up its first link-up with more than 30 research institutes through fiber optic cables'. In fact, this network, to certain extent, could be seen as a milestone of China's

[52] At beginning, the US government didn't agree to allow China to be connected to the main framework of the Internet, because they thought China was a socialistic country and it would threaten US national security if connected a socialistic country to the Internet. Therefore, at that time, the special line between IHEP and Stanford University became the only Internet line China and US scientists made connections with each other.

Internet development, since that it is in the first time China setup its own 'inter-net' although this network was still hardly connected to the outside world. 'In face of the hot wave of the Internet development, CCG started to think about the construction of a much wider network for broader use of the Internet, in particular in the area of commercial business'. Finally, in the same year, the 'Ministry of Post and Telecommunications (MPT), decided to rapidly construct China's largest commercial network, the ChinaNet; and in the first half of the next year, the network had been completed and ready for use on a nationwide scale'. 'The ChinaNet was launched by China Telecom, which was still an official part of MPT at that time, and aimed at providing various Internet services to public uses and to promote the commercialization of the information network'. By then 'ChinaNet had become one of the earliest backbones networks of China's Internet, which includes 8 regional network centres that covers 31 provinces and cities' (also see Tai, 2006) (for a more detailed history of the Internet development over this period, please see Appendix D). As a result of the Internet development, Internet use in China has been growing very fast since the late 1990s. According to CNNIC, by the end of June 2008, 'the amount of netizens in China had reached 253 million, surpassing that in the United States to be the first place in the world.' At the same time, China also has had the largest number of broadband users and country-code Top Level Domains (CNNIC, 2008). According CNNIC (2010), by January the total number of the Internet users in China had reached 3.83 hundred million (see figure 5.4).

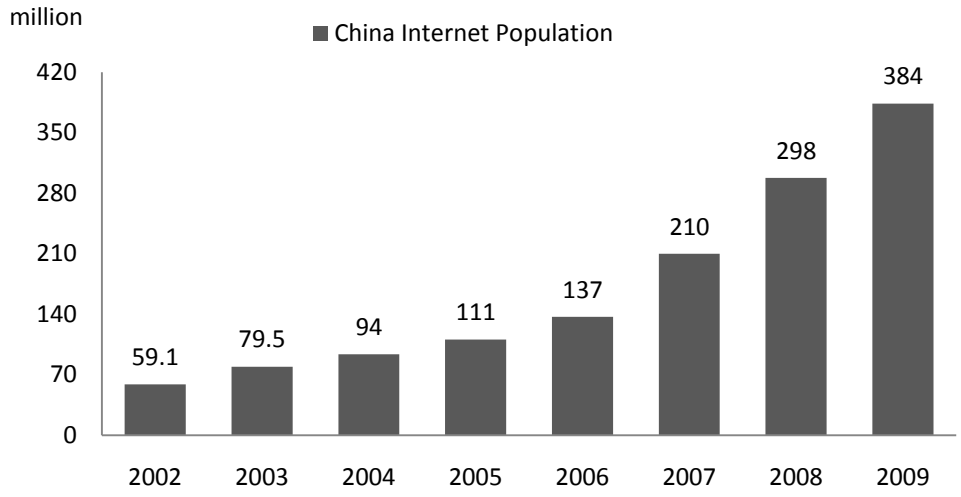

Figure 5.4: Growth of Internet Population in China (2002-2009)
Source: Data from CNNIC (2010)

In fact, although we can see a sharply increasing trend in the development of China's Internet from the statistics, the development of the Internet in China is fairly unbalanced; and the enlarging gap of China's digital divide has aroused some serious attention of the government. According to a relevant official research by CNNIC (2002), about 61.99% Internet users were living in the Eastern China; and only about one third of the total users were from the Central or Western China. For instance, in 2002, there were 12.4% of the Internets uses are from Beijing; but only 0.03% from Tibet. Certainly, the unbalanced distribution of Internet domain names could be also taken as clear evidence to demonstrate the situation of China's digital divide. According to the research done by Fan and Zhang (2003:180), in 2001, 82.61% of '.CN' domain names were registered in the Eastern China, of which Beijing accounted for 36.87%. In addition, according to CNNIC (2010), compared to many other countries in the world, the Internet penetration

rate of China is still very low (see figure 5.5). This is not only reflected in enlarging gaps in the access rates of the Internet usage between China and other countries, but more importantly reflected the enlarging gaps in the depth of the Internet usage between China and many other countries (Shang, 2008).

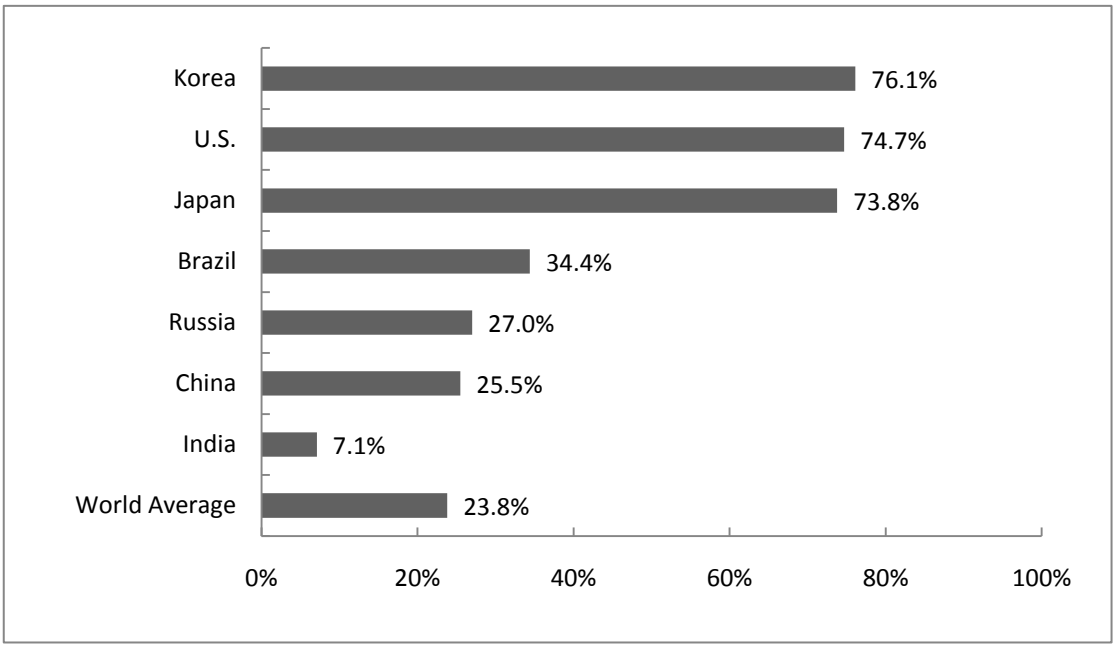

Figure 5.5: Internet Penetration in Some Countries
Source: Data from CNNIC (2009)

5.4 China's Information Control

Although information infrastructure and information networks are developing very fast in China, CCG is always cautious about people's use of the networks, because they want to make sure that the new communication tool will not be made use of to affect or destabilize China's socio-economic development and the political regime with certainty. As Wen (2006), the prime minister of China's State Council, indicates 'CCG support

the development and widely application of the Internet ... [Since that] according to the constitution, every civilian of the country has right and freedom in using the Internet; however, in the meantime, all the people should self-consciously abide by the relevant laws and public orders, actively safeguarding the national, social and collective interests. Therefore, CCG will legally administrate the Internet; in addition, we welcome and advocate the self-discipline and self-control activities of all the relevant industries or enterprises. The methods that CCG uses to administrate the Internet are common internationally, [since that] we attach great importance to the adoption of the relevant experience from other countries about manipulating the Internet,' as wen concludes, 'our perspective to administrate the Internet is, supportive, not against, but with restriction'.

As MC1 (Media Center, China Information Industry Association) said, there are four key aspects, in which CCG wants to take control over China's Information networks. The first aspect is taken from the consideration to ensure China's economic development. After that, CCG needs to ensure the social stability of the country. Third, CCG is sensitive to some political debates. At last, cultural differentiation of Chinese nationalities has to be taken as another important consideration. The three major official departments play roles in controlling the Internet are respectively Ministry of Industrialization and Information Industry (MIIT), The State Administration of Radio Film and Television (SARFT), and Ministry of Public Security (MPS). MIIT is mainly in charge of the layers of 'Information infrastructure', 'Information nodes'; while

SARFT and MPS in charge of the layers of 'Information contents', and 'Internet users'. Certainly there are some other official departments also taking part responsibilities for monitoring China's network security, such as the State Food and Drug Administration (SFDA), still MIIT, SARFT and MPS play the biggest role. In addition, for assurance of a 'healthy' environment of China's Internet development, in April 2000, the Internet Information Management Bureau (IIMB) was established under the State Council Information Office (SCIO) to regulate the Internet media and improve the websites of five well-known state media, namely, the China Daily, the People's Daily, Xinhua News Agency, China Radio International and SCIO's China Internet Information Centre (CCIC). For more details about the laws and regulations on China's Internet, please see Appendix E.

Summary

Through a general discussion, this chapter has helped to draw a background picture of how information technologies have been used to support a digitization process of China's economic development. Due to the rapidly increasing use of information technology, China's national economy has been experiencing a dramatic transformation from an industrial economy to an information economy, during which the use and development of information technologies has been gradually moving towards the center of China's economic growth. However, although China's information economy is improving so rapidly, as a developing country that is still in the half-way period of its

industrialization construction, China's information construction and information-based economic development are indeed facing many difficulties resulted by the incomplete industrialization. Therefore, the development mode of China's information economy has to be different from other countries, in particular for the developed countries that have already completed the industrialization process. In other words, China's distinctive national situation has determined that China's information economy should not simply make copy of other countries' development mode; rather it is important that the balance between industrialization and informatization is properly adjusted so that the maximum value of the both processes can be achieved. This is the essential meaning of China's information economy that will be explored more in the next two chapters.

Chapter 6

China's Neo-industrialization

As a developing country, China still has not fully completed its process of industrialization yet. Therefore, it seems that there are always some problems or difficulties hindering the progress of China's national economy at the current stage of development. For example, although there has been a high-growth of GDP in China over the recent decades, a large part of the growth still relies on some kind of low-level industrial production and international trade such as that of low-end manufacturing processing. Actually the problem with such kind of industrial production is its low efficiency but high pollution and high cost of natural resources. This will to a certain degree affect the sustainability of China's economic development. In order to improve the situation, CCG has decided to help the country find a new path of development, in which they believe that China's economic growth should be improved to be based on a 'high efficient' and 'low-cost' mode of economy; and this is why Hu Jintao, the present of China, has revised the original economic objective from the 'fast and sound development' to the 'sound and fast development', appealing that China's economic growth should from now on be based on a 'scientific view of development' (Hu, 2007a, 2008). In order to achieve the goal, CCG has attached great hope to the information technologies. They insist that through effective and innovative use of the new technologies, China's industrialization and industrial production can be promoted, so that a 'leap forward' of China's national economy can be realized. This new process is

called a ‘neo-industrialization’ path of development (NDRC, 2006).

In this chapter I will discuss the policymaking and implementation processes relating to China’s ‘neo-industrialization’ development in four aspects, namely ‘readjusting China's economic development strategy’, ‘driving industrialization with informatization’, ‘promoting informatization with industrialization’, and ‘overcoming challenges and seizing opportunities’. The first aspect is considered as the precondition or premise of the latter three aspects; while the latter three aspects are seen as the practical meanings to respond to the first aspect. In detail, in the first aspect, I will look respectively into the four objectives of China’s national economy, namely ‘industrialization’, ‘informatization’, ‘marketization’, and ‘internationalization’, because these four objectives are also the main goals of China’s neo-industrialization development. Then in the second aspect, I will look into the policy of ‘driving industrialization with informatization’, in order to understand the transformation process of China’s industrial economy under the impact of information technologies. Through the analysis, people are expected to understand how the development of China’s national economy is driven from an industrial economy into an information economy. After that, in the third aspect, a discussion about China’s information industry will be generated, through which the development of the four key areas of ICTs related industries will be taken into analysis. At last, I will examine two major opportunities and two key challenges in the process of China’s neo-industrialization, in order to depict a more complicated picture of China’s developing information economy.

6.1 Readjusting China's Development Strategy

In order to cope with the increasing complexity of China's national economy and to achieve a better performance in industrial development , CCG has modified the original national development strategy [53] , and readjusted China's national economic development with five new strategic objectives, which are respectively 'industrialization', 'informatization', 'urbanization' [54] 'marketization', and 'internationalization'. As Hu Jintao (2007a) points out, 'we must keep remaining sober-minded, standing on the basis of the fact that China is still at the "primary stage of socialist development", to scientifically analyze all the opportunities and challenges in front of China', in order to further promote its full participation in the global economy. Therefore, 'we [should] comprehensively understand the new tasks of "industrialization", "informatization", "urbanization", "marketization", and "internationalization", and profoundly process the new topics and the new contradictions, in order to strive to open up broader prospects for a scientific development of socialism with Chinese characteristics'. According to CG1 (Development Research Center of SCC), for 'industrialization', it means that China will continue to place industrial development in the first position of China's national economy. In that sense, industrial production and related business exchanges would be taken as the dominant force of China's economic growth from a long term perspective.

[53] The old national development strategy, which is also recognized as the 'Four Modernizations' was originally raised by Zhou Enlai, the first premier of PRC, in 1963; and it framed the goal of Deng Xiaoping's Economic Reform in 1978. Officially the old 'Four Modernizations' refers to the fields of 'Agricultural Modernization, Industrial Modernization, National Defence Modernization, and Scientific & Technical Modernization' (Evans, 1995:204; Hsü, 1995, 1999:1017; also see Chen, 2009).

[54] There will be a separate discussion about 'urbanization' in the next chapter (chapter 7)

For ‘informatization’, it means that development of information technologies or the informatization construction is considered as a premier measure to support China’s industrial development. Therefore the government would ‘further promote’ the use and development of information technologies so that the overall productivity and competiveness of China’s economic output and structure will be improved. For ‘marketization’, it means that the government will ‘further deepen the scope’ of China’s economic reform, in order to build up a relatively complete market economy system, under a certain moderate degree of direction by the government. For ‘internationalization’, it means that CCG will insist on a ‘long term open-door policy’, in order to help China ‘further merge into the global economy’; and this is ‘a process believed beneficial to both China and other countries in the world’. Now let’s take a closer look at the meaning of each of the four development objectives.

6.1.1 ‘Industrialization Construction’

CCG has always stressed on the importance of ‘Industrialization construction’, and they consider this to be the most important task at the stage of China’s development (Jiang Zemin 2002; Hu Jintao, 2007a). As CG2 (Policy and Regulation Office, MII) explained, although China had built up a huge industrial system, the ‘system’ itself was still not very strong; there were still many problems affecting the daily operation of the ‘system’. In this realistic situation, ‘we have to place industrialization construction in the first place’. Apart from that, there are also some specific reasons for which CCG insists on

the ‘industrialization’. The first reason is the relationship between industrial economy and employment development. According to CG2, due to the huge and increasing population, there are a large number of labor forces in China. ‘In consideration of their realistic survival interests, the government would have to push forward the process of industrialization construction, in order to secure their employment opportunities’. The second reason is the quality of industrial production, especially when it is now further related to the increasing environmental issues in China. As CG2 has pointed out, low level industrial manufacturing is ‘not compatible’ with China’s current development goals and it is also a major cause of the environmental problems. Therefore, now the government has ‘strong willingness’ to promote industrial production ‘at some higher levels of development’ so that more economic and environmental profits can be achieved. After that, it is also related to the development of China’s industrial structure. As CG2 has indicated, as the world’s largest manufacturing factory, China’s industrial structure is still very irrational, of which many of the industrial activities are still at the low-end of the industrial chain. Therefore, ‘through further promoting industrialization, we hope that China can carry out some industrial activities at some higher ends of the chain’; this is believed important to make China a better participant in the global division of labor. Finally, to promote the industrialization could also be related to China’s ‘energy security’. Through upgrading industrial activities, it is believed that the reliance of industrial production on the consumption of energy resources can be reduced; this will to some extent help to improve China’s economic security from a long term perspective. It is basically from these concerns that, the government has stressed to

‘accelerate the pace of China’s industrialization construction’.

In order to meet the objective, Beijing’s local government has made its own specific plan to boost Beijing’s industrialization construction (BMCDR, 2006b). However, because of Beijing’s limited natural resources such as water resourc and its own unique development predominant situations such as technology and talent, Beijing’s local authorities have chosen to give priority to the development of only those ‘optimal’ industries, such as high-technology manufacturing and modern manufacturing. As BG1 (Modern Industry Development Office, Beijing Industrial Promotion Bureau) has indicated, Beijing has its own development situation. ‘Accordingly we have to be very clear about this situation when we set up the directions and push forward the development in such directions’. In fact, considering the ‘barriers’ such as the environment and limited natural resources, Beijing’s industrial development has to be carried out on the basis of four key factors. Firstly as the capital city of China, Beijing has gathered most of the information resources, including that of markets and policies, which are important to development of an industrial economy. Secondly, as the place which has gathered most headquarters of enterprises in China, including those of national enterprises and transnational enterprises, Beijing should effectively make use of such resources to further drive local industrial development. Thirdly, Beijing and its surrounding areas, including Hebei and Tianjin, is one of the fastest developing regions in China, which has huge potential to support and digest the industrial development. At last, as the ‘technology center’ and the ‘education center’ of China, Beijing is the largest

reservoir of high quality human resources, which is able to provide all kinds of 'talents' or 'well-educated workers' needed for the development of the local economy.

From ENTs' point of view, it is certainly a good thing that China is willing to further stimulate industrialization, because they think it is helpful for creating more business and investment opportunities, in particular when the world has been suffering from the economic recession since 2008. However, as ET1 (R&D Sector of Alibaba Group) has also pointed out, although China's industrial development has made enormous progress, and has built a huge and relatively complete industrial system over the last 30 years, it seems that the industrialization construction in China is still not strong yet in a general sense. Taking manufacturing as the example, as ET1 explained, despite that the numbers said that China had surpassed Germany to become the largest manufacturing nation in the world, it was undeniable that the quality of China's manufacturing was much lower than that of many developed countries. 'In that sense, there is still a long way ahead for China's industrialization construction to catch up with the leading industrial countries in the world'. This, he added, 'may be ascribed to the current political economic system such that for economic assessments of institutions; GDP is usually placed as the most important indicator of economic performance'. This has resulted in many local governments over-emphasizing those industries with a high return in GDP. 'But these "high-return" industries are usually low-end manufacturing that doesn't have much quality' at all. As for Beijing's situation, as ET1 indicated, compared to other major cities in China, Beijing's modern manufacturing obviously

‘lacks cooperation’ with its surrounding areas within the economic region. Comparing to the ‘Pearl River Delta’ and the ‘Yangze River Delta’, although Beijing is one the most industrialized cities in China, the average level of industrialization of the Jing-Jin-Ji area is still comparatively low; this has undoubtedly affected the overall potential of Beijing’s modern manufacturing. In order to solve the problem, BMG has to take out more effective activities build ‘economic ties’ between Beijing and its surrounding area including Tianjin, in order to build up a more ‘cooperative industrial environment’; and this will benefit Beijing’s development in return.

6.1.2 ‘Informatization Construction’

As one of the recent updated meanings of China’s modernization, ‘informatization’ is given strong priority since the 1990s; it is now usually seen as an inseparable part of ‘industrialization’. As Jiang Zemin (2002) indicates, China's industrialization is still in the half-way stage of China’s economic modernization. Therefore how to further promote China’s industrialization has become ‘an arduous historic task’; and ‘to persist in using new technologies to stimulate China’s industrialization’ has become an important measure towards achievement of the goal. In this case, China should promote, and make effective use, of information technologies, in order to ‘promote an information-based industrialization’; this is essentially important to whether China will be able to create a ‘neo-industrialization’ mode of development in the future. As CG2 has indicated, although having been developed for over twenty years, information

technology is still not fully adopted in China's industrial development; therefore, it is important to further stimulate the integration of the information technologies into China's industrialization at the current stage of development. In addition to this, in the process of informatization, there is a fast rise of the information industry in China; this has become another important reason why CCG keeps supporting the 'informatization construction'. In practice, 'driving industrialization with informatization' is taken as the key measure to realize China's 'informatization construction'. As CG2 said, through promoting the development of the information industry, 'we hope that China's industrial development will gain more momentum'. This is perfectly in accordance with Jiang Zemin's (2002) appeal that, China should now give priority to the development of information industry, so that information technologies can be applied to drive China's further socio-economic development. In other words, CCG would like to see further development of China's information technology, so that it could provide some greater technological assurance to promote the development of China's national economy.

As BG2 (Beijing Municipal Office of Informatization) indicated, Beijing had been all the way playing the important role of China's informatization development. 'It is not only because Beijing is one of the fastest information- developing cites in China, but also because Beijing's information development is dealt with really well in the light of its own specific conditions, and offers a valuable reference for the other cities in China'. According to BG2, as one of the earliest cities to set foot in the information industry in China, Beijing is actually in possession of a few prominent advantages in developing

the new economy over the other places of the country. Firstly, owing to the rapid and steady development of the information technology related industries over the last 15 years, Beijing has gained a lot of technical predominance and valuable development experience. This has made the city become the base of the most ICT enterprises in China; and that is why Zhongguancun has become considered 'China's Silicon Valley'. Secondly, the construction of Beijing's information infrastructure is comparably earlier than many other places in China. This has then made the city equipped with the most completed information system facilities. Thirdly, as the Chinese education center, Beijing's technology R&D capability is the strongest in China. Fourthly, as one of the economic and financial centers of China, the development of Beijing's information technology related industries has an abundance of economic or financial supports. However, as BG2 has pointed out, there are 'challenges' in Beijing's informatization construction, one of the challenges is that 'our independent innovation capability is still relevantly weak if compared to some cities in the developed countries'. On the one hand, this is because 'the high-end information talent reservation is not enough'; on the other hand, 'the innovation environment is still not good enough'. Therefore, 'the focus of our work in the next step is to improve these two aspects of development'.

From ENTs' point of view, as ET1 (R&D Sector of Alibaba Group) has indicated, China is merely a manufacturing power but not an industrial power, because its manufacturing level has not yet reached that of those industrial developed countries. 'If China wants to realize a breakthrough from a manufacturing power to an industrial power,

informatization construction should have played an even more important role in industrial development'. ET1 used an example to support his argument. For the moment, China's steel output has reached nearly 400 million tons per year. However, this is the only number can be seen. If you what to know how much steel China's has consumed a year, the only way to do this is to do a simple calculation, namely using the total steel output (400 million tons) + total steel imports – total steel export = total domestic consumption of steel. But about how the steel is consumed and where it is consumed, we would have no idea to answer these questions. 'It looks a bit funny right? What has been reflected here is China's lack of information measurement system for steel production'. In fact, such kinds of problems in the different industrial sectors might cause some big errors for China's macro-economic management and lead to a huge waste of its industrial production. 'This is a not technology problems; rather I see it as a problem of business administration'. As for Beijing's development, according to ET1, it is true that many of Beijing's industrial enterprises have adopted the information system in their production. But this has to be based on the fact that most of the enterprises themselves are those large state-owned or international business entities depending on high-tech based manufacturing, such as auto manufacturing. Many small and medium sized industrial enterprises are left far behind in development. Although the local government has carried out a series of activities to stimulate the local manufacturing SMEs to make more use of ICTs and has made some achievements on that, such achievements are still by far not enough. 'If you cannot solve the problem in the administration process, it is very unlikely that ICTs will be effectively used; and if this

situation remains unchanged, it is believed that more and more SMEs will lose patience about the so-called "informatization" development, because they will find that making use of the new technologies cannot help them improve their businesses'. 'In fact, as far as I know some of these enterprises have already shown their concerns about this now'.

6.1.3 'Marketization Construction'

CCG is undoubtedly enthusiastic about China's marketization construction, because clear evidence shows that China has received tremendous benefits from the new economic system since the 'economic reform' in 1979 and early 1980s. Therefore, to insist on the policy of economic reform and 'continually expanding market potential' has become one of the most important objectives on the government's working agenda (NDRC, 2009). However, due to the unique social and political institutions of China, it seems that CCG would not just let the 'reform' operate without limitation; rather it wants to take control of it and set up a different economic system for the country. This is called by the officials a 'socialistic market economy with Chinese characteristics', which it means that the market economy of China is under supervision by CCG, in order to make sure that it will not be abused in any way. In addition, as Chinese authorities are clearly aware that, despite the fact that the market can drive the high growth of China's national economy, there are still short-falls of the market that should not be ignored, such as over-exploitation of national resources and destruction of the environment. Therefore, as CG3 (Economic System Comprehensive Reform of

National Development and Reform Commission) has indicated, it has been always very necessary for CCG to, to certain degree, take control of and moderate the process and the pace of China's marketization development, in order to ensure the achievement of a 'purposeful' and 'sustainable' development of China's socialistic market economy.

In fact, it is believed that BMG has been actively responding to the policy of China's economic reform and 'marketization construction', and has carried out a series of activities to implement the policy. According to one of the latest official reports, Beijing local government has reformed the local tax system in order to further stimulate the growth of the Beijing marketplace (BMG, 2009). However, as BG3 (Economic System Comprehensive Reform Sector, Beijing Municipal Commission of Development and Reform) pointed out, 'compared to other front-line cities in China', such as Shenzhen, Shanghai, and Guangzhou, Beijing's local government needed to be authorized by the central government with more 'adjustment space', in order to further advance Beijing's 'market deregulation', in particular that of the financial market. As BG3 said, the financial industry was Beijing's 'backbone industry', 'contributing the largest portion of Beijing's local GDP and the government's taxation revenue'. The degree to which the 'financial market' was deregulated would directly affect the performance of other economic sectors. Although as the capital city, Beijing is holding the 'largest part of the financial assets in China', due to 'the limitation' by the Central Government 'the reform of Beijing's financial market seems always to some extent to lagged behind compared to that of other coastal cities in China'. BG3 said he understood that, this might be due

to China's 'special' 'strategic arrangement' for ensuring China's economic stability, since most state enterprises and financial institutions were located in Beijing. But BG3 also said, the limitation itself is nothing but 'an institutional barrier'; Beijing's financial market should be allowed with 'more equal opportunities', because it was strategically important to Beijing's competitiveness and growth; not just of the financial market, but also of the overall marketization construction. In fact, at the moment, CCG has only allowed Beijing more development space for its culture and technologies industries. This is the reason why Beijing's local government has been making some great efforts to 'enlarge the market space' in these two industries, so that an 'inside-driven' (内驱型), rather than 'outside-driven'(外驱型), mode of market economy can be created.

From the ENTs' point of view, ET2 (China Electronic Commerce Association) pointed out, 'CCG should have given more priority to the development of SMCs in China', as he believed that SMCs were an 'unignorable force' in China's marketization development. ET2 gave a group of numbers to support his claim, 'by 2008, there had been over 42 million SMCs registered in China; and this had counted 99.8% of the total number of enterprises in China'. Although CCG has made some efforts to support the development of SMCs in China, such as providing the needed information services and financial assistance, it is still not satisfactory if the current situation is examined. This is mainly because China still has not constructed a 'structural framework' to protect SMCs, so that they are not able compete, on a more equal level, with the big enterprises, such as the state-owned enterprises and multinational enterprises. As for the distinctive

situation in Beijing, a large number of SMCs are 'technology-focused or innovation-based companies'; therefore Beijing's local authorities 'should pay more attention to effectively protecting this special group of SMCs' interests and competitiveness in market competition', in order to ensure the activeness of their contributions to Beijing's local economy and marketization construction.

6.1.4 'Internationalization Construction'

For 'internationalization construction', from the CCG's perspective, it is very important for China to become an internationalized economic body today, as this will benefit the country with more competitiveness of its development. As CG3 (Economic System for Comprehensive Reform of National Development and Reform Commission) has introduced, since the 'open-door' policy was carried into practice during the 1980s, CCG has taken out a series of preferential policies, such as pushing and deepening 'taxation reform', in order to support FDI and secure the development of China's international trade. On the one hand, China exports goods, labors, and capitals to other countries; while on the other hand, China imports goods and attracts investment from other countries. 'It is these two processes that have enabled China to be closely tied up with the world economy over the past few decades. However, as CG3 has also indicated, the process of China's internationalization is not as smooth as it could be. Due to differences in understanding and different standards of agreement, there are always some trade frictions between China and some other countries. Therefore, at the moment,

the most important thing to do is to ‘make efforts to improve international exchange channels and enhance mutual understanding between China and other countries, so that a more firm tie between China and other countries can be created’.

It seems that Beijing’s local government has been always endeavoring to build Beijing into an ‘internationalized city’ since the 1990s. As BG4 (Policy Study Office, Beijing Municipal Government) introduced, the construction of Beijing’s internationalization ‘contains at least two aspects of significance’. Firstly, from the domestic perspective, as the capital city of China, Beijing’s internationalization should take responsibility to have a ‘demonstration effect’ for other cities in China. As BG4 said, Beijing had a few superiorities to become an internationalized city, among which the ‘Headquarters Economy’ or ‘HQ Economy’ should be the most prominent one. Since the late 1990s, ‘Beijing municipal government has introduced a number of measures to encourage multinationals to set up their regional headquarters in the capital. Since then, an increasing number of distinguished multinationals had established their global research and development bases here, branding the city with a distinctive HQ economy quality’. Currently, according to PDO (2005) ‘four major HQ centers have emerged in Beijing, including the Zhongguancun business district, offering a technological and business HQ atmosphere for enterprises during their hatching period; the Central Business District (CBD), providing a business environment for multinationals and joint ventures; a HQ center in Yizhuang for manufacturing enterprises; and a business district in Fengtai, a concentrated HQ area for multinationals and domestic enterprises’. Secondly, from the

international perspective, Beijing was a city representative of both 'typical oriental culture' and 'advanced socialistic thought', with which 'no other city in the world can compare', as BG4 followed up, over recent years, there was an increasing trend of international communication programmes established in Beijing; this had to a certain degree improved Beijing as a solid international exchange center of China. 'For maintaining such a trend of development, our work is mainly focused on how to provide first-standard government services, in order to make sure that the city will be able to attract more and more international communication programmes and events'.

From the perspective of ENTs, although the development of China's internationalization has been, to a large extent, dependent on the rapid growth of international trade and FDIs, a more important factor is whether China can help to create a 'competitive environment' to enable its local enterprises to grow up to multinational enterprises (MNEs) on their own. As ET3 (China National Electric Cable&Wire Imp/Exp Corp.) has pointed out, to become international does not simply mean to be internationalized. 'No matter how much investment has been made by foreign MNEs in China, it is their "internationalization", but not yours'. In that sense, ET3 did not believe there were any 'short cuts' for China's 'internationalization construction' only via attracting international investment, though he would not deny that the international investments made by foreign MNEs could 'make China look more international than ever before'. According to ET3, there is still a long way ahead for China's internationalization construction. Therefore, 'it is still too early to say that

China really has any international cities', because even having had the major metropolises like Beijing and Shanghai, 'neither of the cities can really compare to New York, London, or Tokyo'. As for Beijing's internationalization development, Beijing has gathered a lot of China's most influential and fastest-growing national enterprises, both the state-controlled ones like China National Offshore Oil Corporation (CNOOC) and Bank of China (BOC), and the private owned companies like Lenovo and Li Ning; some of these enterprises have really strong potential to become MNEs in the future. But whether these enterprises will eventually help China become 'international' would rather depend on if the government can guide them to set a 'competitive mechanism' for their development', in particular for the development of privately owned companies.

6.2 Driving Industrialization with Informatization

In order to meet the new objectives of China's 'neo-industrialization', and drive China's economy to more efficiently adapt to the current global economic system, CCG has made a key policy called 'driving industrialization with Informatization', by which it means that the strategic use of information technologies is promoted as an essential measure to support and drive the development of industrialization, so that a higher economic performance of China's industrial economy can be achieved (CCCPC, 2000 and 2005). In recent years, CCG has further required that, China should pick up the pace of 'driving industrialization with Informatization', in order to realize a 'further integration' between the two processes, so that China's national economy can more

quickly adapt to the changeable international context. Therefore, 'promoting further integration between industrialization and informatization' is now considered to be the latest version of the key policy (Hu, 2007a; SCC 2008b). As CG1 (Development Research Center, SCC) indicated, there were a few specific reasons for the policymakers to make this decision. 'Due to the uncompleted industrialization process, China's industrial development now faces of many problems, of which 'the relatively low productivity and competitiveness of industrial production' and 'the irrational industrial development structure' are two of the key concerns. In fact, although China's national economy has experienced a high growth rate over the past two decades, 'the progress is mostly based on a low-efficiency mode of development, which is usually referred as a "high-input but low-output" mode of development'. The direct impact of such a way of development is its 'over-cost' of natural resources and serious damage to the environment, which is not beneficial to China's sustainable development at all. Therefore, CCG is very keen to find an effective way to improve the situation; and that is one of the key reasons why information technologies have been given so much attention by the government these years.

6.2.1 Promoting informatization of the Industrial Economy

Primarily China's informatization works are conducted in three key areas, which are 'modern agriculture', 'traditional industry' and 'service industry' (NDRC & MII, 2006). According to CG4 (Informatization Promotion Office, MII) this is determined by the

economic structure at the current stage of China's national development[55]. Actually mong all these areas, 'informatization of traditional industries' is obviously given the most attention. As CG4 has explained, at the moment, China is still in the 'half-way period' of industrialization construction; therefore, the traditional industries are undoubtedly considered as the backbone of China's national economy at the current stage of development. In addition, although over the half century of development China has built a solid foundation of the industrial system, the development mode and the overall structure of the industrial production are still not very rational. 'For instance, a major part of China's industrial production is still based on the relevantly lower-end of manufacturing that consumes huge natural resources and produces high pollution', as CG4 added, through promoting wide use of information technologies in the process of industrial production, 'we hope that the situation can be improved or radically changed, so that a more highly efficient development mode of the industrial economy can be achieved' (see figure 6.1). As for the 'modern agriculture' aspect, CG4 said, informatization of modern agriculture was becoming increasingly important now; 'this is because over 7 hundred million people, which has accounted for 50% of China's national labor force, are engaged in "agricultural production" in China'. However, the problem is that, among all the economic areas in China, agriculture is the least industrialized area; therefore, 'to promote informatization of China's modern

[55] Agricultural industry is generally considered as the first industry, which includes, farming, forestry, animal industry, food processing, fishery, water conservancy, meteorological observation, and so on. The second industry is traditional industry, including the basic industry such as the energy industry, transport and communication, heavy manufacturing such as the metallurgical industry, machinery building, chemical industry, and light manufacturing such as car manufacturing, electronics industry, home appliances, and the textile industry. Service industry is also called the third industry or tertiary in China, referring to all the other business areas apart from the first and the second industry.

agriculture can directly help to pick up the pace of the industrialization process of China's agriculture and help the largest Chinese population out of poverty'.

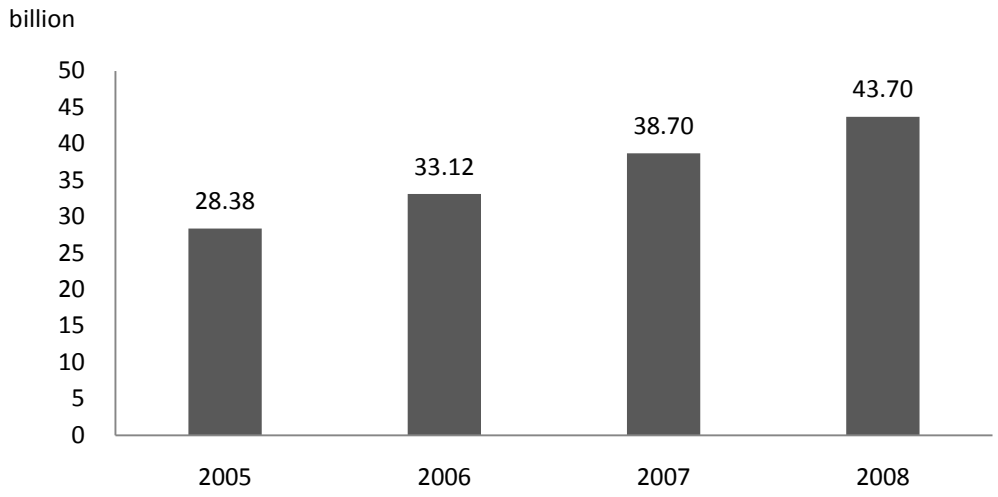

Figure 6.1: Growth of investment in IT sectors of China's manufacturing
Source: Data from CCID (2009a)

Since the late 1990s, Beijing's local government has carried out a series of activities to support informatization works of the local industrial economy (BMOI, 1998). However, due to the distinctive situation of Beijing's local economy, the focus of Beijing's informatization works is rather different from other places in China. According to BG5 (Policy and Regulation Office, Beijing Municipal Office of Informatization), although it is generally true that the traditional modern industries are considered a major task of Beijing's informatization development, the different economic structure of Beijing's local economy determines that the service industry has to be considered as another focus. As BG5 has explained, firstly, it was because service industry had made the most contribution to Beijing's local GDP, roughly over 73%. Secondly, the host of the Olympic Games was stressed as one of the most important tasks; therefore,

informatization of the services relating to the Olympic Games was seen as another reason for the local government. Basically, the development of Beijing's modern services industry is encouraged by the local government from 5 areas, which are respectively the 'culture and creative industry', 'finance industry', 'tourism industry', 'trade and commerce', and 'logistics services' (BMOI, 2006).

From ENTs' perspective, as ET2 (China Electronic Commerce Association) said, although some enterprises, such as Haier (海尔) and Janjing Beer (燕京啤酒), had benefited hugely from making use of information technology, it seemed that some enterprises, in particular small and medium enterprises (SMEs) and/or the private business sectors, were still not very interested in making changes, 'because many of these enterprises do not believe that they will benefit too much from the higher levels of production due to the serious phenomena of economic monopolies in the market, either controlled by state-owned enterprises or by Multinational corporations'. Although CCG has enacted the 'Anti-monopoly Law' in order to protect the market order, it seems that the implementation of the law is still immature. Therefore, 'to improve the activities to protect SMEs and create a fair environment for competition is crucially important for the informatization works in China'. In other words, although information technology can be used to improve the productivity of industrial economies; market competition seems to always play an essential role in driving the development. Therefore, 'while CCG should keep on enforcing the deepening of China's economic reform, they should also pay more attention to protecting SMEs from monopolies'.

6.2.2 Accelerating Globalization of the National Economy

As Wen Jiabao (2007) indicates, ‘we will express a more active attitude to participate in the process of economic globalization in a much wider realm’. Generally Chinese authorities believe that information technology plays a very important role in supporting and improving the development of China’s economic globalization, because they believe that information infrastructure, as the key material basis of today’s economic transactions, will ensure and secure the economic flows throughout the globe. As CG3 has (Economic System Comprehensive Reform, National Development and Reform Commission) pointed out, China’s economic globalization is taking place at its own pace; and one of the major reasons for this is that CCG sees the ‘open-door’ policy as part of China’s economic reform. In other words, China’s economic openness has to be based on a win-win outcome. On the one hand, China is providing the world more opportunities and creating more wealth or other countries; but on the other hand, China should also benefit from the process as well; this is the initial intention of China’s economic reform and open-door policy. As CG3 introduced, at the current stage, CCG had indeed carried out more activities to continuously maintain and accelerate the pace of China’s economic openness. One of the major actions is to lift some restrictions on the international trade of Chinese enterprises. However, the problem was that most of China’s international trade was based on the exchange of ‘low value-added products’ and ‘finished goods’. Therefore, although such kind of international trade can improve China’s economy, the cost is huge too’. In recent years, CCG has realized the problem

and made some policies to support industrial service outsourcing, such as software and financial outsourcing; this is an undoubtedly correct direction. However, 'such kinds of high value-added industries are all based on the information infrastructure. Therefore, to improve China's economic globalization in the new direction is also to a large extent dependant on the development of informatization' as CG3 concluded.

From the perspective of ENTs, the process of China's further economic globalization really depends on the economic performance of SMEs, as SMEs are usually more active than larger enterprises, in competitiveness and creativity. However, as ET3 (China National Electric Cable&Wire Imp/Exp Corp.) also pointed out, 'although the situation is making improvements, still SMEs are the least benefiting group compared to larger enterprises'. As ET3 continued, there were 'two reasons' why China's SMEs prevented themselves from overseas development. The first reason was that, although it seemed that the situation was improving now, most of China's SMEs still found it to be difficult to apply for financial assistance from the state-owned financial system. The second reason was that, without being certain of their local market in China, they would usually hesitate to 'go out' to explore the 'overseas market'. 'Without such an impetus', as ET3 criticized, 'why do they need a global business?'

6.2.3 Encouraging Informatization of Enterprises

CCG is very interested in the development of SMEs when they talk about China's informatization construction. As CG5 (Small and Medium Enterprises Service Innovation Sector, National Development and Reform Commission) said, 'how well the enterprises in China act in response to the informatization construction will directly influence the efficiency of the whole project of China's economic informatization construction'. However, as CG5 also pointed out, at the moment, informatization construction of enterprises in China was still at a lower stage; and there were many problems existing. Firstly, 'informatization construction actions are always disjointed from the layer of enterprise management. In other words, the enterprises in China would rather take information technologies as a tool to reduce work load; but few of them have really thought about making changes on the basis of technologies. As CG5 pointed out, this was on the one hand due to the rigid thoughts of these enterprises about the management system; but on the other hand, it was also because the development level of many Chinese enterprises at the current stage was still very low'. 'They do not have much complicated management works to deal with'. Apart from that, secondly, many enterprises in China thought of informatization construction as only a technical development rather than a business development. Therefore, 'they don't feel it is necessary, and they usually tend to ignore it; after all, they consider it a burden rather than a support' (also see MIIT, 2008; SCC, 2009).

BMG has taken out a series of activities to help the local enterprises for informatization development, because they are very clear that without informatization of enterprises, the whole project of Beijing's information development would lag behind. As BG2 (Beijing Municipal Office of Informatization) said, they had provided some free training courses to help enterprise management staff to learn IT skills, of which it was believed would to some extent help the enterprises to improve their information capability. 'We have organized some conferences about "informatization of enterprises" to bring together enterprises to exchange ideas and experience about informatization construction'. Apart from that, BMG had also helped to construct a few information platforms online, so that enterprises would make use of the platforms to exchange business information. As BG2 stressed, 'in fact, most of the participants of our programmes are small and medium sized enterprises, because compared to larger enterprises, they usually lack channels to learn about informatization. Therefore, what we are doing is to provide them the channels, so that they will not lag behind'.

6.2.4 Advancing Flexibilization of Employment

As CG1 (Development Research Center, SCC) has introduced, along with the rapid economic development of China over the last two decades, China has been entering a new phase of socio-economic development that is named by Deng Xiaoping (1979) as a 'Xiao Kang Society', for which it assumes that most people could live in a relatively comfortable and sufficient social situation without struggling with the basic needs for

survival. However, in the new period, although the people don't have to struggle with the basic needs anymore, it has to be realized that, being faced with the huge challenge of a large population, employment pressure has become one of the biggest problems restricting further development of China's 'Xiao Kang Society'. Therefore, how to properly resolve the problems of employment has become a very important point for discussion. As it is put by the government itself, 'at the moment, China is still staying at the early stage of Xiao Kang Society, for which the levels of socio-economic development are still low, incomprehensive and unbalanced' (Jiang Zemin, 2002).

Under this pressure, the Ministry of Labor and Social Security (MOLSS) launched the 'Jin Bao Project' (金保工程) in 2002, in order to increase the capability of social employment through making use of information systems. As Zhang Xiaojian (2005) indicates, following the gradual lifting of Institutional barriers affecting employment and labor flows, the problem of lack of communication for employment information now becomes increasingly prominent and this requires informatization works to further adapt to the development of a unified and open labor market, using networks to provide convenient and two-way optional services for both employees and employers. Basically, there are at least three major aspects of actions, which MOLSS has carried out in practice to support the development. Firstly, a specialized database has been built for collecting employment information throughout the country. Secondly, a number of platforms for exchanging employment information are set up. Thirdly, services in support of employment are encouraged to pick up speed (MOLSS, 2006).

From the ENTs' perspective, with the support of the relevant policies, there has been an increasing number of public and private sectors beginning to use information networks to organize employment information. However, as ET4 (EasyFlow R&D Dept., Digital China Holdings Ltd.) said, it seemed that some problems still existed. For example, although having had experience of using the Internet, many enterprises still preferred to keep the old methods to search for employees, because many of them did not think the information provided over the networks was trustworthy enough to meet their requirements. In addition, due to the separated administration of employment information and repeated construction of similar information infrastructure, a lot of employment resources were really dispersed. In the face of these problems, 'the government should further increase the flexibility of informatization works for employment, opening up the database, converging the platforms, and improving the services to be more specialized in accordance with requirements, because without improvements to the process of flexiblization, informatization works of employment will be less likely to achieve their main aims in the end'.

6.3 Promoting Informatization with Industrialization

While China's industrialization process is transforming under the enormous impact of information technologies, the development of information technologies itself has created a new economic growth point; and this has been recognized by the Chinese officials as the 'information industry' since the 1980s (EVLG, 1984). During the Tenth

Five-Year Plan period (2001-2005), CCG attached further importance to the development of the information industry in China, and made some more detailed policies to 'accelerate the development of the information industry in China' (SCC, 2001; MII, 2001). Since then China's information industry has entered a booming period; and this also helps to explain why the Internet industry has gained such a huge momentum in China since the early 2000s. As CG4 (Informatization Promotion Office, MII) introduced, at the current stage, although the industrial economy was still considered the most important task of China's national development, information technology had been already seen as a very important 'strategic resource' and 'new economic growth point' of the national economy. Beijing's information industry has gained the full support of CCG since the 1980s when Zhongguancun was established as China's first 'national level' of 'High-tech Industry Development Zone' in 1987 (ACZSP, 2009:2). In the early 2000s, 'information services' were given full emphasis in Beijing. With the support of CCG, Beijing has showed great ambition to become the 'information service center' of China that 'covers the country and connects the world' (BMCDR, 2001). However, as CG4 pointed out, although having made some remarkable progress, in comparison to many other countries, China's information industry was still not strong at all[56]. 'One of the key reasons is that China still has not set up its own effective "market mechanism" that is important to a self-driven process of development. Therefore, as Lou Qinjian, the vice minister of MIIT, (2009) stresses, China should make more effort to 'readjust' the development structure of the

[56] As CG4 said, in terms of the economic scale, China's information industry is undoubtedly one of the largest in the world, and has covered almost every sector of the information industry, from production to services. However, productivity and competitiveness in some areas are still relatively lower than that in some other developed countries.

information industry, in order to foster a better environment to help setting up an effective 'mechanism' for the development of the information industry.

6.3.1 Boosting the Telecommunications Industry

As for China's telecommunications industry, as CG4 (Informatization Promotion Office, MII) introduced, on average, the competitiveness of China's telecommunications enterprises was still obviously lower if compared to those from some other countries. Therefore, 'at the current stage, the key objective of the government is to encourage China's telecommunications industry to transit from a "big" to a "strong" industry'. One of the major actions to improve the situation is MII's appeal to urge China's telecommunications industry to accelerate the pace for the transition from a 'basic service industry' to a more 'value-added industry'. Generally, the basic telecommunications service refers to those business areas related to information-network connections or access; and value-added telecommunications services refers to those business areas relating to information-processing features of the networks, such as call centres and Internet content providing services (MII, 2003)[57]. Actually the basic telecommunications business has made great improvements due to the fast construction and development of information infrastructure over the last decade; however, there are still some problems existing in the business area. Therefore, 'in the next step, the main task of the basic telecommunications service is to solve problems

[57] In terms of the Catalogue of Telecommunication Service (2003), the business of China's telecommunication Service is divided into two main areas, namely the basic and the value-added services.

rather than pursue further development. The value-added telecommunication services, as new developing business, are still at the beginning stage; therefore its development is rather more important to be encouraged from now on' as CG4 said.

BMG has made some great efforts to support the local development of telecommunications. As BG6 (Market Supervision Sector, Beijing Telecommunications Administration Bureau) explained, this was firstly because Beijing had a firm groundwork for the development of telecommunication services. Secondly, Beijing was the Information Centers of China; therefore telecommunication services were important as supporting the special function of the city. Thirdly, as one of the most important economic centres of China, telecommunication services could help the city make further progress on its economic performance. Fourthly, as the cultural center of China, telecommunication services were indispensable. In specifics, 'Beijing has stepped up the construction of telecommunications networks, to develop mobile communications. Construction of third generation mobile communication systems, to develop a wide array of multi-rate mobile communication services, and actively promote broadband wireless Internet access, to develop value-added services of mobile communications'. Furthermore, recently BMG has reemphasized wireless development, in order to complete the construction of a 'wireless city' of Beijing by 2010, for which the first two stages have been completed, piloted in 2008 and 2009.

From the perspective of ENTs, with the gradual completing of information infrastructure in China, CCG has been attaching greater importance to the communicative value of the telecommunications industry. Therefore, value-added telecommunications services are believed to be becoming increasingly important today. However, as ET5 (Atos Origin China) pointed out, it seemed that the policy was still 'not concrete enough' to encourage the 'value-added' services. In fact, there was a large range of categories of value-added telecommunication services; some business areas, such as content providing services, had already showed obvious oversaturation status. 'This is undoubtedly something the policymakers do not want to see'. In order to improve the situation, as ET5 suggested, the government should clarify more details of the policy and effectively stress those services which could radically improve the quality of the telecommunications system and networks, such as the Convergence of 3 Networks (C3N) and WiMAX, so that a 'strong' telecommunications industry would become realized in the near future.

6.3.2 Accelerating the Software Industry

CCG is very active in supporting China's software industry. As Zhao Xiaofan (2008) indicates, 'software services, as one of the core areas of the information industry, are the basic, strategic, backbone industry of China's socio-economic development. It is also an important measure required to improve the traditional industries, to upgrade the quality, effectiveness and competitiveness of various industries'. With the active

support of the government and great efforts by the social and industrial forces, the software industry has made prominent achievements, and become an important growth point of China's information industry. Apart from the clearly supportive views of CCG, there have been a series of actions carried into practice. One of the most effective activities is that 'for those enterprises that establish software businesses in China, they can receive benefits from cutting down income tax' (SCC, 2000). As CG6 (Information Products Administration Office, MII) introduced, 'we reduce tax payments of software enterprises; in particular for those enterprises that carry out R&D of software products in China; they only need to pay 17% of the statutory value-added tax until 2010'. In addition, in order to further promote their actions, the government also clarifies the development direction of China's software industry, such as stressing the priority of 'government procurement' for China's software production (SCC, 2002).

BMG has issued a series of supportive policies for the development of Beijing's software industry. Apart from the taxation reduction, as BG2 (Beijing Municipal Office of Informatization) detailed, in recent years, there had been some detailed actions of the local government to promote Beijing's software industry development, such as ensuring the financial support of IT companies and setting up special funding to encourage small and medium IT enterprises. In specifics, BG2 listed several specific measures. One of the measures was 'Beijing software enterprise software products, identification and registration of management implementation approach', 'this is to encourage the development of software and IC industries to complement the issues related to

corporate income tax notice'. Some other measures included 'High-level Talent on the Beijing Software Enterprise Incentive Management Project Interim Procedures' issued by Beijing Science and Technology Commission, Finance Bureau in May 2001; 'Views on the Strengthening of Intellectual Property Rights' issued by the General Office of Beijing Municipal People's Government in June 2001. As BG2 said, these measures were all helping to create a good development environment for a strong impetus to Beijing's software and service industry.

From ENTs' perspective, in the development of China's software industry, some problems have begun to appear, restricting the development potential. As ET5 (Atos Origin China) pointed out, one of the problems was that due to the increasing competitiveness of the software market, some software enterprises have gradually come under pressure from low profitability. In other words, although the software industry was growing rapidly, the benefit that enterprises could generate from their software products showed a decreasing trend, so that some of these enterprises had begun to lose interests in investing more into the business (also see CEI, 2003). In fact, the core meaning of software is its application. Although CCG has attached great importance to the development of China's software industry, it seems that the attention they have paid to the applications of software is still not very clear. In this case, the demands of a decisive market become relatively diminished compared to the prosperous growth of the software industry. Therefore, it certainly makes it increasingly difficult to make profits from continuous expansion of software production. Therefore, the next step for

CCG to support China's software industry should be to promote the use of software services, stressing those enterprises focusing on network-applications-related projects, and accelerating the development of Software as a Service (SaaS), so that the uses of software become increasingly accessible for a wider range of economic development.

6.3.3 Encouraging Electronic Commerce

Basically among the business areas, CCG has clearly clarified their willingness to encourage the development of the Internet industry in China, of which electronic commerce is given particular emphasis by the government, because they think it is helpful for improving China's industrial production through rationalizing the distribution process. According to SCC (2005), 'electronic commerce is an important joint outcome of industrialization and informatization; therefore, development of electronic commerce becomes a significant measuring point to match the goal of 'driving industrialization with informatization'. It helps to optimize China's economic growth mode, increase the national economic operation efficiency and quality, and helps to work out 'a brand new neo-industrialization way'. In order to re-emphasize the importance of electronic commerce development in China, SDRC and SIO particularly issued an important official document, *The Electronic commerce Development Eleventh Five-Year Planning* (2007), in order to further stimulate the development of China's electronic commerce (SDRC, 2007). Furthermore, as Shi Weiguang (2006), Director of Informatizaion works of Ministry of Commerce, indicates 'accelerating progress of

electronic commerce is an inevitable choice, while China faces of the challenges from economic globalization; therefore, we must hold initiative tightly in hand so as to increase our international economic competitiveness', encouraging the application of electronic commerce is beneficial to improving China's socialistic market economic system, because it helps the 'flexible flows' of goods and production materials, so that the negative factors restricting justice completion can be reduced, which is very beneficial to realize the market-leading economic distribution in China in order to unify all the national market in supporting the national economic development.

BMOI indicates (2006) that, 'Beijing should accelerate the speed to popularize Internet industry development, upgrade the general application levels of electronic commerce, and construct Beijing as one of the most influential electronic commerce centers of China' (see table 6.1). As BG2 (Beijing Municipal Office of Informatization) introduced, Beijing, as one of the most important business centers in China, had a few superiorities in the development of electronic commerce. Firstly, Beijing was one of the most important exchanging centers of business information in China. This was because on the one hand Beijing had gathered most of the national enterprise headquarters. On the other hand, an increasing number of transnational corporations chose Beijing as their regional headquarters. Secondly, Beijing had gathered the most electronic commerce related companies, which became another major force driving the development of the new business area. In practice, Beijing's local government had also carried out a series of measures to encourage Beijing's electronic commerce development. 'One of the most

impressive activities is that they stress that the construction of creditability, identity, standards, payment, logistics, and accounting systems should be accelerated and completed', however 'our principle is to guide rather than forcing the development; we would like to leave the market or the enterprises more power to drive the development'

Province/Municipality	Proportion
Beijing	24.3%
Guangdong	9.1%
Zhejiang	5.4%
Jiangsu	5.1%
Shandong	4.7%
Shanghai	4.6%
Liaoning	3.3%
Hebei	3.1%
Henan	2.7%
Sichuan	2.4%

Table 6.1: Distributions of IPv4 Addresses in China (by location)[58]
Source: Data from CNNIC (2009)

From the perspective of ENTs, although electronic commerce companies are still weak compared to the traditional enterprises, they're growing really fast. 'Due to the increasing use of information technology and the Internet in business areas, there are an expending variety of new service areas emerging, out of which a great number of them

[58] Distribution of IPv4 can reflect the economic scale of the internet industry and electronic commerce of a place.

are information technology related companies.' As ET6 (Beijing Deofar Information Technology Co. Ltd.) introduced, 'although the contribution of these companies to national economic growth is still weak at the moment, compared with that of the industrial enterprises, its growth speed is so rapid that the government cannot ignore its development. Furthermore, setting up electronic commerce is very easy in China now; ant this has become one of the reasons electronic commerce is attracting more and more SMCs'. However, as ET6 also points out, 'now in China B2B is obviously developing much faster than B2C, and this has to arouse attention'. On the one hand, CCG gave more emphasis to the development of B2B, as this was directly related to the industrial production; on the other hand, China's national economy was, to a large degree, dependent on international trade, and this had provided a good environment to foster the growth of B2B in China. As ET6 added, 'the situation need to be changed', according to the experience of some developed countries, such as the United States, B2C is usually more important as it would really help to improve the market system of the country, and is the 'substantive indicator' to measure the development of electronic commerce.

6.3.4 Encouraging the Electronic Finance

Although CCG would like to see the development of China's financial industry, it seems that they are always very cautious when making relevant policies. As Hu Jintao (2007) stressed in one of his important speeches about China's financial works, 'It is very important to fully understand the significance and pressure of the financial works,

and make in-depth investigation to study the new circumstances and new problems. Based on that, we should accelerate financial reforms, strengthen financial security, and improve the general financial capability, competitiveness and risk management in order to promote the continuous and healthy development of the financial industry.' Apart from that, at the same time, CCG also stresses the importance of 'financial innovation' in order to encourage an increasing variety of modern financial services (Liu Mingkang, 2006). Actually, there are at least three major factors influencing the decisions of CCG to promote development of financial services. Firstly, financial services are considered to be an indispensable support to China's industrial economy. Currently China's industrial economy has been entering a new phase of development; financial services, therefore, become essentially important, because without the proper financial supports, it seems very difficult for industrial development to continue. Secondly, China's financial system is still far from completed, and this makes it difficult for China's financial industry to grow under the huge pressure from dramatically increasing International competition. In terms of the WTO agreement, China's financial market has to gradually open up to competitors from other countries. Therefore, how to survive becomes a very challenging topic for CCG. Finally, financial services are also considered to be one of the new engines of China's economic growth.

As BG7 (Policy and Regulation Office, Beijing Municipal Office of Informatization) introduced, BMG supported Beijing's Electronic Finance mainly in three aspects. Firstly, to support financial institution of information construction, the building of a

full-featured system, giving priority to efficiency, safety of cross-bank payments and settlement systems, improving the paper processing systems, Tong Cheng, innovation and the development of online payment. Secondly, BMG vigorously promoted the application of bank cards for the Olympics; for Olympic venues and surrounding areas' business services network, focusing on the business district, commercial district, tourist attractions, etc. so that the card would be accepted as an international card for the Olympic Games and create a good environment for making transactions. Bank cards were promoted for sporadic payments, public fees, and other closely related fields, encouraging people's use of the card. Thirdly, BMG supported the establishment of financial credit networks, network construction and financial credit combined with the building of a social credit system to promote the capital base of credit information and credit information integration and sharing, to increase the financial risk prevention capability.

As ET7 (Global Markets Sector, Atos Origin) said, it was strategically important that CCG insisted on supporting the development of China's financial industry, because it was closely related to the important process of China's industrialization. Therefore, improving the quality of China's financial services had become undoubtedly significant. After that, stressing financial security should be further enhanced, especially when it was faced with the uncertain international environment, because without continuous awareness of financial security, China's still weak financial system would become fairly vulnerable if placed under the international financial shock. Considering that, setting up

a highly efficient administrative system should be considered a long term development strategy for China's financial industry. Certainly, at last, it was also valuable to promote 'financial innovation', for example, to encourage development of financial derivatives based on the use of information technology. As a brand new industry in the digital age, China's modern financial service should keep full of its vitality through technology-based 'innovation', because it was this feature that would fuel the development in the future.

6.4 Overcoming the Challenges, Seizing the Opportunities

In fact, although having seen remarkable progress, it has to be noticed that, in the process of China's neo-industrialization development, some practical problems or difficulties will indeed be challenging on the road ahead; therefore unless these challenges are solved, it would be very hard for China to keep up the pace of the new development. Generally it is believed that there are at least two challenges in the development of China's neo-industrialization economy. One of the challenges is the trend of the continuously 'enlarging digital divide'; while another challenge is that of 'IPR protection'. As CG2 (Policy and Regulation Office, MII) explained, the 'enlarging digital divide' mainly referred to the increasing differentiation or polarization 'between the urban and rural areas in China' in terms of the use of information technologies. For the 'IPR protection', it points to the dilemma between the increasing technological progress and the relatively worse situation of 'IPR protection' in China. Certainly, in the

face of challenges, there are still many reasons to be optimistic, because opportunities would help to build up China's confidence and direct the way to success for development. Firstly, the 'continually expanding market' both inside and outside the country, could provide an unprecedented opportunity for China's development. This was usually recognized by the Chinese officials, as the 'two markets with two resources' of China. Another opportunity for China's neo-industrialization development is that of the ongoing 'technology innovation', because it will help to create unlimited potential for the innovative use of information technologies for driving industrial development.

6.4.1 Diminishing the Digital Divides in China

Although it has raised the attention of many countries and organizations, the continuously enlarging 'digital divide' is still one of the major difficulties throughout the world today. In China, although it shows a dramatically increasing number of Internet users over the last decade, the penetration rate of Internet use in China is still very low and unbalanced. According to CNNIC (2009), 'By June 2009, the proportion of Chinese urban Internet users had been consistent with that in late 2008, with the proportion of rural users increasing slightly. Now, the number of rural users has reached 95.65 million and is increasing progressively, but the penetration of the Internet into the rural areas slowed down a bit compared with 2008' (see figure 6.2) As CG7 (CNNIC) indicated, 'on the one hand, this is due to the large numbers of the rural population and increasing difference between rural and urban areas; on the other hand, unbalanced

development of regional economies becomes another important inducer to worsen the situation' (also see CNNIC, 2007a). In the face of the problem, CCG has made some efforts to help diminish the 'digital divide' by stressing the administrative means to enforce information construction over some rural areas in China. 'For instance CCG has carried out some actions, such as the *Cun Cun Tong Project*[59], in order to bridge the 'digital divide' between rural and urban areas' as CG7 introduced (also see MII, 2006)

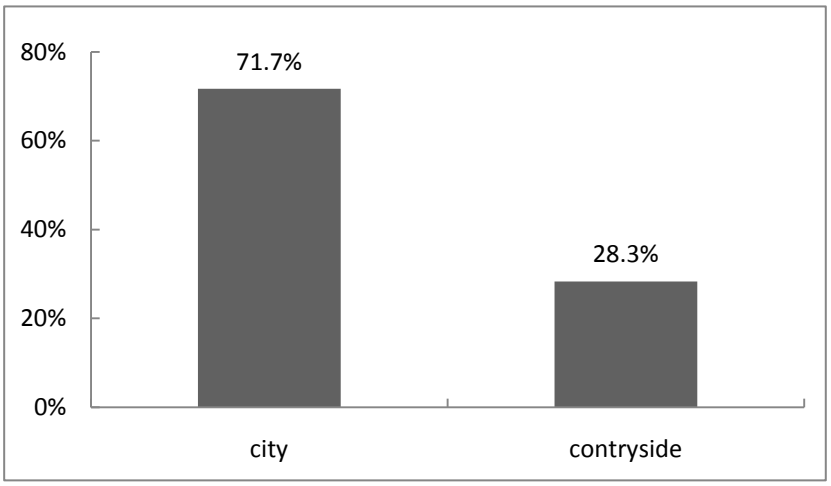

Figure 6.2: Comparison in Urban and Rural Structure of Internet Users
Source: CNNIC (2009)

According to a survey among nine groups of people living in Beijing[60], the situation of Beijing's digital divide has been increasing in recent years (BMOI, 2005). As BG2 (Beijing Municipal Office of Informatization) pointed out, 'the development itself is rather unbalanced', showing a trend that, among the nine groups of people, 'the strong is stronger, the weak is weaker'. In response to the problem, BMG had carried out a

[59] It can be translated to Telecom Universal Service by the Village Access Project in English
[60] The nine groups include: white-collar workers, college students, blue-collar workers, individual industrial and commercial households, and unemployed or laid-off staff, groups of foreign workers, farmers, the disabled, and the elderly.

series of official activities to improve the situation, among which the project of 'Digital Families' had to be taken as a successful example. As BG2 introduced, this project was also called 'Millions of Families Go Online'; and 'it is designed to help more local citizens to learn how to use computers and the Internet'. Through authorizing enterprises to open some free training courses, it saw an increasing number of people who had benefited from the project since it commenced in 2004; and 'this is believed to be one of the most effective measures to improve the situation of Beijing's local digital divide; and has received a lot of positive comments from the people till now'.

Generally enterprises had approved the huge efforts made by CCG to improve the situation of the digital divide in China. However, as they pointed out, the 'digital divide' between China and some other countries, especially the developed countries, still showed an enlarging gap. As ET7 (Global Markets Sector, Atos Origin) indicated, on the one hand, the number of China's Internet users is increasing very fast, which has narrowed down the gap between China and the developed countries; while on the other hand, in terms of the degree of use of the information technology, the gap between China and the developed countries keeps on enlarging, which is primarily because of the fast improving technological accessibility and applicability in those countries. As ET8, (Beijing Deofar Information Technology Co. Ltd.) suggested, in order to resolve the problem, 'CCG should attach more emphasis to promoting personalization of information technologies and relevant services', promoting 'easy-to-use' technology, so that the 'in-depth' applications of ICTs will be improved. As ET8 also pointed out,

although in some cases the quality of the development in those places is still not very satisfactory, the development trend itself should be kept on'. In addition, 'the relevant service to help rural people access the Internet is really important; once the network to a place is finished, such kind of service should be launched as soon as possible'.

6.4.2 Improving IPR Protection in China

At the current stage of development, there is another problem challenging the progress of China's 'neo-industrialization' economy, which is the problem in the protection of IPRs. In fact, along with the tightening relationship between China and other countries and the accelerating development of China's information industry, applications of information technology and information products become an inevitable trend of China's socio-economic development. However, as MC1 (Media Center, China Information Industry Association) pointed out, 'due to the still uncompleted legal system and some other social factors, abuse of IPR is a very serious and common problem in China today. Although CCG and enterprises have carried out many actions to improve the situation, there are still some problems existing'. As ET8 (Beijing Deofar Information Technology Co. Ltd.) argued, 'lower levels of economic development in China would be considered one of the major inducers of the problem'. Although China's economy was growing so fast, the average living conditions of Chinese people had not changed very much. In other words, for the majority of people in China, the costs of IPRs, which are usually embedded in the information products, still seem too much to afford; and it

is this practical social difficulty that has lead to the dilemma of protecting IPR in China. Therefore, to raise the average living standards of Chinese people becomes strategically important to deal with the dilemma of protecting IPRs in China.

6.4.3 Getting Hold of the 'Two Markets as Two Resources'

Although challenges are unavoidable in development, as long as we can positively face up to the problems and actively make efforts to improve the situations, the objective of "neo-industrialization" will eventually be achieved, because the opportunities are always there, providing development with an infinite future. In China, it is usually believed that there are 'two markets with two resources' driving the rapid growth of China's economy over the recent decades, which are respectively the 'domestic market with domestic resources' and the 'foreign market with foreign resources' (PDO, 2009). As CG8 (Macro-economic Information Sector, Industrial Development Research Institute, National Development and Reform Commission) explained, due to China's increasing openness and economic globalization, 'China's domestic market is becoming increasingly intertwined with the foreign market'. This was primarily expressed through the vastly increasing of exportation of goods from China to other countries, and FDI from other countries into China. 'One of the advantages of referring to this model of market activities is that China could utilize the foreign capital, experience and technologies to build up its own industrial system, in exchange for China's cheap labor and fast growing consumers' market'. But, as ET3 (China National Electric

Cable&Wire Imp/Exp Corp.) said, ‘the disadvantage is that China’s national economy becomes increasingly dependent on foreign economies; once the global economic environment suddenly changes, China’s economic development would become very easily affected’. Therefore, CCG should definitely attach more importance to the domestic market, in order to stabilize China’s national economy for a more sustainable trend of development in the future.

6.4.4 Enhancing Independent Technology Innovation

Apart from the market opportunities, ‘technology innovation’ could be seen as another important opportunity to drive China’s neo-industrialization economy. At present, in China, ‘technological innovation’ is mainly defined as only relating to those innovation outcomes of high-level technological development (NDRC & MII, 2006). As ET8 (Beijing Deofar Information Technology Co. Ltd.) argued, ‘this is quite unnecessary, because most of those high-levels of technological outcomes have to be based on huge consumption of social and natural resources’. But actually the new typical technological innovations today were mostly derived from people’s daily use of information technology more than anything else. Therefore, besides stressing the importance of the strategic IT results, he thought that CCG should pay more attention to those technological innovations based on general use of information technology, so that China would become a distinctive technologically strong country and should step out the shadow of those traditional technologically-advanced countries.

Summary

In this chapter I have discussed the policymaking and implementation processes relating to the transformation of China's industrialization process under the enormous impact of information technologies. Through the specific case study of Beijing, we can see that the national strategy of promoting a 'neo-Industrialization' economy is an inevitable choice of China's socio-economic development. Firstly in order to solve the existing problems and achieve a better performance of the national economy, CCG (CCG) has readjusted China's development objectives, unprecedentedly placing 'informatization' as one of the most important tasks of China's national development strategy, along with 'industrialization', 'urbanization', 'marktization' and 'internationalization'. In practice, CCG has made a key policy called 'driving industrialization with informatization', by which it means that the increasing use of information technologies (that is officially considered as a process of 'informatization') is now promoted by the government to gear up and merge into the process of industrialization, in order to improve or upgrade the performance of industrial development and economic growth. Secondly, in order to ensure the strategic development of information technologies as a continuous support for China's industrial development, CCG also stresses 'promoting informatization with industrialization', and attaches great importance to the information industry in China. Although having made some progress, there are still challenges or problems such as the 'digital divide' and 'IPR protection', hindering the new economic practice; therefore, these should be taken

into careful consideration, because without solving the problems, it is very hard to keep up the pace of development. On the other hand, we should have enough confidence to keep pushing forwards, because it is also clear that some opportunities, such as ‘market expansion’ and ‘technology innovation’ will be creating a huge potential for development along the road ahead; and it is these opportunities that have built China’s ‘neo-industrialization’ into a sustainable path of development. In the next chapter, I will focus on the ‘neo-urbanization’ development in China, discussing how China’s economic space has been restructured under the potential influence of information networks. Beijing’s successful example will be analyzed.

Chapter 7

Beijing's Neo-urbanization

While China's social economy is transforming under the impact of information technologies, the transition of China's regional space is taking place as well. As CG1 (Development Research Center, SCC) pointed out, due to the growing amount and complexity of China's national economy, it is getting increasingly difficult for the old 'regional economic structure' to cope with the accelerating pace of economic growth in China over the recent years. On the one hand, this is reflected in the continuously-enlarging gaps between the economically developed and less developed areas; while on the other hand, it is reflected in the growing problems of China's environmental issues and energy security. Therefore, in this situation, the government has to readjust or develop its regional economic policies, in order to ensure that China's national economy will remain a steady and fast pace of development on an overall level. In fact, after over ten years of confusion about its development objectives and blindness in its city construction, Beijing eventually readjusted its development directions in 2005. Since then, the city of Beijing has embarked upon a new trend of urban construction, which is seen as a 'neo-urbanization' development. As BG8 (Beijing Municipal Commission of Development and Reform) indicated, in the new trend of urban development, information technologies were considered to be vitally important, because without the strategic support of the new technologies it would be impossible to carry out the plan. 'In fact, at some point in the future, you will find that the whole city of

Beijing is built on a huge digital network, which is connected by many information intensive areas, such CBD, CRD, CSD, Financial Street, etc'.

In this chapter, I will focus my discussion on the policymaking and implementing processes relating to 'Beijing's neo-urbanization' development under the potential impact of information technologies. I will conduct my discussion around four aspects, namely 'redefining Beijing's city functions', 'promoting Beijing's city transformation', 'improving Beijing's urban construction', and 'China's information network security'. In this last chapter, the first aspect of my discussion is considered to be the precondition or premise of the latter three aspects; while the latter three aspects of the contents are considered to be the practical measures or means to respond to the first aspect of my discussion. To explain it, in the first aspect, I'll discuss four new city functions of Beijing, namely the 'National Capital', the 'World Metropolis', the 'Renowned Cultural City', and the 'Livable City', in order to clarify the new development directions of the city. Then I'll talk about the functional transformation of the city of Beijing in four areas, in order to establish the specific ways in which Beijing is transiting into a functional city. After that for the third aspect, I will have a discussion about the material construction relating to the physical development of Beijing as a 'digital city'. At last, I will have a critical discussion about the 'network regulation' and 'information control' in China, and try to point out the potential influence of such kinds of activities on China's information economy development, in both positive and negative ways.

7.1 Redefining Beijing's City Functions

As the Capital City of China, as well as one of the central cities in the 'Bohai Economic Circle', CCG and BMG have reevaluated and redefined Beijing's city position for its urban development, in order to make the city more adaptive to China's new regional economic system. As BG8 (Beijing Municipal Commission of Development and Reform) introduced, after the modern China was established in 1949, Beijing used to be seen as the political, economic, cultural and educational centers of China, or simply seen as the 'All Center' of China. However since the 'economic reform' and 'open door policy' was conducted and carried out in the late 1970s or early 1980s, a few coastal cities, like Shenzhen, Guangzhou, Shanghai, and Tianjin, have been rising and growing rapidly; and these cities began to share out more responsibilities of development in China. Therefore, as BG8 pointed out, due to the fast growth of China over the last few decades, the old position or identity of Beijing, as the 'All Center', was no longer suitable for China's development; and this should be the reason why Beijing's city position has been taken into reconsideration; 'Beijing needs to find its new position in the new national situation; otherwise, it will be very hard for the city to make a breakthrough in the future of China's development'. However, as BG8 added, it did not mean that Beijing would lose its central position in China; rather the development goal of the city should became more functional and more specifically targeted, in order to make sure that it would play a part in China's development as a whole. It is under the circumstances that Beijing's position is redefined to be the 'National Capital', the

‘World Metropolis’, the ‘Renowned Cultural City’, and the ‘Livable City’, instead of the previous ‘Political Center’, ‘Economic Center’, ‘Cultural Center’, and ‘Education Centers’ of China (BMCDR & BMCUP, 2005).

7.1.1 ‘National Capital’

Among the four positions, the ‘National Capital’ is undoubtedly one of the first important functions of the city of Beijing; and this has indicated Beijing’s ‘leading position’ in China’s development. As CG9 (Development Strategy Research Office, National Development and Reform Commission) introduced, Beijing’s position as the national capital was a firm decision made by the Central Government since the establishment of the modern China; it was considered from various aspects, including geography, culture, history, politics, and so on. However, under the new situation, the meaning of the position has shifted from the previous ‘all center’ to a ‘functional center’ in China; therefore ‘Beijing now should play a more leading role than driving role in the development of the country’. As CG9 explained, Beijing needed to fit itself well to the whole unity of China’s development. For instance, ‘we have noticed that, of the new positions of Beijing, the “economic center” has been deleted. However, as CG9 pointed out, ‘it does not mean that Beijing will give up continuing to play the role of economic center’. In fact, at the moment, the main focus of China’s national development is economic construction, so it is definitely the same to the capital city of China. Actually at the moment, there have been multiple ‘economic centers’ in China apart from Beijing,

such as Shanghai, Shenzhen, Guangzhou, Tianjin, Chongqing, Wuhan and so on; but what makes Beijing's 'economic center' different from the others' is that Beijing now is seen as the 'economic administration and decision-making center' of China. 'This has enabled Beijing with more capability to handle the increasing complexity of China's economic development' as CG9 concluded.

In order to ensure the rapid transformation of Beijing's position as the 'National Capital', BMG has been now stressing the development of a 'Capital Economy' (BMCDR & BMCUP, 2005). As BG9 (General City Layout Office, Beijing Municipal Commission of Urban Planning) explained, 'to develop a "Capital Economy" means to develop a kind of "high-end" economy, of which 'knowledge-based economy', 'high-tech industries' and 'the tertiary industry with the capital-led economic characteristics' were three main focus areas. However, as BG9 also pointed out, 'it does not mean that Beijing will ignore the development of "modern manufacturing".' In fact, due to historical lessons[61], 'modern manufacturing' was considered as a very important support to Beijing's economy; therefore, to develop 'modern manufacturing', such as an auto industry, had become the necessary supplement for the development of 'Capital Economy'. Another important activity that BMG has been stressing on to support the 'Capital Economy' is called the 'Headquarter Economy' (BMIO & BMCDR, 2006), by which it means that the local government needs to provide quality services for the

[61] For some reasons, CCG withdrew many key industrial projects from Beijing in the late 1990s; and this resulted in a big recession of Beijing's local economy at the time. The situation remained until the early 2000s, when some new industrial projects, such as Beijing Hyundai, were launched in haste, as ET8 (Beijing Deofar Information Technology Co. Ltd.) said.

enterprises headquarters located in Beijing, in order to facilitate them with better means to make investment in China. According to a commercial report (Fortune, 2009), Beijing was ranked as the 3rd largest city in terms of the number of 'Global 500' enterprises' headquarters (see table 7.1). As BG9 said, 'in China, Beijing has gathered the largest number of "Global 500" enterprises; therefore, how to provide service of high quality in order to meet their requirement would be significantly important to both Beijing's and China's economic development from a long term perspective'.

City Rank	City	Country	Number of Global 500 Companies	Revenues ($ millions)
1	Tokyo	Japan	51	2,237,560
2	Paris	France	27	1,399,172
3	Beijing	China	26	1,361,407
4	New York	U.S.	18	869,150
5	London	Britain	15	994,772
6	Seoul	South Korea	11	519,351

Table 7.1: Ranks of cities in terms of number of Global 500 enterprises (2009)
Source: Fortune (2009)

Generally it seems that ETNs would rather affirm the progress of Beijing's 'Capital Economy' and 'Headquarter Economy' so far. However, they have also pointed out that, Beijing should make more efforts to improve its administration system, so that more SMEs are able to grow up and gain benefits from capital resources. As ET5 (Atos

Origin China) admitted, as the capital city of China, Beijing had undoubtedly gathered a large part of the economic resources of China; and it was also clear that the local government had been very active in promoting the 'Headquarter Economy', such as constructing the Beijing Advanced Business Park (ABP). These were all very helpful for improving Beijing's 'Capital Economy' and for attracting more enterprises to locate here. However, as ET5 also indicated, Beijing's local government should review or rethink their administration system dealing with the SMEs market; and make more efforts to improve the business environment for SMEs, so that they would be able to grow up and become more competitive. In fact, according to (BBTNews, 2010), by the end of 2008, there had been 252 thousand SMEs registered in Beijing that account for 99.7% of the total enterprises. However, as ET5 pointed out, few of the SMEs were very strong; many of them could not even survive more than one year. 'One of the reasons is that, China's market is still not regulated very well; and this has resulted in some disordered competition in the market'. Another reason was that most resources were monopolized by or shared between larger enterprises; and this had made it even more difficult for SMEs to survive due to the decreasing of profit.

7.1.2 'World Metropolis'

Aside from the function of 'Nation Capital', there is a new functional requirement to define the city of Beijing, which is termed 'World Metropolis' (BMCDR & BMCUP, 2005). As CG9 (Development Strategy Research Office, National Development and

Reform Commission) pointed out, over the past few decades of development, Beijing has already grown up to a super city in China. However, 'if compared to other important world capitals, such as London, New York and Tokyo, what Beijing has done is obviously far from enough'. In fact, along with the increasing influence of China in the world today, 'Beijing as the capital city of China should play an increasingly influential role too'. This was not only relevant to the improvement of China's international image, but also relevant to whether Beijing could increase its capability to attract more international events, such as the Olympic Games. In fact, as CG9 summed up, at the moment, apart from Hong Kong, there were only two cities in China that had the potential to become world metropolises, Beijing and Shanghai. 'Beijing is usually seen as the "National Gate" of China; it should be the place where China and other countries communicate, and improve relationships between each other'. This is also the reason why Beijing is now entitled the 'International Communication Center' of China (BMCDR & BMCUP, 2005). As CG9 indicated, along with the increasing progress of China's globalization, Beijing should become not only China's Beijing, but more importantly the world's Beijing; 'this is actually how I would interpret the new position of Beijing as a potential world metropolis in the future'.

In order to achieve the goal and construct Beijing as a 'World Metropolis', Beijing's local government has made some great efforts, including for example, to improve the city infrastructure, and to organize more international conferences or activities. As BG9 (General City Layout Office, Beijing Municipal Commission of Urban Planning)

pointed out, Beijing had successfully won the right to host the 29th Summer Olympic Games; 'this achievement proves that we have already made great progress in the development to be a world metropolis'. 'However, we should stay conscious of our current situation. Although Beijing has vastly improved its city infrastructure, the development levels of our 'soft infrastructure', such as administration system, is still not satisfactory. For example, I feel like we haven't done enough to set up a flexible and effective decision-making mechanism to cope with the outbreak events and respond to the changeable social context'. Another problem about Beijing's 'soft infrastructure' is its overall service quality. Over the past few decades, Beijing has had great development in its service industry and has created a large variety of service opportunities for both domestic and international markets. However it is undeniable that the quality of the service we provide still cannot meet the high level of requirement; therefore, I think to develop an effective 'service quality measuring system' will become another goal to meet in order to improve our 'soft infrastructure'.

For enterprises, the relatively weak economic ties of Beijing with its surrounding areas is seen as a critical problem restricting Beijing's 'world metropolis' development. As ET5 (Atos Origin China) pointed out, from the experience of today's most advanced world metropolises, such as Tokyo, London and New York, to keep its economy tied up with a larger area was usually very important not only for the central area but also for the whole region to increase the influence, because usually an important 'node city' or a 'world metropolis' was connected to the world as an 'economic region' rather than an

‘individual place’. At the moment, China has at least 3-4 such kinds of regions, including the ‘Bohai Economic Circle’, ‘Yangze River Delta’, ‘Pearl River Delta’, and maybe ‘Yangze River Delta Middle Reaches Development Area’. Due to the special history, Hong Kong and its greater ‘Pearl River Delta’ has become one of the first regions in China to be connected to the world economy. ‘Although the region was more or less affected during the World War Two and the Cold War periods, the tie between Hong Kong and the ‘Pearl River Delta’ has remained for over a hundred years’. However as for Beijing, due to its special position in China’s history, it has been for a long time, administratively separated from its surrounding areas until the 1980s; and this has undoubtedly affected the city’s capability in progressing towards being a ‘world hub’. Today, holding most of China’s national resources, Beijing should have increased its pace to merge into “Bohai Economic Circle”, so that its “resource advantage” can be maximally utilized; and this will be helpful for Beijing to achieve its goal.

7.1.3 ‘Renowned Cultural City’

The ‘Renowned Cultural City’ has been seen as one of the most important functions of Beijing for its development as the national capital at the world level. As CG9 (Development Strategy Research Office, National Development and Reform Commission) said, ‘Beijing’s history and culture makes the city unique from any other cities in China’. In fact, according to the Beijing Municipal Administration of Cultural Heritage (BMACH), ‘Beijing has over than 3000 years of history for establishment of

the city and 800 years history for founding as the capital. The city itself owns 6 UNESCO World Heritage Sites, 98 China's National Heritage Sites, and thousands of other heritage sites' (BMACH, 2008). As Wen Jiabao says, 'we should have some new ideas to promote Beijing's city construction and administration, in order to build the city into world-class capital with a convergent style of both modern and historical factors' (SACH, 2007). As CG9 explained, one of the major differences of the city of Beijing from other world metropolises is its unique political and cultural values for nearly a thousand years; the latest three important dynasties in Chinese history all made their capitals here'. Therefore, 'when we improve the city construction, all these heritages should remain and be well protected'. 'It's because only in this way, can we make the city rich in cultural and historical characteristics'. Apart from that, according to CG9, it was also important for Beijing to promote the 'socialist market economy culture', because this was the founding culture of the modern China, and would become another important cultural heritage in Chinese history.

As BG9 (General City Layout Office, Beijing Municipal Commission of Urban Planning) pointed out, 'in fact, we have attached great importance to the protection of the historical and cultural aspects of the city'. Over last 10 years, BMG had made the largest investment ever toward protecting the city's cultural and historical heritage sites, and had received a lot positive responses from the public. 'For instance, since the year 2000, BMG has invested more than 330 million Yuan only for repairing heritage buildings; and this activity has restored a number of historical sites to their original

views'. In 2002, BMG also issued the "Conservation Plan for Historic City of Beijing" in order to make use of laws and regulations as measures to force the activities of cultural heritage protection in Beijing. In detail, the plan requires the protection of the city's 'traditional river system' and 'traditional urban axis' (BMG, 2002). 'For the moment, the work is mainly focused on how to effectively implement the policies and regulations. For example, we require all official departments at different levels to seriously treat the "Conservation Plan" and take "concrete actions" to cooperate with Beijing's heritage protection works. We have also organized events to promote the "Conservation Plan" to arouse more attention of the public … We hope that through our efforts we could raise the awareness of every citizen on their responsibilities to make contribution to protect Beijing to be a renowned historical and cultural city' said BG9.

From the perspective of ENTs, 'culture is the spirit of a city, so is it to everybody who lives in the city', as ET5 (Atos Origin China) used this word to indicate the relationship between city culture and enterprises, 'Beijing is one of the most culturally traditional cities in China; and this has tagged the city with its own different disposition or temperament. For enterprises, what they really care about is whether their organizations can learn the "temperament", and merge their own organizations into the "temperament", so that the enterprises become an organic part of the culture.' In fact, 'not many enterprises pay much attention to this yet, because they do not see the direct contacts between city culture and their profit making opportunities'. However, as ET5 pointed out, 'it is the people that run the business, not machines. So if people do not

understand the place they live in, how can we expect them to effectively socialize with the local society; and how can we expect them to make the most use of the social resources?' Therefore, 'although it is very important for the government to do something to construct and protect the local traditional culture, more importantly it is the enterprises that should make efforts to involve themselves in the local culture; and this is what I believe, closely related to the spiritual construction for organizing an enterprise to be a local business'. In other words, 'without being a part of the city culturally, it's less likely that enterprises will succeed'.

7.1.4 'Livable City'

'Livable City is one of the latest ideas added to China's officials working agenda', as CG9 (Development Strategy Research Office, National Development and Reform Commission) introduced, 'at the current stage of development, although people's living conditions have been to a certain degree improved, there are still some problems unsolved. Apart from the problems like environmental pollution and social inequality, social welfare and living conditions in many places are also not satisfactory; and this reminds us of the importance of the "construction of social environment" in China'. In fact, over the recent years, CCG has attached huge attention to the status quo of China's social environment construction, and has raised the idea of a 'scientific view of development', in order to ensure the sustainable development of China's socio-economy (Hu, 2004). Building of a 'livable city' has therefore become one of

their major activities towards implementation of the policy. As CG9 said, ‘we hope, through promoting the construction and development of China’s social environment, some of the problems can be improved; and this is very important for the social stability of the nation-state’. ‘As the National Capital, also as one of the most developed areas in China, Beijing has the capability, as well as the responsibility, to play a leading role in the field of work’. ‘Furthermore, to improve the social environment is also beneficial to Beijing’s development too, as this can improve the investment circumstance of the city’. ‘Therefore, I personally support Beijing to build a “livable city”; it is of interest to both the country and the city itself’.

It is obvious that Beijing’s local government has been actively working on the task. As BG9 (General City Layout Office, Beijing Municipal Commission of Urban Planning) introduced, BMG haD attached great importance to the construction of a ‘livable city’, because this goal was in line with the interests of social and economic development. ‘At the moment, we’ve been engaged in the work in three key aspects. The first aspect is environmental construction and protection. Actually as the host city of the Olympics 2008, Beijing’s environment has become one of the most controversial topics of discussion over the last five years.’ In fact, due to the rapid urban expansion of the city area and the vast increase in the number of automobiles, Beijing’s environment has been, to some extent, destructed at one time. ‘Since the early 2000s, the municipal government has realized the problem and taken out a series of actions, including drafting a set of regulations, in helping to restore the environment; and now we’ve

made some great achievements.' The second aspect is improving the employment environment and opportunities. As BG9 explained, apart from environment protection, to secure people's job had to be taken as another important factor when they constructed the city to be a 'livable' place, as this was a big issue relating to people's livelihood. After that, BG9 indicated 'public safety' the third key area, 'from the current domestic and international situation, to ensure the public safety is essentially important to Beijing's social development; without this basis, it is hard to tell that the city is livable'.

Enterprises were interested in Beijing's 'Livable City' construction too, as this was related to their business and investment. As ET5 (Atos Origin China) pointed out, Beijing had always been one of the first important investment choices in China; and the situation was believed to get more intense after the Olympics. However, the competition was fierce without doubt, both inside and outside of China. For instance, some other first-line cities like Shanghai, Shenzhen and Guangzhou, were all very active in promoting their cities' environment. Therefore, 'in which ways Beijing could win out has to be taken into careful consideration'. From the view of enterprises, at the moment, for most major cities in China, there were at least two major problems really urgent to solve. The first one was city transportation; while another one was social welfare. As ET5 said, 'it has to be admitted, although Beijing has the most developed transport system in China, it seems that the city's transportation is always one of the most heated problems due to the rapidly increasing number of autos'. Actually Beijing

is now sometimes ridiculed by netizens as ‘Shou Du’ or ‘首堵’[62]. This situation has undoubtedly affected the working efficiency of the city. As ET5 pointed out, Beijing’s local government should make more effort to improve the city’s public transport infrastructure, in order to increase city efficiency. About social welfare, ET5 said, Beijing should keep on improving its social welfare system, in order to further reduce the relevant expense of enterprises on their employees.

7.2 Promoting Beijing's City Transformation

In order to promote Beijing’s new city functions, BMG has made some great efforts, promoting the development of functional centers and the construction of functional areas have been attached great importance by the officials. ‘Beijing used to be seen as the only center of China; and this has overloaded the city with too much burden”, as BG8 (Beijing Municipal Commission of Development and Reform) pointed out, under the new circumstances, rather than taking care of all aspects of China’s economy, Beijing’s development should become more focused on certain specific areas; and this was believed to be the most scientific and manageable way for the future development of the city. In fact, ‘as the only city in China that has entered the stage of post-industrial development, Beijing’s economic structure is relatively satisfactory now; with service accounting for over 73% of its overall local GDP’. On this basis, one of the most important tasks for Beijing’s development at the moment was to retain the structural

[62] This is a joke from the public saying that Beijing should be seen as the place with the most horrible traffic jams in China; in Chinese, ‘Shou Du’ can be either pronounced as the ‘capital city of China’ or the ‘capital city of traffic tams’ with only a slight change in the accent to the second character.

advantages of its economy, and to further develop the 'industrial services', in order to make a greater contribution to China's industrialization. Basically as two of the most important backbone industries of Beijing, 'financial services' and 'high technology industry' had made some great achievements over recent years; it was believed these two economic areas would continue to be taken as the substantial forces of Beijing's local economy in the future. Apart from that, in order to actualize the development objectives, Beijing is going to be divided into four areas with different functions; this would help the city more effectively operate its urban functionalities. Certainly, it is also crucially important for Beijing to become gradually integrated with its surrounding area, because this will help to increase the economic potential of both Beijing and the whole area, by which the conception of 'capital region' will become realized.

7.2.1 Promoting Beijing as a 'Financial Center'

Due to the rapid growth of China's industrial economy, the development of 'producer services' or 'industrial services' has become increasingly important to China's national economy today. On the one hand, producer services can help to promote China's industrial production; while on another hand, it can also help to adjust China's economic structure. Therefore, 'producer services' have become one of the focuses in China's Eleventh Five-Year Plan (2006-1010) (NDRC, 2006; SCC, 2007; SCC, 2008). Among all the producer service areas, financial services have gained a lot of attention in China over the last twenty years, because finance is usually considered as one of the

vital factors relating to industrial development (PBC, 2008a). As CG8 (Macro-economic Information Sector, Industrial Development Research Institute, National Development and Reform Commission) pointed out, 'many cities in China have drafted and carried out their own plans to promote financial services, among which cities like Shenzhen, Shanghai, and Beijing are relatively more successful because these cities have gathered most of China's financial resources; they are all very important financial centers in China today' (see table 7.2). As CG8 introduced, as one of the earliest places in China that had benefited from China's economic reform and open-door policy, Shenzhen's success was mainly due to Hong Kong's financial development. Shanghai, as one of the largest industrial cities in China, had attracted a great deal of FDIs; and this had helped the city create a very successful financial market in China'. Beijing, as the political center and one of the most influential economic centers in China, owned the most financial assets and held the most financial information; this had, to a large extent, facilitated the city to become the strategy and decision maker of China's financial development. As CG8 stressed, 'we would like to encourage all the well-situated cities to compete for China's financial development, as long as the competition is constructive and helpful for China's economic development'.

Index		Shanghai	Beijing	Shenzhen
Performance of Finance Industry	Scores	100.00	89.22	62.00
	Ranks	1	2	3
Strength of Financial Institutions	Scores	100.00	150.23	62.05
	Ranks	2	1	3
Scale of Financial (Stock) Market	Scores	100.00	--	19.86
	Ranks	1	--	2
Development of Financial Ecology	Scores	100.00	116.01	73.02
	Ranks	2	1	4

Table7.2: Statistical comparisons between financial center cities in China.
Source: Data from China Financial Center Index 2009 (CDI, 2009)

As Liu Qi, Beijing CPC Secretary, said 'to develop producer services is a new measure to promote the capital's economy at the new stage of development … [therefore] we must exert Beijing's capital advantages, in order to promote the great development of the financial services, information services, R&D services, business services, education and training services, and so on' (BJQX, 2007). In fact, Beijing has made great achievements in the development of producer services over recent years, among which the performance of financial services is in particular outstanding. For instance, by 2008, Beijing's service industry accounted for over 73% of the overall local GDP, of which over 55% was from producer services and over 38% from financial services (BMG, 2009a; PBC, 2008b). 'As the capital city of China, Beijing has gathered most financial resources, including assets and information; and this has become a very important

advantage for the city to further increase the influence on an international scale', as BG10 (Financial Service Sector, Beijing Municipal Commission of Development and Reform) introduced, 'at the moment, Beijing's total financial assets reached 17 trillion Yuan, accounting for nearly half of the country. In the meanwhile, Beijing's financial sector accounted for 12.5% of the local GDP, which is also the highest among all cities in China'. In order to further promote Beijing's development into a financial center, BMG has carried out a series of preferential policies over recent years. One of the most recent documents approved by SCC, *The Suggestion on Promoting the Capital's Financial Development*, should be considered as a very important landmark in this progress because the document has clarified Beijing's financial development objectives as for constructing Beijing as an 'internationally influential financial center city'; and its role as China's 'Financial Decision-making Center', 'Financial Administration Center', 'Financial Information Center', and 'Financial Services Center' (BMG, 2008).

According to ET9 (Beijing Beida Jade Bird Co., Ltd.), 'Beijing is already a financial center of China', because 'over 80% of China's influential financial enterprises, including banks and insurance institutions, are here … although Beijing does not have stock markets, it does not really matter today because information networks are so developed; and stock markets could be everywhere now as long as you can access to the Internet'. 'As a matter of fact, it is not unusual for a country like China to have more than one financial center, as its national economy is growing so fast'. In fact, along with the increasing expansion of China's domestic market, there are more cities standing out

as financial centers in China. For instance, apart from Beijing and Shanghai, it sees the rise of some new financial center cities in the central area of China, such as Wuhuan and Chongqing. However, 'if Beijing wants to become an International financial Center, 'there is still a long way to go', ET9 was very clear about this, 'although Beijing and Shanghai are the two most promising cities in China to become international financial centers in the future, both cities are still very regionally based financial centers at the current stage of development; it is very unlikely to see them becoming substantial international financial centers like London and New York in a short time period. For Shanghai, 'although it has one of China's largest and most successful stock markets, its business and service is mainly based on and focused in China because China's RMB is still not a free exchange currency'. As for Beijing, 'although the capital city has gathered China's "Yi Hang San Hui (一行三会)[63]", how to turn the financial resources into a more effective financial market has become a question lying in front of Beijing and its development, because it is the "market" that is the essential factor of a financial industry, in particular when the objective is set to aim for international clients'.

7.2.2 Promoting Beijing as a 'High-tech Center'

Over the recent 10 years, CCG has paid increasing attention to high technology industry, including both manufacturing and services. This is because they realize that the development of high technology industries would be crucially important to the growth

[63] Yi Hang San Hui (一行三会) refers to four financial departments directly under the admistration of SCC, which includes People's Bank of China (PBOC), China Banking Regulatory Commission (CBRC), China Securities Regulatory Commission (CSRC), and China Insurance Regulatory Commission (CIRC). (Xinhuanet, 2003)

of China's 'overall national strength' (NDRC, 2007). As CG10 (Department of High-Tech Industry, National Development and Reform Commission) introduced, 'science and technology is now one the main areas of China's socio-economic development, as it is closely related to the comprehensive competitiveness of China's national economy'. In other words, whether China can successfully promote the development of high-technology industries will directly affect 'whether it would be able to compete with other economies in higher levels of economic activities'. In order to achieve the goal, CCG 'preferentially encourages' the 'qualified areas' to develop high-technology industries or 'knowledge-intensive industries'; and they expect that such a development trend can 'gradually spread to the central and western part' that are not as developed as the eastern part of China (NDRC & MII, 2006). 'Due to the rapid development over the past 10 years, some eastern coastal cities, like Beijing, Shenzhen, Shanghai, and Dalian, have built a solid foundation of China's high-technology industry', as CG10 added, 'in 2007, China's high-tech industry created 1.9 trillion yuan of added value. In total that accounts for 7.8% of the national GDP, of which about 1.1 trillion yuan was from manufacturing sectors; and with high-tech exports amounting to 347.8 billion U.S. dollars in total. China's high-technology manufacturing scale had ranked second in the world at the time and high-technology services have been developing at a rapid and steady pace in the mean time'. According to CG10, 'the great success of CCG is attributable to its seeking to make more investment in the relevant areas, in order to maintain pace of development'.

The development of Beijing's high-technology industry started in the late 1980s; and has exceeded the performance among all the cities in China over recent years (see figure 7.1). The Zhongguancu Scientific Park, as China's first special district that focuses on high-technology industry, has now become one of the most successful and influential high technology centers in China[64]. On the one hand, this is attributed to the great support of the Central Government; while on the other hand, it should not be ignored that the municipal government has played an active role in supporting the development. In fact, in order to develop Beijing into a High-Technology Center, BMG has carried out a series of policies and activities that are very helpful for creating a positive environment for development. As BG11 (High technology Industry Sector, Beijing Municipal Commission of Development and Reform) introduced, 'apart from financial services, high-technology industry is another key backbone industry of Beijing's local economy; therefore, we have made many detailed policies to encourage enterprises and any entities to do business or make investment in high-technology industries in Beijing since the 1990s'. 'For example, we have set up a few special funds to support those who have made or have the potential to make great contributions to high-technology industries, such as computing, software R&D, bioengineering & medical studies, new material technology, and so on'. Furthermore, 'Beijing has gathered a large number of excellent universities in China; and they are all very helpful for enhancing the R&D capability of the capital's high-technology industry'. 'Certainly if there are any needs, we would be very happy to help enterprises and the universities

[64] Zhongguancun Scientific Park is a special zone that is very developed in high-technology industry; and it is usually recognized as China's 'silicon valley' that has gathered most of the influential IT enterprises in China.

to build connections', as BG11 claimed in the end, 'we are very confident to develop Beijing into a high technology center in the near future, because that is what we are endeavoring to do now'.

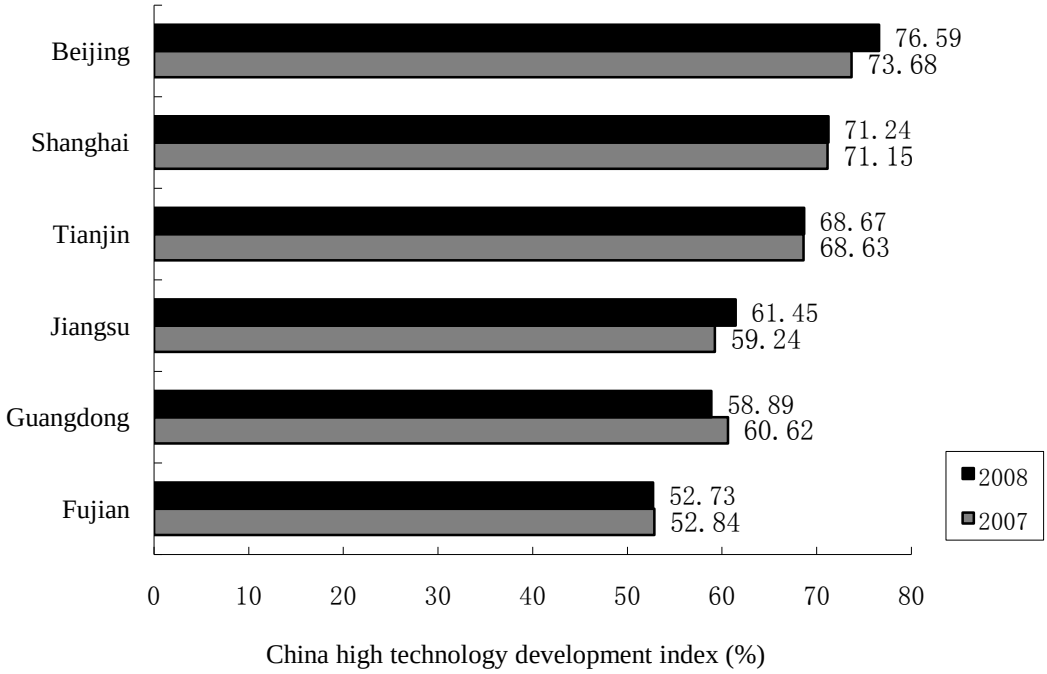

Figure 7.1: China's high technology development index (top six regions only)
Source: Data from MOST (2008)

From ENTs' perspective, although many cities in China have raised their own exciting plans to promote high-technology industry, 'development qualities among the cities could be very unbalanced from place to place;' as ET5 (Atos Origin China) said, 'and this is, to a large extent, due to inequalities in the distribution of social resources in China, which includes capital, technologies, skilled talents, etc'. For example, one of the major reasons why Beijing is more likely to become a high technology center is that 'the city has collected most best universities in China'; and 'this is also the reason why Zhougguancun, which is located in Haidian District, has been able to become "China's

Silicon Valley"[65].' However, as ET5 also pointed out, although China's high-technology industry has been growing up so quickly in quantity over the recent years, 'it has to be aware that large parts of the development is merely based on low-added value outsourcing services', which shows that 'China's independent high-tech R&D and manufacturing capabilities are still not strong due to the scarce of the highly skilled specialists'; and 'this is also one of the key limits that restrict Beijing's high technology industry'. Apart from that, 'at the moment, China's high-technology development is mainly driven by the government or the official departments; and this is not very healthy and potentially persistent from a long term perspective'. Instead, 'the government needs to make more efforts to help the building up of an effective mechanism, in order to encourage a "self-driven process" of development, so that more private sectors would be interested in participating'. For instance, at the moment, there has been already a large number of SMEs engaged in high-tech business in Beijing; therefore, 'the ways in which these SMEs can be stimulated will directly relate to whether the city would become a substantial high technology center in the future'.

7.2.3 Re-dividing Beijing into 'Four Functional Areas'

Over the recent two decades, due to excessive industrial exploitation, China's natural environment and resources have been, to certain degree, damaged. This has led to a series of negative consequences, such as loss of land resources and environmental

[65] Haidian District, is one of Beijing's key urban districts, that has the most intensive concentration of top universities in China, including both Tshinghua and Peking University located there as well.

pollution. In order to cope with the problem, CCG has carried out some activities to improve the situation, among which much attention has been devoted towards the redivision of 'China's territorial space into four types of development areas'. In detail, according to the policy, China's territorial land is going to be divided into four types of areas, namely 'Optimized Development Area', 'Key Development Area', 'Limited Development Area', and 'Prohibited Development Area' (SCC, 2006a); and different types of areas have different functions and criteria of development (see table7.3). As CG11 (Development Planning Office, NDRC) introduced, China had a considerable portion of land where the ecological system is rather fragile, and not suitable for large-scale industrial construction. Therefore, what we are doing is to protect these places from excessive industrial exploitation, in order to scientifically manage the exploitation of our natural resources and improve the sustainability of development. As CG11 indicated, 'For a long time, we have stressed too much the economic rise and GDP growth; and this has led us, to some extent, to ignore environmental conservation; therefore, through limiting or restricting industrial exploitation and development in some areas, we hope that we can make some positive changes'.

Types	**Key Meanings**
Optimized Development Area (ODA)	ODA refers to the regions, of which the exploitation levels are already high, and the natural ecological situations have begun to weaken. In this case, it suggests this type of area should change its development focus from relying on the consumption of raw material and land to high-efficiency economic performances, promoting the layers which participate in the global economic division. At the moment, some places on the east-coastal area belong to this.

Key Development Area (KDA)	KDA refers to those places that have very strong capability and excellent conditions to take on the environmental burden. For this type of area, it suggests that infrastructure construction and industrial investment should be promoted, in order to accelerate the pace of industrialization and urbanization development. KDA also needs to undertake the industrial transfer from the ODA, and gradually become the key supports of China's national economy and the key areas of China's major population.
Limited Development Area (LDA)	LDA refers to those places where the natural ecological situations are relatively weak or weakening, led by large-scale economic activities. For these kinds of areas, it suggests to insist on the principle of 'appropriate exploitation'; and avoid the development that might cause destruction of environment and natural resources. At present, some natural forest areas located in northeast and northwest China, and mountainous areas in southwest China belong to this type of area.
Prohibited Development Area (PDA)	PDA refers to various kinds of natural reserves. It means to force a mandatory protection, in order to control man-made interference with the natural ecology and restrict any activities that do not meet the requirement of protecting environment protection. It is explicitly stated in the draft plan that there are 243 national nature reserves, 31 world natural heritage sites, 187 national key scenic spots, 565 national forest parks and 138 national geological parks are on the list of protection.

Table 7.3: Detailed definitions of the four types of development areas
Source: NDRC (2006); SCC (2007c)

In general, according to the new criteria, Beijing belongs to the 'optimal development area', as BG9 (General City Layout Office, Beijing Municipal Commission of Urban Planning) clarified, however, in order to further optimize the utilization of Beijing's land resources, and actively respond to CCG's requirement on the scientific view of

development, BMG had divided its 18 administrative districts into four functional areas; they are the ‘central capital function area’, ‘urban function expansion area’, ‘new urban development area’, and ‘ecological conservation area’ (see figure 7.2). The ‘central capital function area’, which includes Dongcheng, Xicheng, Chongwen and Xuanwu districts, is the core area of the city of Beijing, which carries the main functionalities of Beijing as China’s national capital, such as the political and cultural center. The ‘urban function expansion area’, which includes Chaoyang, Haidian, Fengtai and Shijingshan districts, reflects Beijing’s new urban functionalities as the modern economic center and an international communication center of China. The ‘new urban development area’, which is composed of Tongzhou, Daxing, Shunyi and Changping districts, refers to the places for the use of Beijing’s modern manufacturing and modern agriculture. The ‘new urban development area’ will become the most emphasized place for Beijing’s development in the future. ‘The Beijing Economic Technological Development Area (BDA)’, which is located in Yizhuang, has developed into one of our most outstanding high-technology manufacturing bases. Apart from that, the area is also used to help in releasing the pressure of intensive population from the central urban area. For example, in Tongzhou, we are at the moment building the Tongzhou New Town, which is expected to be one of Asia’s largest residential areas. The rest parts of Beijing are all the ‘ecological conservation area’ that is the place restricted from industrial exploitation’. ‘It is Beijing’s ecological screen and water conservation area; and this is also for ensuring Beijing’s sustainable development in the future’ as BG9 said.

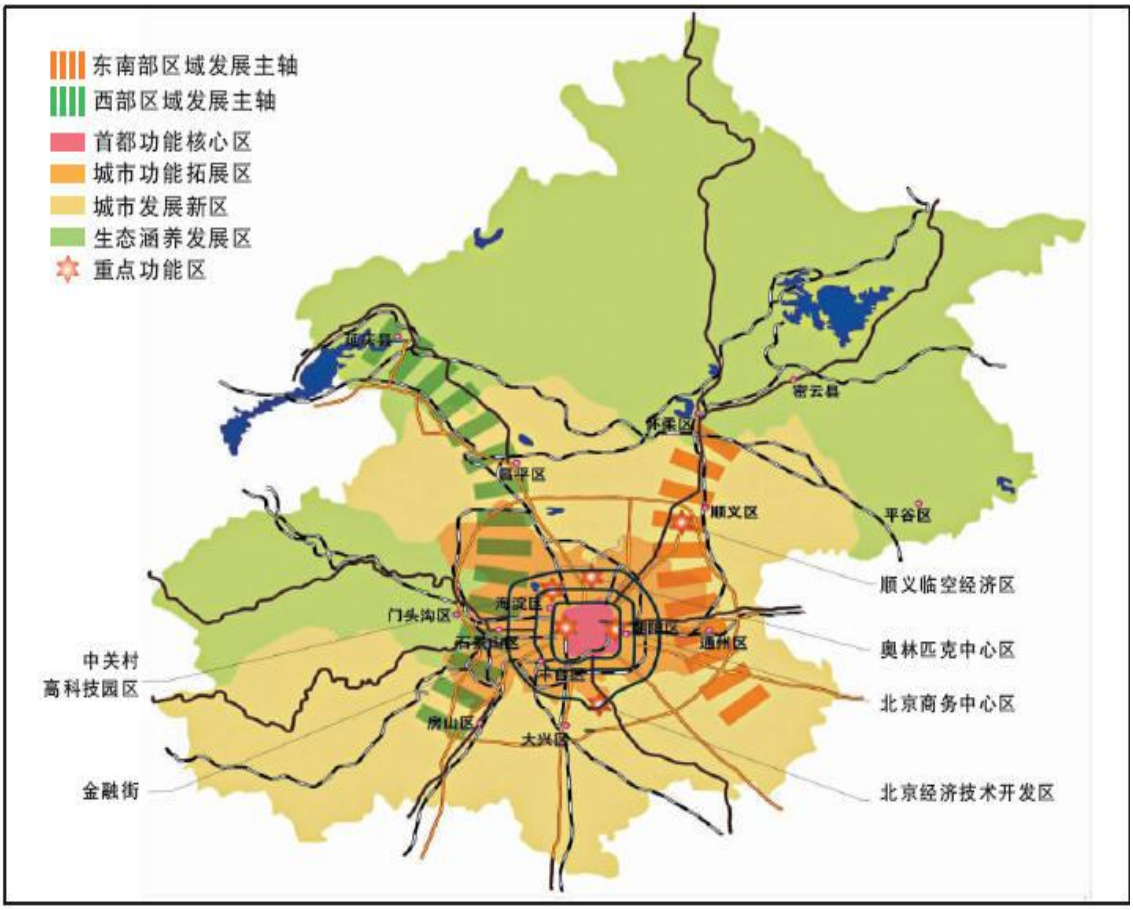

Figure 7.2: Graphic view of the four functional areas in Beijing[66]
Source: BMCDR (2005); BMCDR (2006a).

ET10 (Beijing Homelink Real Estate Agent) thought it would be a good thing if the Chinese policymakers had really taken this plan into a serious consideration, because 'it should be the time for them to reconsider some of their economic policies regarding industrial development since the economic reform; otherwise it might be too late'. As ET10 pointed out, in order to pursue the political achievements, which were usually reflected in the growth of GDP, many local governments would usually allow and even encourage those high polluting industries to grow fast in their jurisdictions; and that has led to the environment of many Chinese cities or towns becoming severely damaged; no

[66] The pink area stands for the 'central capital function area'; the orange area stands for the 'urban function expansion area'; the yellow area stands for the 'new urban development area'; and the green area stands for the 'ecological conservation area'.

one knows how long it will take to restore the situation. ‘As we can see from the new policy, some places are planned to be limited or restricted from industrial development’. ‘On the one hand, it reflects that the problem is becoming very critical now; on the other hand, it indicates that CCG has really made a firm decision to change the situation, because it can be imagined that it wouldn’t be an easy thing to do, especially when those benefitting local authorities and factory owners will definitely not be happy to see this’. However, the problem is that, ‘although it is relatively easy to make policies, it is not easy to implement the policies at all, because some of the polluting industries are closely related to the livelihood of the local residents’. ‘If you plan to withdraw the industries, it means that you are also withdrawing their source of livelihood; and the policymakers have to take this into consideration before they take actions’. As for Beijing’s situation, ‘it’s relatively better due to its already optimized socio-economic structure. But it does not mean that there is no problem. For instance, if Beijing wants to promote the “new urban development area”, and makes it the focus for future development, the local government would have to think about the cost of the work, as you will have to build a lot more infrastructure to accommodate the people who have moved out from the central areas’. ‘I’m not saying it isn’t possible; what I actually meant to say is that the action would be very costly and extremely time-consuming’.

7.2.4 Developing Jing-Jin-Ji into a ‘Capital Region’

Apart from the work of redrawing China’s ‘functional map’, CCG has also made efforts

to promote the development of China's 'urban agglomeration' (NDRC, 2006). As CG9 (Development Strategy Research Office, National Development and Reform Commission) explained, 'this is because, from our experience, we firmly believe that "urban agglomerations" would largely help to improve the country's overall competitiveness and upgrade the nation's international status in various aspects, such as the economic and technological aspects'. 'For the moment, there have been already three urban agglomerations formed in China', namely the Jing-Jin-Ji circle, the Yangtze River Delta, and the Pearl River Delta. 'The next step for us is to continue to improve or strengthen the radiation capabilities of these agglomerations, so that they can play even more influential roles to take the lead and drive China's socio-economic development over the next 10 to 20 years'. 'Certainly, we can also see a few more urban agglomerations, such as Sichuan-Chongqing and Shandong Peninsula, gradually taking shape now. For these new rising urban agglomeration areas, we want to strengthen the overall planning and encourage the major cities to take the lead in development, so that they will play more influential roles in their regions'. For those areas that were not in situations to become or form 'urban agglomerations', CCG would give priority to the key cities or towns, in order to encourage these places to become the service centers of the areas. 'Comparing to the "Yangtze River Delta" and "Pearl River Delta ", it seems that "Jing-Jin-Ji" area is more complicated', due to the large and enlarging gaps between Beijing-Tianjin (Jing-Jin) and other areas (broadly considered as Ji)'. In addition, competition for social and economic resources in this area was very intensive. Therefore, how to effectively manage the integration of Jing-Jin-Ji area had become a

question that had caught most attention of CCG. ‘For the moment, we’ve had a few schemes to improve the development, and we are very pleased to see some quite remarkable changes over the area’, as CG9 said.

It is obvious that BMG has been actively engaged in the works to promote the regional integration between Beijing and its surrounding areas since the early 2000s when Professor Wu Liangyong from Tchinghua Univeristy, was nominated by the authorities to lead a project researching the feasibility of Jing-Jin-Ji integration (Wu Liangyong, 2002), and the contents of the report were then reflected in Beijing’s latest urban planning (BMCDR, 2005). As BG9 (General City Layout Office, Beijing Municipal Commission of Urban Planning) explained, ‘on the one hand, from a long term perspective, this is good for Beijing’s sustainable development as a growing world metropolis; on the other hand, it helps to improve and upgrade the surrounding places and bring benefits to the whole area’. As one of the core cities in the Jing-Jin-Ji area (see figure 7.3), Beijing should have played a more important role to support the regional economy. ‘For the moment, we’ve connected a few national and local departments to work together, in order to promote regional integration between Beijing and other cities, such as Tianjing and Langfang’. ‘For example, we’ve drafted or participated in drafting regional development plans for better encouraging regional economic cooperation, among which the Jing-Jin-Ji urban grouping plan is under development now and hopefully we can get it completed and released soon’. ‘In addition, we’ve also launched a series of projects to financially support some of the

areas. In specifics, during the period from 2007 to 2010, Beijing's local government has planned to arrange a special fund to support those less developed areas; and the fund will be used to pilot or encourage the economic, technological and training cooperation of the local enterprises or relevant business sectors between Beijing and the areas. For example, in 2007 we arranged funding of up to 10 million yuan to help to improve modernization of Chengde and Zhangjiajie's agriculture industries'. 'Now we're confident to say that, we've made some great achievements in supporting the integration of the regional economy; and we believe that all that we've done has been very helpful in developing the area into a united region'.

Figure 7.3: Graphic View of Jing-Jin-Ji economic circle
Source: Xinhuanet (2006)

In general, it seems that enterprises were positive towards the idea of a Capital Region, but at the same time they were also, to some extent, skeptical about the feasibility of the regional merging of the area under the current regional administrative system. As ET10 (Beijing Homelink Real Estate Agent) pointed out, 'I don't want to doubt the government's ambition to build a capital circle or simply a greater Beijing, as has been done in some cities in Europe. But honestly, I don't think it is an easy thing to do under the current regional administrative system … I meant the work to administratively unify all the cities or areas around Beijing, such as Tianjin'. Firstly, 'from my point of view, the local authorities of these cities will definitely not want to see this taking place, because none of them would want their jurisdictional rights devalued'. In addition, 'it might also result in some social problems due to China's special national situation, such as that of household registration[67]'. 'In a specific example, if all these places have become parts of Beijing, what would you do to solve the problem of household registration of such a large number of residents from these places?' In fact, 'I think a clever idea is to build economic ties among these places, rather than really trying to pursue an administratively unified area, because it can help to avoid many of the potential problems'. But 'for the moment, the most realistic and practical thing to do is to build highly effective material connections, such as a super high-speed communication system, between these places and Beijing, because without this, it's hard to tell that you want to bring all the places into one area'. 'As far as I know, the local governments have already been making some praiseworthy efforts to promote

[67] Chinese household registration system is different from that of many other countries, as it directly relates to the residents' social welfare benefits, and it is independent from city to city. For example, for those whose households are registered in city A, their social welfare situations may be better (or worse) than city B.

development of this aspect. So what I'm curious about now is to see what they would do to integrate and distribute the economic resources in the region, because this is one of the vital preconditions to build economic ties among the areas'.

7.3 Improving Beijing's Urban Construction

Along with the fast growth of China's national economy, there has been a dramatic urbanization movement in China since the 1980s when the 'economic reform' and the 'open door' policies were carried into practice. During the period, many Chinese cities brought out their own ambitious plans to improve city construction. As BG9 (General City Layout Office, Beijing Municipal Commission of Urban Planning) introduced, 'Shenzhen was one of the first and fastest new rising cities in China since the 1980s, during which time the place experienced a historically dramatic change from a small fishing village to a large modern city'. After that, during the 1990s, due to the strong support of CCG, 'Shanghai became the second place in China that experienced huge change in city construction, of which the Pudong New District, that is China's second important Special Economic Zone after Shenzhen, became the core place of the whole regional development'. According to Chi, although Beijing experienced a large scale of city construction since the 1950s when the modern China was established, the whole progress was seriously affected by the Cultural Revolution from the 1960s to 1970s. After that, due to the 'policy inclining' to Guangdong province in the 1980s and to Shanghai in the 1990s, Beijing's city construction has been to some extent lagged

behind ‘until the beginning of the 2000s’. Since then, in order to adapt to the new environment of China’s national economy and to fulfill the new historical tasks as the national capital, ‘Beijing has entered an accelerating phase of city construction over the recent 10 years; and BMG has taken a series of activities, including making preferential policies and attracting FDIs, to promote development’. Among the activities, there are at least four aspects which should in particular be highlighted. The first aspect is to improve Beijing’s ‘communication infrastructure’ including both the city transportation and information infrastructure. The second aspect is to rearrange the city space, and to construct ‘two axes, two zones and multiple centers’ of Beijing. The third aspect is to ‘accelerate Beijing’s talents construction’; and the last aspect is to ‘improve the living environment of the city’.

7.3.1 Improving Communication Infrastructure

Due to the massive demands of China’s economic growth, CCG has remained affirmative in continuously supporting China’s communication infrastructure since the 1990s, including both basic transportation facilities and information networks. According to MOC (2006), ‘in order to further improve the capacity of China’s transportation, China will keep promoting the development of the transportation networks, and continue to improve the quality of the national provincial highways, so that the overall efficiency of China’s communication networks gets upgraded’. As CG9 (Development Strategy Research Office, National Development and Reform

Commission) introduced, ‘over the past 20 years, CCG has made enormous investments in order to promote China’s basic communication infrastructure, such as highways, railways, airways, etc. However, as a huge county, as well as a fast booming economy, it seems that the infrastructure construction in China could never catch up with the pace of development’. Therefore, ‘I believe such scale of construction will last at least another 10-20 years until China has roughly entered the next stage of social development’. As CG9 added, ‘at the new historical stage, apart from the basic communication facilities, the development of information networks has become indeed a new focus of China’s infrastructure construction’, because ‘information will become one of the key determinant factors of China’s national development in the 21st century’. Therefore, ‘we’ve listed information infrastructure as one of the key priorities of development in the next 5 years or an even longer period’. ‘Although Beijing has now become one of the busiest areas in the world with regard to its exchange of international communication traffic (see table 7.4), we notice that there are many irrational places existing in Beijing’s infrastructure development’. So ‘we hope that the local policymakers can continue to insist on the scientific view of development, and to keep improving Beijing’s urban infrastructure, so that the development of the capital city can best cope with its core mission as the “international communication center” of China’.

Year to date Passenger Traffic

July 2009

Last update: October 16 2009

	Passenger Traffic total passengers enplaned and deplaned. passengers in transit counted once.		
	Airport	Total	%Chg
1	ATLANTA GA, US (ATL)	51 552 160	(2.8)
2	LONDON, GB (LHR)	37 788 001	(3.0)
3	CHICAGIOL, US (ORD)	37 493 259	(11.8)
4	BEIJING, CN (PEK)	36 882 897	18.8
5	TOKYO, JP (HND)	34 480 492	(8.3)
6	PARIS, FR (CDG)	33 375 705	(6.2)
7	DALLAS/FORT WORTH TX., US (DFW)	32 772 911	(3.5)
8	LOS ANGELES CA, US (LAX)	32 562 399	(9.6)
9	DENVER CO, US (DEN)	29 446 896	(3.6)
10	FRANKFURT, DE (FRA)	29 055 662	(7.3)
11	MADRID, ES (MAD)	27 683 099	(9.6)
12	HONG KONG, HK (HKG)	26 078 500	(8.2)
13	NEW YOUK NY, US (JFK)	25 597 839	(9.0)
14	AMSTERDAM, NL (AMS)	24 808 612	(10.4)

Table 7.4: Passenger Traffic Monthly Ranking by October 2009.
Source: (ACI[68], 2009)

As BG9 (General City Layout Office, Beijing Municipal Commission of Urban Planning) introduced, 'BMG is directing its greatest efforts towards trying to construct a "highly efficient and highly intelligent city" of Beijing'. 'Since the city was going to host the Olympic Games in 2008, we are now engaged in building Beijing into a more convenient place, for which the infrastructure construction is always one of the most emphasized areas of development'. 'On the one hand, this is for meeting the massive needs of the 2008 Olympics Games; while on the other hand, this also benefits Beijing's long-term social and economic development after the Games'. In practice, BMG has carried out the activities in two major aspects. One aspect is 'to improve Beijing's urban

[68] ACI stands for Airport Council International

communication system', including transportation hubs and urban light rails; while another aspect is 'to upgrade the overall quality of Beijing's urban information networks', in order to build a real-time informational city of Beijing. For example, Beijing Municipal Commission of Transport (BMCT) and Beijing Traffic Management Bureau (BTMB) have constructed a super advanced public transportation system in order to monitor and manage the daily situations of Beijing's transportation (see figure 7.4); such system includes at least four major components. The first component is the online checking system, by which it means that drivers can check traffic situations or deal with some other traffic issues, such as paying bills and fines, online with either their computers or mobile phones. The second component is called 'electronic traffic bulletin board', which means that a number of electronic bulletin boards are built on the main roads in Beijing in order to inform drivers about the immediate traffic situations on the roads ahead (see figure 7.5). The third component is the public information service provided for the drivers who use Global Positioning System (GPS) or Satellite Navigation (Sat-Nav) when they are driving on the road. The fourth component is called 'personal text messages', for which drivers can receive the preset information service for traffic information on their mobiles or 3G phones.

Figure 7.4: Public transportation system of the city of Beijing
Source: BAST (2009)

Figure 7.5: Picture of an 'electronic traffic bulletin board' in Beijing
Source: I took this picture myself when I was visiting in Beijing in 2009

In addition, as BG9 introduced, regarding the construction of Beijing's urban communication system, Beijing was building a huge subway network which is expected to be the largest in China by 2015 (see figure 7.6). 'This is very important, because without a highly efficient urban transportation system, it is hard to maintain functional development of a city'. Apart from that, Beijing Capital International Airport was constructing China's largest communication hub, Terminal 3; this would to some extent improve the overall quality of Beijing's communication capacity. For the construction of information infrastructure, 'apart from the existing projects to improve the quality of land-based broadband networks, we're also constructing wireless broadband; and by the end of 2010, Beijing will be expected to become a completely wireless city' as BG9 introduced. Recently, BMG announced another project in order to further stimulate Beijing's information infrastructure development. According to BMG (2009b), 'by 2012, BMG should have helped Beijing to attract another 100 billion yuan for promoting the existing urban information system'; and this will help the city to be constructed as the information hub and the Internet center of China.

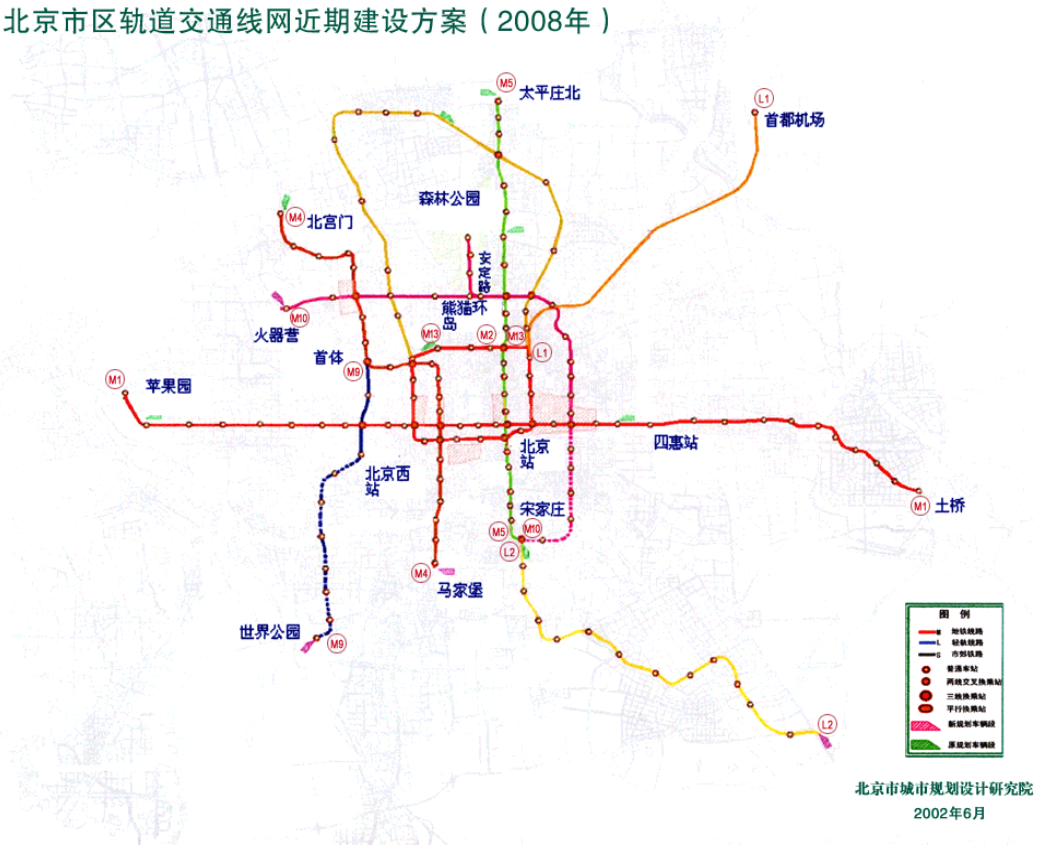

Figure 7.6: Beijing subway development plans for 2008 and 2015
Source: BJSubway (2006)

As ET5 (Atos Origin China) indicated, over the recent decades, China had indeed made some vast changes in many aspects of development, and the change of infrastructure was in particular prominent. However, it was also noticed that 'unbalanced development between or within some areas still exists and may exist for a longer time'. In other words, since the economic reform, due to the advantages of policy preference, the development of infrastructure in some areas, such as in the eastern part of China, has been taking off at a rapid speed. However, on the other hand, 'in some other areas, owing to the lack of the necessary social resources, such as capital and technologies, the progress of infrastructure construction has lagged far behind'. From a long-term perspective, it didn't look very healthy, in particular when China wanted to upgrade its economic structure. 'In fact, China should now pay more attention to the development and construction of those less developed areas, so that they will be well-situated to take over the replaced economic sectors from the developed areas'. As for the development of Beijing's communication infrastructure, one of the key questions is 'how to effectively integrate the existing communication resources with a highly efficient information system', as ET5 argued, although it was important to build new transportation facilities, 'it only benefits the future'. What was the most important for the present was 'to maximize the use of existing communication facilities' in order to receive the social benefits for the current development. In fact, 'although it seems that road building never stops here, the traffic problems looks like it will keep getting worse'. Actually 'the most important thing for a city in building a highly-efficient communication infrastructure today is to integrate and effectively manage the existing

communication resources rather than endless material construction, though I understand how much this means to an ambitious city like Beijing'.

7.3.2 Constructing 'Two Axes, Two Zones and Multiple Centers'

In order to improve China's economic structure, CCG has been paying increasing attention to the development of China's high-end industries[69]. As CG12 (Regional Development, National Development and Reform Commission) introduced, CCG would prioritize the development of high-end industries and high-end industry based districts in those 'well situated places', because without the advantage of capital, technology, R&D institutes, etc., it would be very hard to develop high-end industries no matter how much investment is made. Apart from that, 'the government is also making preferable policies to improve the existing high-end functional districts' in some regional areas like 'Yangze River Delta', 'Pearl River Delta', and 'Bohai Rim Economic Circle'. This is because the high-end functional districts over the places 'have already built solid foundations'; therefore, to improve the existing ones would help to increase the influential capacity of the areas. As CG12 added, to develop China's high-end industries was one of the key measures of the government to improve and optimize China's economic structure; so it was strategically important for China's national economy from a long-term view. The high-end functional districts, as the industrial bases or the gathering places of high-end industries, could help to increase the

[69] As CG12 explained 'High-end industries refer to the industrial areas at the high-end of industrial production or service chains. It could be referred to various industrial areas such as, IT industries, modern manufacturing (i.e. precision instrument manufacturing), and modern service (i.e. financial back office service)'.

agglomeration effect of high-end industries; therefore, ‘through promoting the high-end functional districts, we hope that both the scale and strength of China’s high-end industries can be improved’. At the moment, there had been a number of high-end functional districts growing up rapidly, such as Beijing’s Zhongguancun and the Finance Street; and ‘I hope that some of their successful experiences can be introduced to other places in China, in order to help the growth of more high-end functional districts’. ‘Certainly we’re clear that it is going to take a long time to complete China’s own highly influential high-end industrial clusters; but we’re very pleased to see that such clusters are now growing so fast on the right track’.

In order to implement the scientific view of development, BMG has attached great importance to the development of Beijing’s high-end functional districts, in order to continuously promote the economic structure and optimize the investment environment of the capital city. According to the MCDR (2006c), Beijing is going to be restructured into a city with a plan of ‘two axes, two zones, and multiple centers’ (see figure 7.7). As BG12 (Beijing Municipal Commission of Urban Planning) explained, over the last 10-20 years of development, Beijing’s high-end industries had formed a considerable scale and basis in terms of the fast increase of the relevant tax revenues; and this had to be ascribed to our successful policymaking practice. ‘As the capital city of China, Beijing has gathered a great deal of valuable resources of high-end industrial production and services, from capitals to markets, from government to enterprises. Therefore, it is necessary for us to further integrate and utilize the resources, in order to generate more

economic benefits'. As for the 'two axes, they refer to the 'Chang'an Boulevard crossing from east to west' and the 'Zhongzhou Road crossing from north to west'. These are the two traditional lines of Beijing's urban development, with most political and cultural heritage sites and institutions located along the way. The 'two zones' refers to the 'new development zone' that is in the east of Beijing and the 'ecological zone' that is in the west Beijing. The 'new development zone' will become the most focused extended economic area of the city in the future; while in the 'ecological zone', green industry and creative industry will be integrated over the place. For the 'multiple centers', it refers to a few functional districts, in which high-end industries are gathered, among which Beijing's CBD, The Zhongguancun Scientific Park, The Finance Street, Beijing Economic and Technological Development Area (BDA), Beijing Airport Logistics Park, and the Olympic Central District are the six major focuses of Beijing's development over the next 10 years.

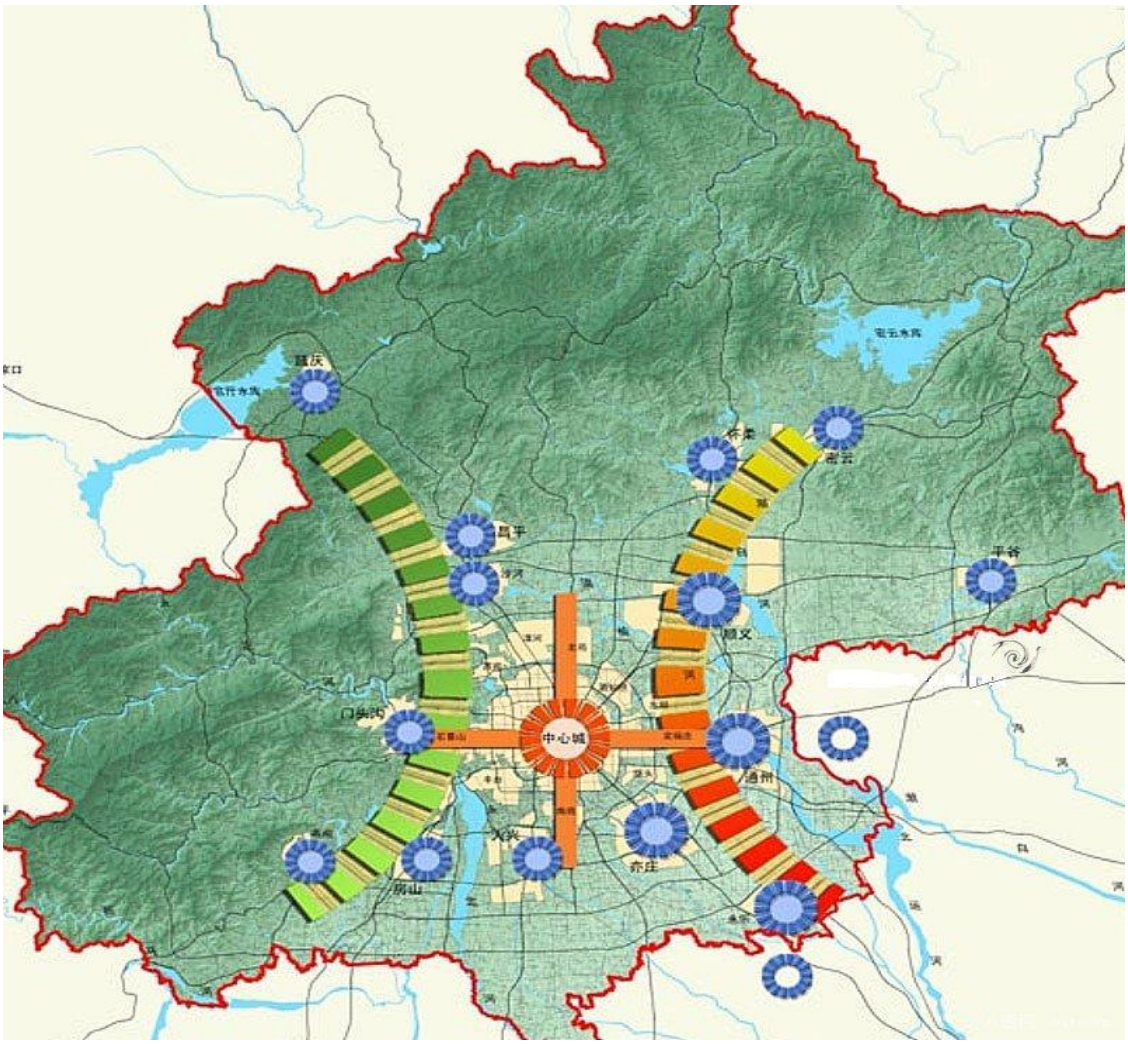

Figure7.7: Graphic view of the 'two axes, two zones, and multiple centers'
Source: BMCDR (2005); BMCDR (2006c)

As ET2 (China Electronic Commerce Association) indicated, 'I can see the point why CCG wants to promote the development of high-end functional districts; and actually there have already been some successful experiences in many other countries'. One of the advantages was that it can help to integrate the social resources of the areas, in order to maximize the effectiveness of advanced industrial production and service. 'Meanwhile it will improve or strengthen the spatial ties between different regional areas, making the different areas co-operated well in the fields of related high-end economic activities'. However, as ET2 also pointed out, at the moment, there were not

too many successful examples in China. One of the key reasons was that China's high-end industries, at a general level, lacked the capacity of independent R&D. Therefore, the outcomes for China's high-end industries were still not very competitive at the international level. As for Beijing's 'two axes, two zones, and multiple centers', as ET2 explained, although the plan looked perfect for the city's development, it would not be an easy job for it to be completed in a short time. Apart from the needs to construct much extended communication infrastructure, there were also massive needs requiring the building of a great deal of necessary facilities, such as residential sites, in order to convince the residents to move to the places to work, and to live. 'Let's take Yizhuang as the example. It used to be a rural area of Beijing that is over 20 kilometres away from the central area. Although Yizhuang has now been developed into the BDA, as far as I know, the communication and residential facilities there are still not satisfactory; therefore many people have to spend over 2-3 hours to getting there for work. I have my office there, but I only go there twice a week; this is very inconvenient'. As ET2 said, Zhongguancun was indeed one of the few successful examples to date, but its success was largely due to many incidental factors, such as its location near-by to so many excellent universities.

7.3.3 Attracting Top Talents to Work in Beijing

Along with the rapid growth of China's high-end industries, CCG has been attaching increasing importance to either fostering or attracting more 'specialized knowledge

workers to work in China' (SCC, 2008b; MOLSS, 2006). As CG1 (Development Research Center, SCC) explained, 'what we are looking for are those who have professional or specialized skills or techniques that meet the various levels of requirements of the fast growing knowledge-intensive industries in China'. As CG1 pointed out, at the current stage of development, the structure of China's human resources was still not very rational. Even though China had produced the largest number of university graduates, including the fastest growing number of doctoral graduates, in the world, the employment situation in China, in particular the situation in the high-end industries, did not appear to be improved as much as was required. 'In fact, I would ascribe this to the even faster growing needs of China's knowledge-intensive economy'. Therefore, in order to deal with the growing problem of China's unbalanced human resource structure, the relevant departments have carried out a series of activities for improving the situation. For example, 'we would encourage the local bureaus to set up their own special funds in order to help enterprises train the knowledge workers they need'. 'In addition, we have also conducted clear policies to encourage overseas specialized knowledge workers to come to China; we promise to provide them with more preferable working and living conditions here'. 'Apart from that, we have been organizing quite a few information platforms, including both annual talent fairs and relevant websites, in order to attract more excellent specialized talents to work in China'. As CCG1 said, with so much great effort, they could quickly improve both the quality and structure of China's human resources, through which more and more enterprises and business sectors in China would benefit from the improvement.

‘As China’s most important political, economic, cultural, technology and education center, Beijing has gathered the largest number of talents in various fields of social development’, as BG4 (Policy Study Office, Beijing Municipal Government) indicated, ‘according to the reports of some nationwide statistical surveys, Beijing has already become one of China’s most attractive places for information workers to seek jobs and pursue career development’ (see table 7.5). In fact, BMG has paid particular attention to the ‘talents reservoir’ construction since the early 1990s, from which many preferential policies and activities are conducted. For example, ‘there is the project called “talents expressway” in 1999; it made Beijing one of the first cities in China to launch a talent attraction scheme’. Over recent years, BMG has unprecedentedly increased the intensity to improve Beijing’s talent competitiveness, which includes the announcement of a package of new policies to attract overseas talents. As BG4 explained, since the economic reform, there had been a great deal of excellent talents spreading out all over the world; and some of them had already become elites in various fields and professions in other countries. ‘In order to attract these talented individuals to work in Beijing, we have carried out some clear measures for improving their employment and living conditions’. For example, ‘we make a definite promise to ensure that they can receive the most preferential policies, such as tax reduction, if they want to make investments or create their own business here’. Apart from the overseas talents, BMG had also encouraged any people who had highly specialized skills or techniques to stay in Beijing. ‘Basically at the moment, we urgently need specialized talents in twelve key areas or professions that include financial services, micro-electronics and software

industries, cultural and creative industries, animation and online gaming industries, biological and medical industries, etc.' 'Now we're planning to carry out more detailed measures, including issuing special prizes and awards, in order to improve the implementation of the policies, so that we can really get more excellent and specialized talents to contribute to Beijing's booming social and economic development'.

Rankings	City	Size (Rankings)	Quality (Rankings)	R & D Investment	Education Investment	Living Environment
1	Beijing	4	1	1	1	2
2	Shanghai	11	2	3	9	1
3	Guangdong	2	15	2	2	3
4	Jiangsu	1	13	4	3	6
5	Zhejiang	9	12	6	6	4
6	Shandong	3	16	5	4	8
7	Liaoning	6	4	7	10	9
8	Tianjin	22	3	9	22	5
9	Hubei	5	11	11	5	12
10	Sichuan	7	20	10	12	14

Table 7.5: China's talent competiveness rankings
Source: data from CASS (2006)

However, from ENTs' perspective, it was the institutional problems that restricted the development, such as the problem of China's irrational educational system, as ET2 (China Electronic Commerce Association) indicated, 'generally speaking, due to some historical and political reasons, China's education institutes, from primary schools to universities, over-stress the shaping effects of knowledge on people's minds and social status; and this will then, to a large extent, limit the scope and degree of the

applicability of knowledge; for instance, from the course settings in most Chinese universities, we can see that, from titles to contents, many courses offered in different universities are extremely similar. The problem is that, most of the students, after they graduate from universities, need to take a long time to learn more applied knowledge before they can fully adapt to their jobs'. Apart from this, another key restriction on China's talent development is that 'at the moment, in China, due to the over-emphasis on the role of the market in economic development, the employment orientations of Chinese people have been largely redirected along a mainstream; and this has resulted in the fact that many fields of basic science or profession lack necessary human resources'. As for Beijing's development, as ET2 said, 'since Beijing is gradually becoming one of China's most important international communication and exchange centers, those talented people who have international or overseas backgrounds are particularly welcome now; and this is why the government has made so many preferential policies in order to attract more excellent talents to work and live in Beijing'. 'However, I also realize that there are still some existing problems in the implementation process of these policies. For instance, I find that some of the policies that have been made so far are more like general guiding opinions without much practical and operational value; and this might affect the effectiveness of the policies in achieving their goals to attract overseas talents'.

7.3.4 Building a Techno-eco City of Beijing

As one of world's largest and fastest growing economies, China has become one of biggest greenhouse gas emitters in the world; and in addition, 'energy consumption in China is expected to rise significantly as the country aims to quadruple its gross domestic product by 2020' (Jia, 2004, also see NCCCC, 2004). In order to save the environment and improve the sustainability of China's economic development, CCG has carried out many policies and activities to control the pollution and manage the use energy, of which encouraging the conception of 'green city' in China is considered as one of the remarkable activities (CIFGD, 2008; Shang, 2010). As CG1 (Development Research Center, SCC) indicated, 'the policy is that we encourage those well situated cities to pay increaseing attention to the "environment construction", as this is to a certain degree related to China's development sustainability and energy security'. As CG1 introduced, in the past, CCG once over-emphasized the economic outputs and ignored the protection of the environment and natural resources; and this has been, to some degree, leading to 'many social and economic problems that could potentially hinder China's development from a long-term perspective'. Therefore, 'to solve the environmental problems is becoming one of the most important tasks of the government when we make economic plans for the next 5 to 10 years of China's national development'. In this case, 'technologies, including ICTs and other green technologies, will be used to help in the improvement, because 'they can be all taken to effectively measure, monitor, and eventually help to solve the problems'. However, as CG1 also

pointed out, ‘it won’t be an easy job to finish this in a short period, because ‘industrial progress is still the first important task at the current stage of our national development’; ‘rather this has been taken seriously as a part of our long-term strategy’. ‘No matter how, we hope that, China’s environmental protection and economic progress will approach a harmonious state of development eventually; and that is I believe beneficial to China’s national interests’.

In order to improve the environment in Beijing, BMG has taken some steps, such as making policies and regulations to protect the environmental and ecological system of the city, of which to improve and further integrate the current ‘environmental monitoring system’ is one of the latest measures to promote such development (BMEPB, 2006). As BG1 (Modern Industry Development Office, Beijing Industrial Promotion Bureau) introduced, ‘since the early 2000s, BMG has set up a comprehensive urban monitoring system in order to effectively control the environmental condition of the city’. For example, one of the latest activities of BMG is to carry out ‘Beijing Contingency Plans for Unexpected Environmental Issues’. According to the Contingency Plans, unexpected environmental issues are classified into four categories, of which each category of issues has its corresponding measures to deal with the problems (BMG & BJEPB, 2008). In addition to that, BMG has been also actively promoting the construction of a ‘low-carbon’ city and ‘low-carbon’ communities, through replacing high polluting industries and enterprises with the relatively greener ‘service sectors’. As BG1 introduced, one of the most important events recently was

Beijing Shougang Steel Company's move. As one of China's oldest and biggest steel manufacturers, Beijing Shougang was also seen as one of the most polluting enterprises of Beijing. Now BMG has decided to move Shougang away; and this has to be seen as a vital indicator of Beijing's development direction. Apart from that, since early 2009, BMG has been planning to develop Beijing's CBD into a 'low-carbon area', from which the 'low-carbon economy' is now put onto the agenda of Beijing's development (BJCBDAC, 2009). According to the plan, when Beijing's CBD is completed, including both old and new parts, the whole area will become one of China's most eco-efficient districts. All these efforts made by BMG have already produced some remarkable effects. According to one of the latest reports on China's Eco-Efficiency (EEI), Beijing is ranked as one of China's most eco-friendly cities or regions in 2009 (see figure 7.8).

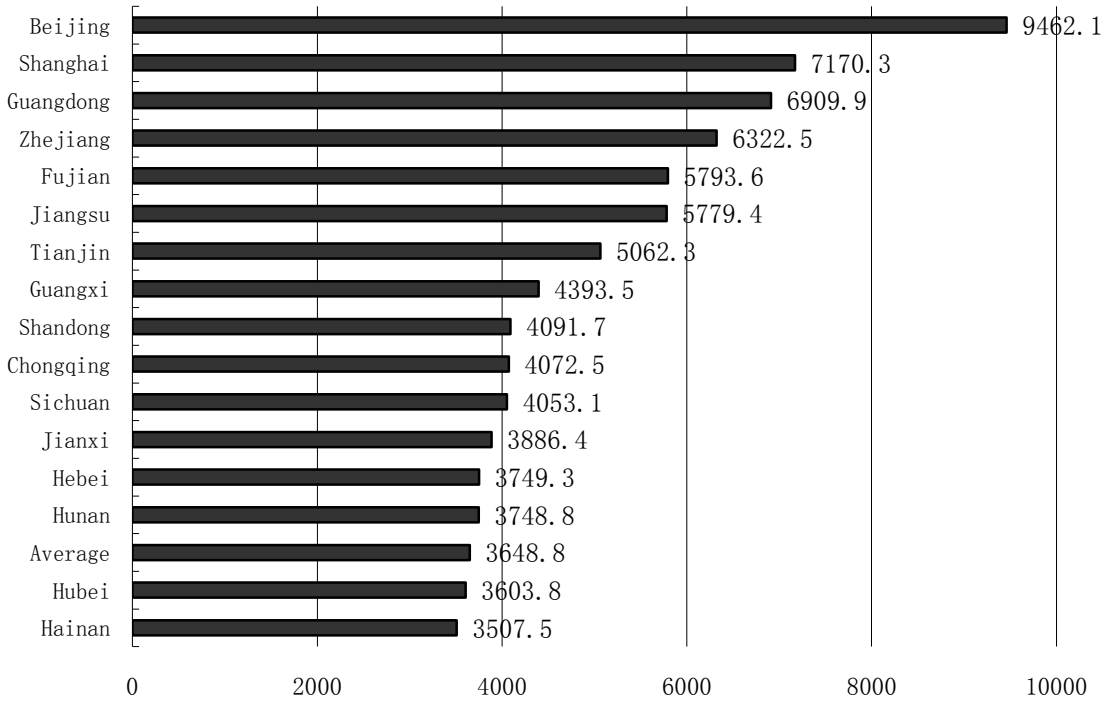

Figure 7.8: China's Eco-Efficiency (EEI) cities or regions rankings
Source: Data from China Economic Weekly (CEW, 2009)

Although CCG is exciting the new development, it seems that enterprises are not as positive as the government because they are not sure yet whether this is s a good sign for their commercial interests or not. As ET11 (Design Direction, Nokia) argued, although it was true that many governments in the world had made some great efforts in promoting the so-called 'green infrastructure', it was still unclear how much such efforts could be positive to the enterprises; so he didn't think enterprises would really care about this anyway. 'I bet few of them would be interested' in this 'if it means that they have to pay extra money for it'. As ET11 explained, 'though I don't mean to say that there is anything wrong with the decision; they have to make clear how this can benefit us.' ET5 (Atos Origin China) also held similar views, as he argued that 'building green infrastructure is still something very new today, so how much enterprise can do with it is still left unknown.' At present, although the idea of green infrastructure, such as a 'low-carbon city' or 'low-carbon community', is getting increasingly popular among some Chinese cities, few of the relevant projects have been done substantively. Therefore, many enterprises would rather choose to wait and see how this was developed in China. 'The conception of Beijing's low-carbon CBD looks very promising, but it is necessary to see the further details about the plan'. 'I would suggest that Beijing can expand international cooperation for the project, and learn from other counties or cities that have already had some experience of this, as it might be a good way to improve the business value of the project so as to attract more interest and attention from enterprises' said ET5.

7.4 Enhancing China's Network Security

Although the Chinese authorities welcome the Internet development in China in considering its economic and cultural interests, ‘they don’t really wish the people to abuse the new communication technologies to exchange information that might potentially undermine China’s social stability and national security’ as ET12 (Beijing Deofar Information Technology Co. Ltd.) said. In fact, CCG has been indeed regulating the Internet from the four layers discussed in the theoretical chapter, which are respectively ‘information infrastructure’, ‘Internet domain names’, ‘information contents’, and ‘Internet users’. For the ‘information infrastructure’, CCG insists that it must be owned by the state enterprises; ‘while foreign enterprises can hold the shares of its business, but no more than 49 per cent in total’. For the layer of ‘Internet domain names’, CCG encourages the Internet companies to ‘register domain names and place their root servers in mainland China’. For the layer of ‘information contents’, CCG requires the websites registered in China to have a list of ‘sensitive words’ for information filtering. The government also requires the relevant Internet companies to ‘improve their capabilities’ to prevent or avoid using ‘junk mails’ and ‘roguish software’. For the layer of ‘Internet users’, the national security departments have employed a number of ‘web police’ or ‘webmasters’ to monitor online information everyday in order to ‘make sure that there is no illegal information flowing over the Internet’. This raises the point that, ‘usage of the Internet is important, because economic and cultural interests need to be approached; while control over the Internet is

important too, because the political values and social consequences of the Internet have to be considered and ordered in some way'. The following sections will discuss the first two aspects of the regulation, because they are most directly related to China's information economy development.

7.4.1 Securing Information Infrastructure

Information infrastructure is always considered by CCG as one of the key strategic resources of China's national development; this is not only because it closely relates to China's national economic interests, but also because it is tied up with China's national information security. CCG is very clear that the Internet is becoming a basic material of the new mode of economic development. As CG4 (Informatization Promotion Office, MII) said, 'indeed, computers and the Internet have been playing an increasingly important role in China's economic development', 'therefore, information infrastructure has to catch up with the fast pace of China's economic development rather than lagging behind'. However, as ET12 pointed out, 'the information infrastructure is always tightly held by the government'. 'It is understandable, because social stability and public security is seen as one of the first important issues for development in China today'. 'The government is very careful about the ownership of the information infrastructure, although there is an ongoing process of privatization of China's telecommunications industry'. Additionally the government strictly insisted on using a 'market entrance permission system' to regulate China's Internet access service market, which meant that

all the Internet service providers (ISPs) including the backbone service providers in China must register and apply for permission from the relevant official department'.

As CG4 explained, although the development of telecommunications was seen to be a very important strategic support to national economic development, 'it does not mean that CCG will sacrifice social stability as the cost'. In fact, the attitude of CCG for the development of China's telecommunication infrastructure is always very clear, in particular in the area of FDI. In the recently released 'Notice about Enhancing the Administration of FDI in China's Telecommunication value-added Business', the MII (2006) reaffirms the principles of CCG towards China's telecommunication market. 'As it says in Attachment Nine of China's Entry into the WTO, namely the 'Details of Reduced Consent of Service businesses', 'the value-added business of China's telecommunication market should follow limited entry regulation'. The regulation clarifies that, after two years of China's entry into the WTO, the FDI in China's value-added telecommunication business (including the wireless business) should not exceed 50%'. 'It means that the foreign enterprises are not allowed fully into China's value-added telecommunication business through solo investment; rather they are only allowed into the market in the form of business cooperation with Chinese enterprises' as ET12 said, in the 'FDI Telecommunication Enterprises Administration Regulation', it shows clearly that the government 'welcomes foreign investment in China's telecommunication market; however the investment or entry will not be allowed unless a legal business permit has been issued' (MII, 2006).

7.4.2 Improving Domain Name Administration

While Chinese authorities make policies to support the development of the Internet in China, they also place some restrictions on domain name registration. The registration of domain names is one of the key areas of the services in China, since it directly relates to the contents classification represented to the Internet users. In fact, the application for domain names is not unrestricted in China; it has to satisfy certain conditions. And the organizations engaging in domain name services have to be examined and approved by the relevant department of MII. As CG7 (China Internet Network Information Center or CNNIC) introduced, 'at the moment, MII has appointed CNNIC as the department responsible for administration and operation of the national top domain names, such that of .CN, Chinese.com, and so on'. According to (CNNIC, n.d.), the China Internet Network Information Centre (CNNIC), is a non-profit organization, being established in June 1997 to perform the role of National Internet Network Information Centre for China. CNNIC also connects with International Network Information Centre (InterNIC) and the Asia & Pacific Ocean Internet Network Information Centre (APNIC). For the main functions of the CNNIC' (see table 7.6), as CG7 continued, 'to establish CNNIC, is 'mainly based on the consideration of protecting the commercial and public interests of domain name users in China'. In addition, 'this also aims to strike against illegal CDN registrations, in order to protect China's national security and maintain normal social order'. As the registration agents clarify, at the moment, individuals are still not yet allowed to register CDNs, such as '中文.CN', '中文.中国', '中文.公司', and

‘中文.网络’. As ET12 (Beijing Deofar Information Technology Co. Ltd.) said, ‘although some arbitration organizations hold supportive views of the individual rights for CDN registration, in order to reduce the problems of cybersquatting and domain names abuse, none of the CNNIC authorized registration agents accept individual cases of CDN registration’. In addition, CNNIC had placed restrictions on registration for the valuable and ‘possible for cybersquatting’ words, phases, and common terms; ‘the strength of protection is unprecedented’, ‘but no one knows how they define the “possible for cybersquatting” as ET12 said.

1	To provide domain names registration service, Internet protocol address distribution and autonomous system codes (AS codes for short) distribution
2	To establish a national catalogues databases
3	To provide information regarding network consumers, addresses, domain names, AS codes, and policies and regulations of Internet network in China
4	To collect statistics concerning the development of Internet in China
5	To provide training on Internet technology and application
6	To conduct research related to Internet
7	To provide technical consultation services

Table 7.6: The main administrative functions of CNNIC
Source: CNNIC (n.d.)

Summary

Basically in this chapter, I have discussed the policymaking and implementation processes regarding the transition of the city of Beijing into a 'digital space' with the potential facilitation of information networks. While information technologies are promoted to upgrade China's industrialization development, the Chinese policymakers have already started to think about the further development of China's regional economy, in order to enable it to better cope with the increasing complexity of China's economic structure. In order to meet a higher level of requirement for China's national economy, BMG has made some impressive efforts, of which redefining Beijing's city functions is seen to be strategically important to the city's development and construction from a long term perspective, as this would help the city to regain its development objectives after over 10 years of chaotic situation. In specifics, Beijing is redefined with four new city functions, namely 'National Capital', 'World Metropolis', 'Renowned Cultural City', and 'Livable City'. In order to realize the functions, BMG has taken at least two aspects of activities to carry out the plan, of which one of the aspects is to promote the functional transformation of Beijing. To elaborate, as it holds most of China's national resources, Beijing is becoming one of the most influential 'financial centers' and the 'technology center' of China now; financial services and high-technology industry have become the two most important economic growth points of the city today. Apart from that, in order to respond to China's appeal to make more effective use of China's territorial space, BMG has re-divided Beijing into four types of

area, and encouraged the mergence between Beijing and its surrounding areas in order to build a ‘capital region’ in China. After that, BMG’s second aspect of activities is to improve the urban construction of Beijing, in order to make it more capable to operate the functional transformation of the city. In details, there at least four key measures to improve Beijing’s urban construction, which are respectively ‘improving communication infrastructure’, ‘constructing Two Axes, Two Zones and Multiple Centers’, ‘attracting excellent talents to work in Beijing’, and ‘building a techno-eco city of Beijing’. While it sees exciting progress on the construction of Beijing’s digital space, it has to be noticed that there is another important aspect relating to the development, which is that of ‘network regulation’ and ‘information control’. Actually the development of Beijing’s digital space is not purely unlimited; CCG has taken four key measures to regulate or control the information networks in China, which are respectively ‘telecommunication infrastructure’, ‘domain name administration’, ‘information content’ and ‘Internet users’. In fact, the reason for discussing this aspect is that it relates to the development scope of Beijing’s digital space, and it may also affect the scale of Beijing’s digital economy. In the next chapter, I will give some final discussions and draw a conclusion for the whole thesis.

Chapter 8

Final Analysis and Conclusions

As one of the largest and fastest developing countries in the world, China is experiencing an important historical phase of its development, in which both the industrial economy and information industry are booming at the same time. It is this unique national situation that indicates that China needs to develop its own ways for advancing the progress of its information economy. This study has found that the Chinese government, including both the central government and the municipal bureaus, has played a strategically important role in promoting the development over the past few decades, in which they insist that the revolutionary impact of ICTs on the socio-economic transformation will help to realize a 'leap-forward' of China's national economy; and this is what they call the 'neo-industrialization' path of development. In other words, the Chinese government believes that industrialization and informatization including not only the application but the development of information industry can be organically integrated into one process of development; and it is this kind of integration that is essential in defining China's 'developing information economy'. In the meantime, the role of enterprises is rather important, because they are indeed the key economic agents and practitioners in promoting the development. In this sense, their responses and feedbacks to the economic policies should be taken into careful consideration so as to help in planning the future development trajectory of China's information economy.

As the capital city and one of the most advanced cities in China, Beijing has been always playing a leading role in the new economic practice. This is not only indicated by its extraordinarily fast developing pace of the local information infrastructure including both the hardware and software infrastructure; but more importantly, this is well reflected through the process of Beijing's informatization construction that has been high efficiently integrating into the city's whole modernization progress over the recent decades and regarding its own unique development situations. Although it has to be admitted that most of the development is still to a large extent on the basis of the Chinese government's promoting activities in a top-down mode of development rather than the spontaneously market-driven activities as of a bottom-up mode, it is such a development mode that has provided a good example or case study and makes it possible for other cities, in particular those of the developing countries, to refer to for promoting an information economy in a developing context. Certainly it is undeniable that there are still some problems with Beijing's development mode of information economy, such as the inevitable deficiency of the social context or social needs of the application of the new technologies; and this has indicated that such development mode is still far from completion and still needs to be revised and improved in a long term perspective. In this chapter, I will give a final analysis and the conclusions of my research so that every key point of my discussion in the work will be further clarified.

8.1 Review of the Research

Basically this research work is aimed to examine the policymaking and implementation processes in order to investigate and evaluate the political initiatives of China's developing information economy, in which Beijing has been taken as a specific case study to look into the depth of the development processes. The thesis addresses that 'government' and 'enterprise' are the two major agents that have played strategically important roles in driving the application and development of ICTs in China, in order to promote a 'leap-forward' of China's national economy. However in practice, the ways that government agencies and enterprises view the development are very different from each other. For the government agencies, what they tend to focus on is the substantial impact of information technologies on the economic performance as a part of China's national development. Therefore, from their 'macro-' perspective, the development itself has to fit into the current national and political situation. But for enterprises who would rather place 'profit making' and 'risk avoidance' as the most important things, they are more interested to look into the practical problems and difficulties in the development, since they always believe that 'solving problems' is the 'root' of development. It is this 'conflict' stays at the heart of my research work, because a more realistic trajectory for the future development of China's information economy lies in the resolution of it. In consideration of above, I set two objectives for my research work. For the first objective, I intend to find out the basic political rationale for the development of China's information economy over the recent decades; and how such

rationale has been carried into practice at the local level. For the second objective, I would aim to investigate or examine the practical problems and difficulties of the development, and how such problems or difficulties can be improved for a more solid development of China's information economy in the future.

In order to meet the research objectives, three key research questions have been posed. The first research question is 'what kind of information economy is being supported in China and why'. For this question what was intended to be found are the main features and the key motives of the information economy development in China. To be specific, as a developing country that has not completed its industrialization process, the focus of China's national economy has to be based on industrial development at the current stage. So what was the special meaning of the information economy to China's industrialization process; and why had information technology gained so much attention of CCG? These were the specific questions to be answered. After that, my second research question is 'how and how well is the information economy developed in Beijing' as one of the most advanced Chinese cities in digitization. To explain it, as the capital city of China, Beijing is seen as one of the most successful examples in the development of information economy in China. Then how and how well this had happed; and what could be taken as the accomplishments? These were the specific points I was interested to look at for this second research question. Finally my third research question is 'what are the major problems and difficulties challenging the development of China's information economy' through the case of Beijing. To put it in

another way, although having made some great progress, it seems that the development of China's information economy still faces of many problems or difficulties throughout the process. Therefore, to find out and to figure out the problems and difficulties was considered as a really important measure to help China to adjust the way for a better future of development.

In order to find the proper ways to answer the questions, I have conducted my research work at three different layers, namely the national layer, the local layer, and the enterprise layer. Firstly, at the national layer, I have looked into the policymaking process of some key central government departments relating to China's information economy development. My purpose in doing this was to understand the 'political motives' of CCG for supporting the development. After that, for answering my second research question, I shifted my focus to looking at the implementation process of the policies made by the central government at Beijing's local level, investigating how Beijing's local bureaus had taken some practical activities to promote Beijing's information economy. Therefore, it was seen that my purpose in doing this was to investigate the 'political practices' of CCG for supporting the development. Finally, to answer my third research question, I have looked into the enterprises' responses to the policies and the implementations of the policies, in order to find out the problems and difficulties existing in the practice of China's information economy. In addition, I was also interested to seek for any practical answers from enterprises that might be helpful for solving the problems. For carrying out the research work, I have taken

‘documentary analysis’ and ‘in-depth qualitative interviewing’ as the two key data collection methods. For ‘documentary analysis’, its main purpose was to collect the policy information from the relevant key official documents, in order to provide the basic knowledge for the analytical work. For ‘in-depth qualitative interviewing’, its aim was to gain insight into the contents of policymaking and implementation. Through interviewing related policymakers and enterprisers, it was believed that a more in-depth analysis of China’s information economy development can be produced.

The research has answered the questions I addressed in the following main ways:

- To answer the first question, ‘what kind of information economy is being supported in China and why’, I found that, at the current stage of China’s national economic development, industrial economy is still placed at the first position because of China’s incomplete industrialization process. However, in the face of the growing industrial problems and the advent of global information technology revolution, CCG do not want to follow the traditional path of industrialization development; instead they have been trying to create a new model of development, of which they believe that through actively promoting the pervasive and effective use of ICTs (or say a process of informatization) in the industrial development, China will eventually realize a ‘leap-forward’ of the national economy. They call this new model of development a ‘neo-industrialization’ path of development, referring to the official attempt to integrate ‘industrialization’ and ‘informatization’ into one process.

- To answer the second question, 'how and how well is the information economy developed in Beijing', I found that as the capital city of China, Beijing has gathered most of China's national resources. Under this special situation, Beijing Municipal Government (BMG) has been really active in promoting Beijing's digital information economy, carrying out a number of policies and actions to support the development. On the one hand, this is reflected in Beijing's actual responses and activities to China's overall informational socio-economic transformation. While on the other hand, it is also reflected in the distinctive practice in a corresponding spatial transformation of the capital from an 'industrial city to a 'digital city'. However, due to the lack of experience, although having made some progress, there are still some obstacles or barriers to the development. Therefore, it seems that the next step of BMG's work is to get focused on breaking through such barriers, so that the progress of Beijing's digital information economy will keep advancing.

- To answer the third question, 'what are the major problems and difficulties challenging this development', from the responses of enterprise representatives, I found that many of the policies and activities conducted to support China's information economy are to some extent showing lack of 'contextual basis'. On the one hand, such a shortage has to be ascribed to China's incomplete industrial system; but on the other hand, it has also reflected a general problem of the relevant policymakers' 'limited actions' on setting up an effective 'institutional mechanism' for driving the development. As for Beijing's case, although BMG has made some great efforts in support of the

development, it is thought that from an enterprises' perspective, most of the efforts are showing obvious lack of concern for establishing a proper 'social context' for the development. Without improving this situation, it is very hard for many of the 'ambitious' plans to become realized. In the following two sections, I will have a more detailed discussion on my research findings.

8.2 China's Neo-industrialization

As having been discussed in the theoretical analysis, the idea of an 'information economy' can be understood as an objective process to achieve a dramatic change in the socio-economic development in the 21st century, by which a strategic use of ICTs is rather important as it relates to whether the economic society can switch from an industrial mode of development to an informational mode of development. It is such radical change that has made the 'information economy' a 'new economy' if compared to the predecessors. However, it does not mean that we are going to enter a completely different economic society disembedded from the social basis including the previous industrial success. Rather, manufacturing-based material production including its related social context is still essential in the economic activities, though the information-processing or knowledge-generating through the creative use of ICTs has now moved to the central position of the value generating process for development; and it is such development that has helped improving the productivity of the national economy. In addition, the development of information industry has created a new

value-generating area that is seen to be a new growth point of national economic development. Certainly in the process of the new economic practice, there are two major challenges, namely 'digital divide' and 'IPR protection', in the way of development. However as long as we can get firmly hold of the 'market' and 'innovation' opportunities, the development of information economy will continue to make progress even though there could be more difficulties challenging the road ahead.

In the case of China's information economy development, in order to carry out the plan of 'neo-industrialization', CCG has readjusted the development strategy of China's national economy; and claimed five 'new' objectives for China's national development in the new social context, which are respectively 'industrialization construction', 'informatization construction', 'urbanization construction' [70], 'marketization construction', and 'internationalization construction'. In brief, 'industrialization construction' means that China will insist on the process of industrialization at the current stage of development, because industrial development is the material basis of China's national economy; without this basis it is unrealistic to talk about any further development. Secondly 'informatization construction' refers to the use of information technologies; considered a very important or strategically significant measure to facilitate China's industrialization process, because it is believed that through adding information technologies to industrial production, productivity and market competitiveness can be to certain degree increased. After that, China's 'marketization

[70] The discussion and conclusions of 'urbanization construction' will be conducted separately in the next section.

construction' implies China's resolution to adhere to and further deepen the process of the economic reform, in order to build a strong and complete market as the key drive for China's economic development under direction of the government. At last, 'internationalization construction' directly points to China's 'open-door' policy; it demonstrates China's responsibility and confidence to further advance China's cooperation with the rest of the world in order to build a constructive and stable environment for the world economy, though there could be still a long road ahead.

In order to realize the four core missions of China's neo-industrialization path and carry the strategy into practice, CCG has stressed a policy called 'driving industrialization with informatization', in order to actively promote the transformation of China's national economy from an 'industrial mode' to an 'informational mode' of development. The government is hoping that through promoting the increasingly use of information technologies, which is considered as a process of informatization, the process of industrialization in China can be upgraded to a higher level of development, so that the two processes will be integrated into one in order to realize an accelerated development status of China's national economy. There are four key aspects of activities that have been carried into practice to support the development. They are respectively 'promoting informatizion of the industrial economy'; 'accelerating globalization of the national economy'; 'encouraging informatization of enterprises', and 'advancing flexibilization of employment'. In other words, it is obvious that the Chinese Government, including both CCG and BMG, has made some great efforts to support the informational

transformation of China's industrialization development, which is primarily reflected in their active engagement to improve the productivity of China's industrial economy and boost the efficiency of the relevant enterprises organization through promoting the use of information technologies. However, generally it seems that the government still needs to pay more attention to establishing a better social context when they are promoting the transformation works, so that the use and development of information technology will become a spontaneous choice of China's national economy. In other words, although information technologies could play an important role in increasing productivity or competitiveness, it is still the social choices and social willingness that are shaping and directing the use and development of the new communication technologies. After all, as Dicken (2007:73) argues, 'technology is not independent or autonomous; it does not have a life of its own'. This is also the general view of enterprises when they respond to China's neo-industrialization development.

While the process of 'driving industrialization with informatization' is advancing at a fast pace, CCG has also noticed the strategic significance of developing China's own information industry, because they think that without developing a strong and independent information industry, the process of 'driving industrialization with informatization' will be very possibly restricted by many unexpected problems or difficulties, and this will to a certain degree affect the overall pace of China's 'neo-industrialization'. In other words, from the perspective of the government, developing an information industry is very important to China's national economy

because it can give strong support to China's informatization construction. In addition, the boom in the information industry itself can make an enormous contribution towards the growth of the national economy. This is very helpful for improving China's economic structure, which is also an important task for China's national economy at the current stage of development. In practice, there are four key areas of development in China's information industry, namely the 'telecommunications industry', 'software industry', 'internet industry', and 'electronic finance'. In order to promote development in each of the areas, BMG has carried out many preferential policies, including reducing tax rates and providing financial support. Notably, with support from the government, the information industry, including the information service industry, has already become one of the backbone industries of Beijing, contributing more than 12% of GDP growth in 2008 while in the same period the proportion accounted for by the information industry in China's GDP growth is over 7% for instance. However, although having seen remarkable progress, from the enterprise perspective, there are two major problems existing in the current development of China's information industry. One problem is that China still has not established a healthy and complete market mechanism to drive the development; and this has led to a result that while the industry itself is expanding continuously, profit-making by business owners is getting increasingly difficult. Another problem is the lack independent R&D investment in China's information industry; and this will threaten the sustainability of the industry and even the whole strategy from a long-term perspective.

In the process of China's neo-industrialization development, there are certainly some challenges lying ahead. One of the key challenges would undoubtedly be the continually-expanding digital divide; while another challenge is the dilemma in the protection of IPR in the country. Rather than ignoring the facts, CCG has chosen to face up to the challenges, and has actively implemented some measures to overcome the difficulties. At the same time, the officials have also realized and actively responded to the two opportunities, namely the market opportunity and innovation opportunity for development; this has, to some degree, boosted development and has helped to maintain a faster and steadier development of China's neo-industrialization economy. In other words, challenges and opportunities are the two unavoidable topics in the development of China's neo-industrialization economy. Therefore, CCG needs to hold an active attitude towards both the challenges and opportunities. When making efforts to bridge the gaps of the 'digital divide', it is important to get hold of the 'market opportunities' while encouraging 'technological innovation'. It is also crucial to enhance the protection of IPRs. It is believed that only through this way of thinking can the path of China's neo-industrialization economy become smoother and more successful in its future development. From the historical experience of China's national development, the restriction of challenges is usually limited, while the potential of opportunities is infinite. As long as China can confidently seize the opportunities and effectively overcome the challenges, it's believed that China's 'neo-industrialization' economy will keep advancing, with a more rapid and steady pace of development in the future.

Generally it is obvious that the Chinese government is very clear and active in supporting the application and development of information technologies for China's economy; and this is the reason why they have come up with so many exciting policies over the recent decades in particular since the 1980s. However I have to say that most of the policies haven't attached enough attention to the building of a technology-related social context. Therefore this has resulted in a fact that the fast construction of China's information infrastructure has not achieved its most effectiveness for the informatization development. For example, as for reducing the digital divide in China, it seems that the Chinese government has overstressed the quantitative increase of people's access to the Internet, and been tending to ignore the quality of the access. If such situation cannot be improved, China's 'digital divide' will undoubtedly keep enlarging, because people's involvement in the technological development would never be just about their quantitative access to the technologies; rather it is about whether these people can make effective and strategic use of such technologies to meet their social needs at bottom. As for Beijing's development, although the pace of informatization of the capital city is extraordinarily fast over the recent 10 years and has regarded the unique social context in general, obviously some of the related policies are not specific enough so that the implementation quality of such policies has been more or less affected; and this needs to be taken into consideration by the local policymakers. In addition to that, in order to further boost Beijing's information industry, Beijing's local government need to take further actions to regulate the related industrial areas so that the competiveness the new emerging market will be effectively protected.

8.3 Beijing's Neo-urbanization

While the information revolution has made great impact on the substantial transformation of the national economy, the organizational structure of the economic space is becoming reformed too since that the spatial structure of the economic activities in the new information age would not seem to continue in the 'old' industrial form of organization; rather it is now more likely to be organized by or via the process of information or knowledge generation and consumption. Therefore, it is the 'flows of information' that have become the dominant feature of the new spatial logic, as well as the structural form of the new spatial organization. In practice, in the process of transformation, the spatial feature of urban spaces becomes reorganized; therefore the urban functionalities become unprecedentedly redefined, through which it sees the rise of some new globally influential 'advanced service centers' and 'technical poles'. Furthermore, some of these functional places are creating clusters so that 'mega-cities' are emerging as a new urban form in the world today. Throughout the whole process of development, the construction of material space, which is composed of information infrastructure and its related material supports, is essentially important, because, without it, the new 'digital city' would become rootless and unsustainable. Certainly although having remained in controversy, it is believed that some moderate regulation on the new digital space, which is recognized by the UN as IG, is necessary as it closely relates to the socio-economic interests of the stakeholders who are in the loop. However, any intention beyond such point is not IG, and therefore should not be encouraged.

Apart from industrial development, information technologies have also had some significant impact on the transformation of China's regional economy; with the growing information-processing-centered mode of the economy, some big Chinese cities are now able to become increasingly more function-based than they used to be. In fact, under these new circumstances, Beijing should play a more effective role in directing and promoting China's development rather than just driving development; and this is believed to be more beneficial to both the national and local economic interests. Therefore, with the support of government, Beijing has been redefined with four new city functions, namely the 'Capital City', the 'World Metropolis', the 'Renowned Culture City', and the 'Livable City'. As the ex-major of Beijing, Wang Qishan (2006) stresses that, 'Beijing will adhere to its new urban identities and strive to improve its new urban construction'. For the 'National Capital', it re-emphasizes Beijing's leading role in China's economic development by further enhancing the city's role as the 'administration and decision-making center' of the national economy. For the 'World Metropolis', it clarifies the future goal of Beijing's development as competing with other important cities in the world; and it indicates the ambition of the city to become one of the most influential centers of the world in the 21st century. For the 'Renowned Culture City', it shows Beijing's resolution and willingness to protect its historical and cultural footmarks, in order to build the city into a unique capital that is treasured as a live world heritage site. For the 'Livable City', it expresses the wish for Beijing to become one of the best places to live in the world; and it shows the generosity and hospitality of the city to welcome all people to China in order to build a more

harmonious society of the world. In fact, these four new identities have all helped to shape the main goals of Beijing's development as a 'digital city'.

In order to meet the new functions of the city development, Beijing is now becoming transformed into a functional city under the active support of the government. Firstly, in possession of a huge amount of financial resources, Beijing is making great efforts to construct one of the most important financial centers in China. Due to the fact that Beijing holds most of China's state banks and financial institutions, the city is now entitled China's 'financial administration and information center' under the permission of CCG (BMG, 2008). However, due to some political reasons, the development of Beijing's financial market is still not competitive enough compared to other cities like Hong Kong, Shenzhen and Shanghai; therefore, whether Beijing can improve its financial market has become one of the triggering factors affecting the pace of Beijing's financial center construction. After that, under the support of CCG, Beijing has now become one of China's most successful high-technology centers after over twenty years of development. BMG is very confident about their policies and activities, because they think the achievements that Beijing has made in this field of development can clearly prove that they are on the right track. However, from ENTs' perspective, China's overall capability of independent R&D in high technology industry is still not strong enough; and this is a problem that potentially restricts Beijing's further ambition to become an international high-technology center. Apart from that, BMG is also actively promoting the functional transformation of Beijing and re-division of the city into four functional

areas, although the whole project would seem to be very costly. At last, despite that having received criticism from enterprises, the integration of Beijing into its surrounding area in order to build a 'Capital Region' has gained full support from CCG because this is strategically important to both Beijing's and the whole region's development from a long-term perspective.

Due to the ongoing transformation of Beijing into a functional city, there is a huge demand for the further improvement of Beijing's urban construction. Therefore, under the support of CCG, BMG has carried out the works in four aspects in order to promote the 'functional construction' of the city of Beijing. Among all the aspects, to improve Beijing's communication infrastructure becomes one of the most important tasks. From the view of CCG, this is to meet the rapidly growing needs of China's economic development. In practice, BMG has undertaken the works in both basic transportation facilities and information networks; however, from ENTs' perspective, it is rather more important to effectively integrate the existing communication resources; otherwise, it is helpless to resolve the current communication problems. Apart from communication infrastructure, due to the demand for improvement of China's economic structure, to construct and develop high-end industrial districts has become another important task of Beijing's urban construction. In order to further promote the development, BMG has decided to restructure the city of Beijing with a plan of 'two axes, two zones, and multiple centers'; however what seems to have concerned the enterprises is whether the affiliated facilities of new districts can be improved so that the quality of the work

environment will meet the requirement of enterprises. Certainly in the meantime, the new development of Beijing's urban construction has to be operated by the specialized talents, because without the 'managerial elites' it is hard to improve overall competitiveness; therefore, how to effectively make and implement polices to attract more highly-skilled knowledge workers becomes one of the core questions in front of BMG. Lastly, alongside the fast pace of urban construction, the increasing environmental issues have become another problem threatening the competitiveness of Beijing. In order to resolve the problem, BMG is making efforts to set up an effective monitoring system to control urban pollution; however, such action will need more cooperation of enterprises.

Finally, although CCG encourages the construction of information networks and supports the development of the Internet in China, considering the economic and social values, they do not want the new communication technologies to be 'misused' or 'abused' by any individuals or groups, whose activities might be seen as threatening to China's social stability and national security, even though there is now an increasing voice against such view from the public. In practice, in parallel with the policies to support development, the government has also carried out some measures to regulate or control the network space in China; and they term it 'to promote a healthy environment of networks'. One of the key measures of the government is to control or monopolize China's telecommunication infrastructure, in order to ensure their ownership of the material basis of China's information networks. Then the second key measure of the

government is to improve a ‘domain name administration’ system in China. As discussed earlier, domain names are usually considered as the key nodes of information exchange on the Internet. In China the government has adopted an ‘entry permission’ system, in order to regulate and administrate the distribution of domain names. In addition, the ‘Great Firewall of China’ is also designed to serve the system; for those websites that are not registered in China and are suspected of containing ‘illegal’ information, they will be blocked off from China’s information networks. After that, the third measure of the government to regulate or control the Internet is to prevent the spread of ‘illegal information’ within China’s information networks, which means that all the information that is suspected of breaking Chinese laws or the relevant regulations will be censored from the Internet, though it sometimes may depend on the personal subjectivity of the webmasters who are practically authoritative in controlling the web publications. Finally, CCG would ‘hope’ that the netizens in China should remain responsible for their usage of the Internet, so that a ‘clean’ network environment can be saved for the rest of the people.

Generally there are some clear evidences to show that the new communication technologies have already impacted on the spatial transformation as well as the material reconstruction of the city of Beijing. Under such impact, Beijing is believed having played a more functional role as the ‘capital city’ of China, making more stress on its leadership role in China’s economic development rather than just a major part of the national economy. This is the reason why BMG has made clear policies to support the

the HQ economy. Actually I think this is the future trend for the development of a world city and therefore should be remained as a long-term strategy. However as for supporting the functional transformation of the city of Beijing, although BMG has made clear policies, it is obviously far from enough. In my view, what Beijing really needs for developing into a functional city should not be just an abstract political agenda from the government; rather, Beijing needs a whole corresponding policy system. For instance, when BMG raised the ambition to develop Beijing into an international financial center, they should had carried out a series of activities to increase the capability of Beijing's financial market; they should make a strong voice to request a stock market from the CCG. Without such kind of activities, it is hard to tell when Beijing will become a real international financial center. Apart from that, when constructing the material base, BMG needs to take more consideration of the ways in which the existing construction can be fitted in the whole social development rather than continuously launching more construction projects. At last although it is understandable that CCG wants to regulate the Internet because of the economic, cultural, social and political reasons, they should not overuse or even abuse their 'privilege' and try to control over the Internet, since this will more or less affect the development potential of China's digital economy.

8.4 Looking Forward

All in all, due to its fast development, China is becoming one of the fastest rising economic powers in the world today. In the development, it is undoubted that ICTs have

played a very important role. Therefore, how and how well information technologies are impacting on China's economic growth attracts a lot of attention in the world today. Basically, Chinese policymakers believe that the application and development of information technologies is one of the most prominent features and determinants of China's modern economy in the 21st century; and it has to be deeply embedded in the success of an industrialization process of China. Bearing this in mind, they would want to drive the process of industrialization with that of informatization, in order to realize an overlapped and accelerated mode of development or a leap-forward of China's national economy; and this is what they call a 'neo-industrialization' economy; this is also the essential meaning of China's developing information economy. However, due to the incomplete nature of China's industrialization, the process of such a new mode of development would never seem to be as simple as it would seem. Actually, there are many problems or difficulties of various kinds that challenge the road ahead. Therefore the ways in which we could effectively analyze and solve the problems have become the major focus in the next step for the development of China's 'neo-industrialization' economy. 'Digital Beijing', as one of the most successful projects in China, has provided a specific example of China's new development and for this reason it has been taken as a case study that provides much valuable experience for other cities in both China and the rest of the world.

APPENDIX A

LIST OF KEY DOCUMENTS[71]

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BMCDR (2006c) Beijing's "Eleventh Five-Year" Functional Area Development Planning (北京市“十一五”时期功能区域发展规划). [Accessed, 2 May, 2007]

[71] In order to obtain the detailed information of the relevant policies, I have looked over quite a number of policy documents, including China's national five-year plans, national development programming papers, local city layouts, and government reports. The documents being listed are only the key documents I have made use of and collected data from. In order to ensure the objectivity and accuracy of the sources of my data, apart from the English translations of the documents' titles, I have also provided more details of the original documents such as their original Chinese titles, the web addresses of which I used to access to the online texts, and the dates on which I accessed to or revisited the texts of the original documents.

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APPENDIX B

LIST OF KEY INTERVIEWEES

CG1, Development Research Center, the State Council of China
[Interviewed in 2006 & 2007]

CG2, Policy and Regulation Office, Ministry of Information Industry
[Interviewed in 2006 & 2007]

CG3 Economic System Comprehensive Reform, National Development and Reform Commission [Interviewed in 2006]

CG4, Informatization Promotion Office, Ministry of Information Industry
[Interviewed in 2006]

CG5, Small and Medium Enterprises Service Innovation Sector, National Development and Reform Commission [Interviewed in 2006]

CG6, Information Products Administration Office, Ministry of Information Industry
[Interviewed in 2007]

CG7, National Internet Network Information Centre for China (CNNIC)
[Interviewed in 2006]

CG8, Macro-economic Information Sector, Industrial Development Research Institute, National Development and Reform Commission [Interviewed in 2007]

CG9, Development Strategy Research Office, National Development and Reform Commission [Interviewed in 2007]

CG10, Department of High-Tech Industry, National Development and Reform Commission [Interviewed in 2007]

CG11, Development Planning Office, National Development and Reform Commission [Interviewed in 2006]

CG12, Regional Development, National Development and Reform Commission [Interviewed in 2007]

BG1, Modern Industry Development Office, Beijing Industrial Promotion Bureau [Interviewed in 2006 & 2007]

BG2, Beijing Municipal Office of Informatization [Interviewed in 2006]

BG3, Economic System for Comprehensive Reform Sector, Beijing Municipal Commission of Development and Reform [interviewed in 2006]

BG4, Policy Study Office, Beijing Municipal Government [Interviewed in 2006]

BG5, Policy and Regulation Office, Beijing Municipal Office of Informatization [Interviewed in 2006]

BG6, Market Supervision Sector, Beijing Telecommunications Administration Bureau. [Interviewed in 2007]

BG7, Policy and Regulation Office, Beijing Municipal Office of Informatization [Interviewed in 2007]

BG8, Beijing Municipal Commission of Development and Reform
[Interviewed in 2007]

BG9, General City Layout Office, Beijing Municipal Commission of Urban Planning [Interviewed in 2007 & 2009]

BG10, Financial Service Sector, Beijing Municipal Commission of Development and Reform [Interviewed in 2007]

BG11, High technology Industry Sector, Beijing Municipal Commission of Development and Reform [Interviewed in 2007]

BG12, Beijing Municipal Commission of Urban Planning
[Interviewed in 2007]

ET1, Consultancy Director, R&D Sector of Alibaba Group
[Interviewed in 2006]

ET2, China Electronic Commerce Association
[Interviewed in 2007 & 2009]

ET3, China National Electric Cable&Wire Imp/Exp Corp.
[Interviewed in 2006 & 2007]

ET4, EasyFlow R&D Dept., Digital China Holdings Ltd.
[Interviewed in 2006]

ET5, Atos Origin China
[Interviewed in 2006, 2007 & 2009]

ET6, Beijing Deofar Information Technology Co. Ltd.

[Interviewed in 2007]

ET7, Global Markets Sector, Atos Origin

[Interviewed in 2007]

ET8, Beijing Deofar Information Technology Co. Ltd.

[Interviewed in 2006, 2007 & 2009]

ET9, Beijing Beida Jade Bird Co., Ltd.

[Interviewed in 2007]

ET10, Beijing Homelink Real Estate Agent

[Interviewed in 2006 & 2007]

ET11, Design Direction, Nokia.

[Interviewed in 2009]

ET12, Beijing Deofar Information Technology Co. Ltd.

[Interviewed in 2006 & 2007]

MC1, Media Center, China Information Industry Association

[Interviewed 2006, 2007 & 2008]

APPENDIX C

KEY INTERVIEW QUESTIONS

1. How does CCG define the meanings of 'industrialization', 'informatization', 'marketization', and 'internationalization' as the four aspects of China's neo-industrialization development? How does BMG promote Beijing's development in each of the aspects? How do enterprises think about China's development in each of the aspects; do they feel any problems with these objectives?

2. Why does CCG want to promote wide applications of the information technologies in the development of China's industrial economy, regarding the aspects of industrial production, economic globalization, enterprises organization, and employment? How does BMG promote the development of each of the areas? How do enterprises respond to the development so far?

3. Why would CCG like to give priority to the development of information industry over the recent 10 years? How does BMG carry out policies to actively promote Beijing's information industry? How do enterprises look at the achievements of China's and Beijing's achievements on the information industries; and what do they think could be the problems in the development?

4. How does CCG think about the challenges of the 'digital divide' and 'IPR protection' in China; why do they think the 'two markets' and 'technology innovation' are opportunities for China's development? Has BMG taken any activities to deal with the problems on the one hand, and seize the opportunities on the other hand? And what are enterprises' views on such activities?

5. How does CCG think about Beijing's four new city functions, namely the 'National Capital', the 'World Metropolis', the 'Renowned Cultural City', and the 'Livable City'?

How does BMG interpret Beijing's new city functions and what are their concerns? How do enterprises respond to the changes of Beijing's city functions; do they feel that they can benefit from the changes or not?

6. How does CCG think about Beijing's new identities as a 'financial center' and 'high-technology' center in China; and what are CCG's views on the functional transformation and the greater regional development of Beijing? What are BMG's practical activities in support of the development of Beijing's urban transformation? What are enterprises' responses to the changes?

7. How does CCG think about the four aspects of Beijing's city construction; and how does each of the construction aspects relate to a broader national development scheme? How does BMG promote the construction of the city of Beijing regarding the relevant official projects? How do enterprises look at the construction of 'Digital Beijing' from their unique perspective?

8. What are the detailed measures of CCG for 'enhancing China's network security' in the four different regulating areas, namely information infrastructure, Internet domain names, Internet content, and Internet users? What is enterprises' view, if there are any, on the 'measures'; do they see any impacts or influence of the 'measures' on the business environment of China?

APPENDIX D

MILESTONES OF CHINA'S INTERNET DEVELOPMENT

Time	Significant Events
Sept. 1987	Qian Tianbai, a professor in Beijing, sent out the first e-mail in China through the Chinese Academic Network (CANET)
1988	ECNETM, hosted by the Institute of High Energy Physics (IHEP) in the Chinese Academy of Science (CAS), was able to exchange e-mails with Europe and North America.
Oct. 1990	Represented by Professor Qian Tianbai, China registered the country's domain name, 'cn.' at DDN-NIC, the predecessor the InterNIC (a cooperative domain name registration service between the U.S. Government and Network Solutions, Inc.).
Jun. 1992	CCG and the U.S. National Science Foundation discussed the possibility of connecting China to the Internet. However, China was informed that China's access to the Internet would encounter political barriers due to the presence of U.S. government agencies on the Internet at that time.
Mar. 1993	The specialized line that connected the IHEP to Stanford University started operation. The IHEP rented the line from AT&T's international satellite channel.

Aug. 1993	Premier Li Peng approved US$3 million in funding for the construction of the Golden Bridge Network project, China's first national public economic information network.
Dec. 1993	The National Economic Informatization Joint Conference was set up and Vice Premier Zhou Jiahua was appointed as the chairman.
Apr. 1994	The NCFC project (aimed at building an information superhighway in Peking University, Tsinghua University and the Chinese Academy of Sciences) was connected via Sprint to the Internet.
May 1994	The IHEP in the Chinese Academy of Sciences set up the first web server and developed the first homepage in China.
May 1994	The CN first level domain name registration server was moved from Germany to China
Sept. 1994	China Telecom signed an agreement with U.S. Secretary of Commerce Ron Brown to start two specialized lines (in Beijing and Shanghai) through Sprint.
Jan. 1995	The two specialized lines in Beijing and Shanghai came into operation, creating public access to the Internet.
Jan. 1995	China's first online magazine started operation.
Jan. 1996	A national informatization leadership group was set up under the State Council; Vice Premier Zou Jiahua was appointed the chairman.
Jan. 1996	China Public Computer Internet (CHINANET) started operation.
Mar. 1996	The IETF (Internet Engineering Task Force) approved the fist standards for Chinese character transmission.

Sept. 1996	China Golden Bridge Network (CHINAGBN) started operation.
Dec. 1996	China Public Multimedia Network hosted by China Telecom opened; the first batch of local websites including Shanghai Online launched.
Jan. 1997	The Chinese Academy of Sciences (CAS) set up the China Internet Network Information Center (CNNIC) to oversee China's Internet development.
Nov. 1997	The first CNNIC Report on China's Internet was released, with biannual updates to follow. As of 31 Oct. 1997, there was 299,000 computers in China connected to the Internet, 620,000 Internet subscribers, 4,066 .cn domain names, and 1,500 website.
Mar. 1998	The Ministry of Information Industry (MII) was established.
Jun. 1998	The second CNNIC Report on China's Internet was released. There was over 542,000 computers accessing the Internet some 1.2 million Internet subscribers, 9,451 .cn domain names and 3,700 websites.
Jun. 1999	CNNIC released the third national survey, which claimed there were 747,000 computers in China connected to the Internet, 2.1 million Internet subscribers, 18,396 .cn domain names, and 5,300 websites.
Jun. 1999	The fourth CNNIC Report on China's Internet was released. The survey showed 1.46 million computer connected to the Internet in China, 4 million Internet subscribers, 29,045 .cn domain names and 9,906 websites.

Jan. 2000	The fifth CNNIC Report on China's Internet was released showing 3.5 million computers connected to the Internet in China, 9 million Internet subscribers, 48,695 .cn domain names and 15,153 websites. At the same time, special computer network, http://www.5000.gov.cn, started a trial run to connect CCG's economic department with 5,000 of the country's large enterprises which uses the Internet to send their operational information and statistics directly to the State Statistical Bureau. The enterprises also provide detailed information such as annual statistics, quarterly investment in basic construction, technological upgrade, R&D (Research and Development) and payroll, monthly output, sales sales-revenues, profits, orders and inventory of key products. The network includes 60-70% of China's industries and covers over 2,000 products made by these enterprises.
Mar. 2000	Chinese network operators such as China Telecom, China Unicom, China Netcom and China Jitong announced that they would inject US$1 billion into developing the Internet infrastructure in the same year, signaling increased competition in the sector and potentially lucrative contracts for foreign equipment suppliers. The heavy spending is expected to boost creaky infrastructure via expanding digital networks establishing or developing the asynchronous transfer mode (ATM) and Internet Protocol (IP), expanding the capacity of the backbone and spurring sluggish we speeds.
July 2000	The sixth CNNIC Report on China's Internet was released, showing 6.5 million computers connected to the Internet in China, 16.9 million Internet subscribers, 99,734 .cn domain names and 27,289 websites.
July 2000	Over 40 famous Internet enterprises and news media websites amalgamated to form China's first academic Internet Society.

***Sources: original text citied from* Wong &Nah (2001:38-41; also see CNNIC 2007b)**

APPENDIX E

SELECTED LAWS AND REGULATIONS ON CHINA'S INTERNET

National Laws (Standing Committee of the National People's Congress)			
1	Decision on the protection of Internet security	The Decision clarifies the harmful activities toward the Internet security and frames the relevant penalty measures that aim at boosting the healthy development of China's Internet.	2000
2	China electronic signature law	The E-signature law indicates that the e-signature has the same legal efficacy with the manuscript signature and official stamp. The issue of the E-signature law effectively boosts the development of e-business and e-governance, safeguarding the legal rights and interests of the relevant entities, increasing the security of online exchange.	2004
Administrative Regulations (The State Council)			
3	China Computer Information System Security Protection Regulations	The Regulations defines the security protection system of China's computer information system, and marks off the surveillance responsibility of the police, and clarify the penalty measures if the regulations are broken	1994
4	China Computer Information Network International Connections Administration Provisional Regulation	The regulation makes clear of a series of items about the administration of China's information network connection, among which for those enterprises who engage in the commercial business of the Internet connections, the Regulation requires them to apply for ISP license. For those who engage in the noncommercial affairs of the Internet connections, the Regulation them to report to relevant official department in records.	1996

5	China Telecommunicatio n Regulation	Basically the Regulation prescribes security issues of China's telecommunication networks and information mediated over the networks from the aspects of telecommunication market, service, construction, etc.	2000
6	The Internet information service administration methods	Basically the methods classify the Internet information services into commercial and noncommercial services. For the commercial information services, the enterprises should apply for the admission of the business; for the noncommercial information services the entity should and the services should be recorded the relevant official department.	2000
7	Investment of Foreign Telecommunicatio n Enterprise Administration Regulation	The Regulation prescribes the qualifications of the foreign telecommunication enterprises who want to invest in China's telecommunication industry, and the application process. In the regulation, the second item indicates that all the investment of the foreign telecommunication enterprise must be in the form of joint venture with the investment of China's enterprises. They much co-register a firm and engage in the business together.	2001
8	The Internet Online Services Management Locale Administration Regulation	The Regulation prescribes the Internet online business from the aspect of setting-up, management, punishment, in which the Regulation requires that all the online business enterprises or entity must apply for the permission of their business with the relevant official department.	2002
9	Information Networks Communication Right Protection Regulation	The Regulation dictates right protection, right limitation of the information communication on the networks, and clarifies the relevant punishment for those who do not follow the rules so as to keep the balance of interests between various business entities.	2006

Department Regulations (The Ministry of Information Industry)			
10	The Internet E-bulletin service administration regulation	The Regulation elucidates the qualifications and responsibilities of those entities that run online bulletin. The Regulation requires those entities who want to operate the online bulletin service must apply for the special admission or be recorded as special cases in the relevant official department.	2000
11	Telecommunication Services Quality Management Provisional Methods	The Regulation indicates the supervisory relationship between telecommunication service providers and the relevant administrative departments.	2001
12	The Internet Access Administration Regulations	The Regulation prescribes that the access of all the telecommunication devices must apply for admission with the relevant administrative department	2001
13	Dispute disposal methods for telecommunication network connections	The document regulates the process, of which the telecommunication administrative departments deal with the disputes between different telecommunication networks in order to resolve the conflicts between the telecommunication infrastructure providers, and that between the telecommunication infrastructure providers and special telecommunication networks related departments.	2001
14	Telecommunication Business Admission Administration Regulation	The Regulation specifies the application, approval, usage, change and write-off, and annual check of the telecommunication business admission license	2001
15	The administration regulation of the International communications exports and imports	The regulation clearly indicates that the exports and imports of the international communications must be applied, operated and maintained by the national exclusive investment enterprises only	2002

16	International communication infrastructure construction administration regulations	The regulation dictates the situations and operation process of application and approval of the international communication infrastructure construction, among which the ninth item indicates that all the relevant infrastructure construction must under the permission of the Ministry of Information Industry after the proper application with the relevant department	2002
17	Telecommunicatio n networking code resource management regulation	The Regulation prescribe that Chinese government has the authority to examine and approve the usage of the code resource. The telecommunication administrative department should be in charge of and responsible to the application, distribution, and application the code resource	2003
18	China Internet Domain Name Administration Regulation	The Regulation prescribes registration, management, penalty measures of the domain name over the networks in order to ensure the security of China's Internet operation	2004
19	Non-commercial Internet Information Service Records Administration Regulations	The regulation indicates that all the non-commercial Internet information service must be recorded with the relevant official department. The regulation also clarifies the recording, changing, writing-off, annual check, and some other relevant procedures for the information services.	2005
20	Internet IP Address Recording Administration Regulations	The Regulation indicates the authority of Chinese government about distributing and recording IP address. The Regulation also clarifies the responsibilities of the relevant administrative departments, IP address distribution institutions, and telecommunication business operators.	2005

21	Electronic Identification Service Administration Regulations	The Regulation was operated together with China electronic signature law. It basically standardizes the procedures of release and administration of the electronic identification services.	2005
22	Telecommunicatio n Service Standardization	The Regulation standardizes the service range of telecommunication business operators, among which the lowest standard criteria were made in the document.	2005
Department Regulations (The Ministry of Public Security)			
23	Computer Information System Security specialized Products Examination and Sale License Administration Regulation	The Regulation prescribes that the sales of all the security specialized products must apply for license, and the Ministry of the Public Security has the authority to examine and approve all the organizations that responsible to the security check of the products.	1997
24	Computer Information Network International Connections Security Protection Administration Regulation	The Regulation indicates the responsibilities and the punishment of all the organizations in the security protection of the international networks connections.	1997
25	Computer Virus Prevention and Cure Administration Regulations	The framework of the Regulation is based on China Computer Information System Security Protection Regulations. It ordains the measures and corresponding punishment about the computer virus control and management.	2000
Department Regulations (The Ministry of Culture)			

26	The Internet Culture Administration Provisional Regulations	The Regulation ordains the culture related activities on the Internet, among which for those enterprises who engage in the commercial business of the Internet connections, the Regulation requires them to apply for ISP license. For those who engage in the noncommercial affairs of the Internet connections, the Regulation them to report to relevant official department in records.	2003
Department Regulations (The People's Bank of China)			
27	Online Banking Service Administration Provisional Regulations	The Regulation lists the operation and administration procedures of online banking services, including that of the market admittance, the risk management and the legal responsibilities of the operators.	2001
Department Regulations (Bureau of China National Broadcasting)			
28	The Networks Information Communication AV Programs Administration Regulations	The Regulation prescribes that all the online AV programs must apply for admission with the relevant official departments. The Regulation also ordains the application procedures and the admission criteria of the relevant online activities.	2004
Department Regulations (Head Office of the National News Release)			
29	E-publication Administration Regulation	The Regulation indicates the punishment criteria for the e-publication in various aspects, such as producing, publishing, coping, importing, and releasing. The Regulation prescribes that all these activities must apply for admission with the relevant official department.	1997
30	The Internet Publishing Administration Provisional Regulation	The Regulation indicates the details of the examination and approval criteria, surveillance and punishment measures of the Internet publishing administration business.	2001

Department Regulations (Bureau of China National Copyright)			
31	Computer Software Copyright Registration Regulation	The Regulation ordains the procedures and fees of software registration, examination and approval, releasing, and so on. The regulation indicates that the software copyright owners can choose if they register their products. The national copyright administration department encourages the registration of software, and promises to give special protection to those registered software.	2002
32	The Internet Copyright Administrative Protection Regulation	The Regulation indicates the rights and responsibilities of the copyright owners, Internet information services providers (ISPs), and Internet Content Providers (ICPs).	2005

Source: **raw data selected and translated from BMOI (2005)**

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