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STUDY ON BEIJING'S EMERGING MOBILE COMMUNICATION INDUSTRIAL CLUSTER AND ITS POLICY IMPLICATIONS

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ABSTRACT: This paper is a preliminary and illustrative case study of Beijing's emerging mobile communication industrial (MCI) cluster, which helps understand the cluster by qualitative analysis and description. Beijing's MCI cluster is emerging as far as the competence of the industry and its spatial concentration are concerned, although it is not the type of the cluster described by PORTER due to the low competence of indigenous firms. The formation of the cluster can be explained by means of the factor and demand conditions of Beijing. However, it is mostly determined by the multinationals that promote the growth of the industry and the formation of the cluster, and by the government that also plays a key role in many ways. As a matter of fact, the interaction between the multinationals and the local government is the key to understanding the formation of the cluster. All in all, Beijing's emerging MCI cluster is a value-chain, geographically concentrated but non-localized cluster, which is highly dominated by the multinationals and the local government. Its special characteristics bear some policy implications as to the change of the roles of the local government and the localization of multinationals, etc.

KEY WORDS: industrial cluster; Mobile Communication Industry; multinationals; Beijing

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1 INTRODUCTION

Clusters, defined as geographically proximate groups of interconnected companies and associated institutions in particular fields, linked by commonalities and complementarities (PORTER, 2000), have aroused an intense interest of urban and regional planning researchers and policymakers over the past decades. It is widely recognized that clusters can promote productivity and innovation, develop local competitive advantages. Popularized by Michael PORTER in his book "The Competitive Advantage of Nations" in 1990, the cluster is not a new concept, but it does provide a new way to understand regional economies. And industrial cluster policies are becoming trendy in economic development planning, which has as well attracted much attention from many Chinese scholars and governors.

Quite different from traditional industrial policies which emphasize the support to specific desirable industries, cluster policies deal with industries as a system with a view to the integrated development of all industries. The cluster thinking has a basic understanding that the regional competence is determined by the growth of productivity and innovation, which is much more a result of interconnections and spillovers in a cluster than the scale of individual firms. So, the cluster theory believes that all existing and emerging clusters deserve our attention and the role of government is not to decide which one will succeed but to facilitate the existing and emerging clusters to upgrade or form, which bears clear policy implications to the government (PORTER , 1998; 2000).

The cluster thinking throws light on the study of Beijing's IT industry development. With the rapid growth of Beijing's IT industry in recent years, some potential industrial clusters are emerging, especially the mobile communication industrial (MCI) cluster. This paper is a preliminary study of Beijing's emerging MCI

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cluster.

2 DEVELOPMENT OF BEIJING'S EMERGING MCI CLUSTER

Beijing has a tradition in electronic and telecommunication industries, having established its electronic industrial base as early as in the 1940s. However, the rapid growth of Beijing's mobile communication industry did not begin until the middle 1990s, which was propelled by both the domestic policy and the investment of multinational companies. And with nearly 10 years of rapid development, Beijing is witnessing that its MCI cluster comes into being, consisting of various industries interlinked.

2.1 Introduction to the Emerging MCI Cluster in Beijing

Beijing's MCI cluster consists of a large number of mobile communication system and terminal producers, the related supporting industries(such as the electronic component industry), and the mobile communication service producers(such as China Mobile and China Unicom). The firms and industries in the cluster are connected through the vertical(buyer/supplier) or horizontal(common customers, skilled workers, and technology, etc.) linkages(Fig. 1).

Beijing's mobile communication industry enjoys an obvious competitive advantage in the production of most mobile communication products. For example, with a production of 22.7×10^6 mobile telephones, Beijing's producers accounted for 26.1% of the total production in China in 2001; in terms of capacity, Beijing's base station subsystems and switching centers reached 0.4×10^6 channels and 22.9×10^6 lines in 2001, which accounted for 15.7% and 25.4% respectively of the total in China. All the data above show the competitive market position of Beijing's mobile communication industry (Table 1).

But what should be noticed is that foreign companies are dominant in the cluster. Major mobile communication producers are foreign-funded, especially by European companies, such as Beijing Nokia Mobile Communication Co., Ltd., Beijing Ericsson Mobile Communication Co., Ltd., etc. (Table 1). In 2001, five major mobile telephone producers, including Nokia, Ericsson, MCB, Mitsubishi-Shuyuan and Sony-Hong, accounted for 98.2% of the total production of Beijing. So, foreign multinationals play an important role in the development of Beijing's MCI cluster, which, as a distinct characteristic of the cluster, will be discussed in detail in the following sections.

Despite the fact that there are a lot of local electronic component producers in Beijing, apparent supply linkages between local firms and foreign-funded companies are still not established. Moreover, most pivotal components have to be imported, which also shows Beijing's MCI cluster is highly foreign dependent. Therefore, Beijing's MCI cluster is far from being the type of the cluster described by PORTER, which emphasizes the competence of indigenous firms and industries. It may be just thought as an emerging, or only a potential, cluster.

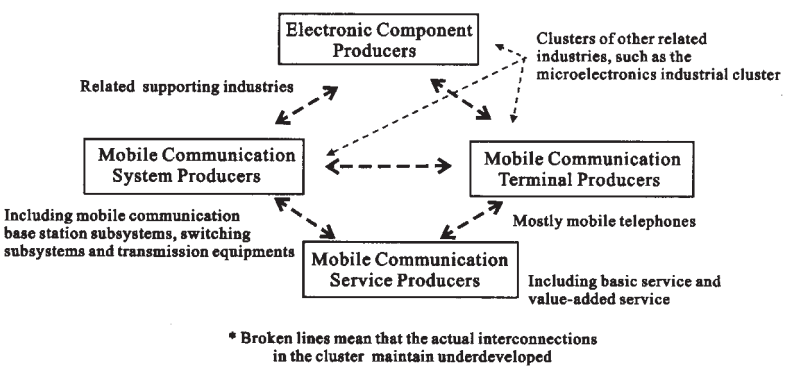

Fig. 1 The structure of Beijing's emerging MCI cluster

2.2 Geographical Concentration of Beijing's Mobile Communication Industry

The concept of industrial cluster emphasizes the importance of spatial proximity. According to PORTER (1990), a geographical concentration of related industries, including rivals, suppliers and customers, can promote efficiency and specialization. And, more importantly, the geographical concentration of industries

Table 1 Beijing's major mobile communication products and producers

Product	Capacity/Production/ Production value	Beijing's share of the total of China (%)	Major Companies
Mobile Communication System			
Base station subsystem	0.4×10^6 channels (Capacity)	15.7	Beijing Nokia Mobile Communication Co., Ltd. Beijing Ericsson Mobile Communication Co., Ltd.
Mobile switching center	22.9×10^6 lines (Capacity)	25.4	Beijing Nokia Hangxing Communication System Co., Ltd.
Optical fiber cable	60×10^3 km (Production)	17.1	Beijing Lucent Technologies Cable Co., Ltd.
Light-transfer equipment	0.4×10^9 yuan(RMB) (Production value)	2.50	Datang Telecom Technology Co.,Ltd.
Mobile Communication Terminal			
Mobile telephone	22.7×10^6 (Production)	26.1	Beijing Nokia Mobile Communication Co., Ltd. Beijing Ericsson Mobile Communication Co., Ltd. MCB Beijing Mitsubishi-Shuyuan Mobile Communication Equipments Co., Ltd.
Electronic Components and Fittings			
SIM card	–	–	Datang Microelectronics Technology Co., Ltd.
Plastic accessories	–	–	Beijing Youxin Communication Equipment Co., Ltd.
TCXO	–	–	Beijing Tokyo Dianbo Electronics Co., Ltd.
Loudspeaker for mobile phone	–	–	Philips Electronics (Beijing) Co., Ltd.

can accelerate innovation, which is crucial to the development of high-tech industries (the mobile communication industry, for example), since spatial proximity can increase the concentration of information, the speed of information flow within the industries and the rate at which innovations diffuse (PORTER, 1990). Moreover, spatial proximity makes it easy for face-to-face contact and competitive cooperation of enterprises, which are also important to innovation. Therefore, most competitive industries, especially high-tech industries, agglomerate geographically, with the competency of each being reinforced in the process of clustering.

Beijing's mobile communication producers are concentrated primarily in the east of Beijing and located mainly in three industrial zones: Electronic Town of Beijing Municipality (ETBM), Beijing Economic-technology Development Area (BEDA), and Tianzhu Airport Industrial Park (TAIP) (Fig. 2).

ETBM, as one of the oldest electronic industrial bases of China, has a long history, and most indigenous mobile communication producers, such as Capital Group, C&W Group, etc., are located there. BEDA, with most mobile communication enterprises funded by foreign there, has developed into the most important industrial zone of Beijing for the export-oriented manufacturing industry. TAIP, an industrial park adjacent to the Capital International Airport, has attracted some mobile communication producers for its advantageous location, which makes it the third largest concentrated zone of Beijing's mobile communication industry.

In addition, surrounding the main mobile communication producers, many components, accessories, and fittings producers are concentrated in ETBM and BEDA. Through the vertical relationships, they link together and form a relatively complete industrial cluster. It is much more prominent in BEDA due to Xingwang (International) Industrial Park, which is becoming a popular mode in Beijing's high-tech industry development.

The Xingwang (International) Industrial Park is joint-venture by Capital and Finland Nokia Group, with an initial investment of 10×10^9 yuan(RMB) and an area of 50ha. Concentrated in the park, there are about tens of world-wide famous enterprises as the suppliers of Nokia, from clips and IC boards producers to mobile phone covers and keypads producers, which guarantees zero inventory and the lowest cost of time and transportation.

The core of the "Xingwang Mode" lies in the concentration of the upstream and downstream firms in one common product chain in the industrial park (Fig. 3), which can not only promote the efficiency of production, but also offer opportunities for the face-to-face contacts of collaborators so as to stimulate the co-innovation of the enterprises. So, just like in an industrial cluster, the enterprises in the park benefit much from the agglomeration.

According to the plan concerned, over 30 global and

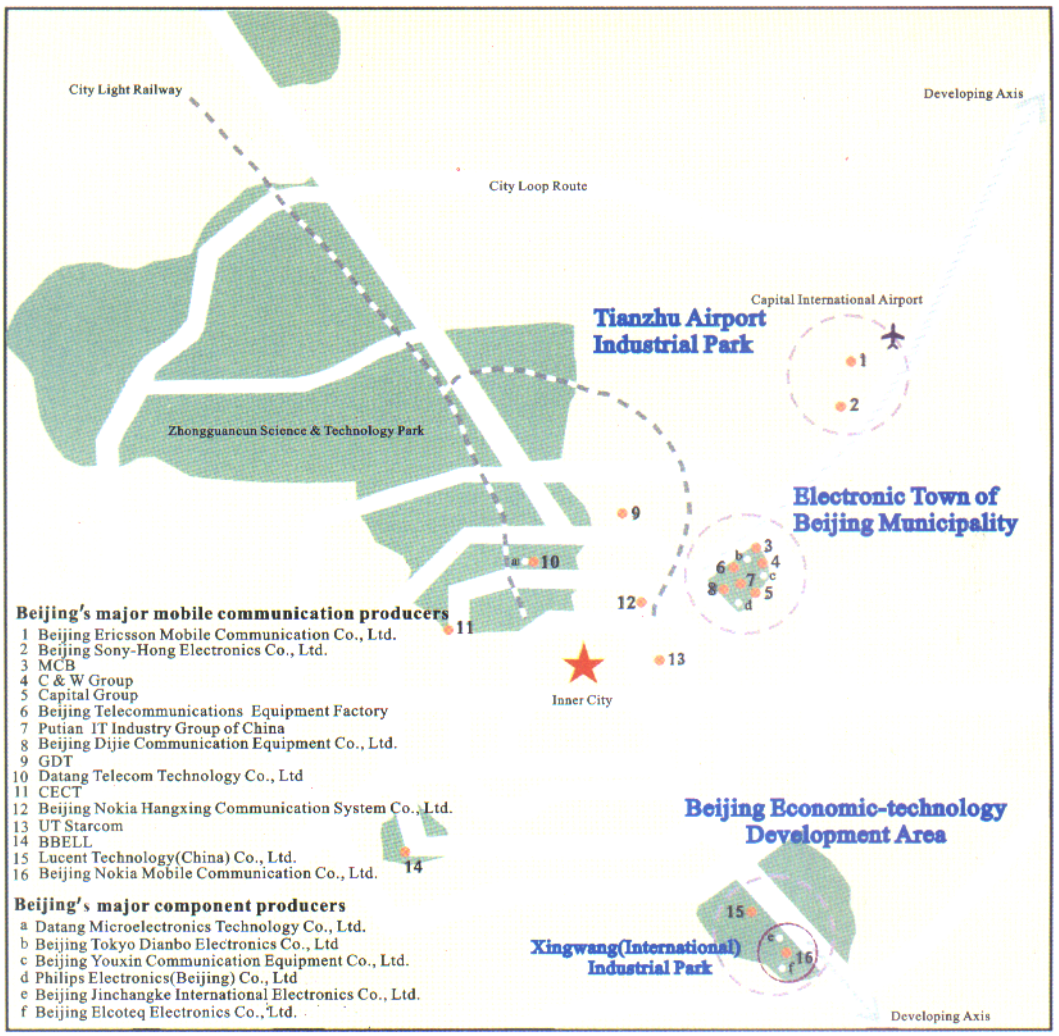

Fig. 2 Geographical concentration of Beijing's Mobile Communication Industry

domestic producers and R&D institutes will be located in the industrial park, which will create more than 10 thousand employment and a sales volume of 50×10^9 yuan yearly when built up. Nokia believes "Xingwang Mode" will help promote his competence in the world market. However, some criticisms to the mode believe that the concentration of all the firms in one product chain carries the risk, as one firm's mistake will probably affect the whole cluster and bring on loss to other firms as a consequence.

3 FACTORS DRIVING THE GROWTH OF BEIJING'S EMERGING MCI CLUSTER

PORTER(1990) argued that competition was a driving force behind the cluster development. The evolvement of a cluster was a dynamic process influenced by four determinants in his diamond: factor conditions, demand conditions, related and supporting industries and firm strategy, structure and rivalry. Although Beijing's emerging MCI cluster is not the same type described by PORTER, the determinants of his model do prove relevant to the explanation of the formation of the cluster. Fig. 4 shows the determinants and their contribution to the formation of the cluster.

Beijing's mobile communication industry had developed slowly before 1995. It was not until then that the rapid growth of the industry was triggered by a large number of new entrants into the industry, mostly foreign multinationals attracted by the large and rapidly growing local market. As a matter of fact, through joint venture and cooperation with local firms, they have played a pivotal role in the formation of Beijing's MCI cluster.

Obviously, Beijing's local mobile communication market and its special strategic position in the market of China are the most important attractions for the multi-

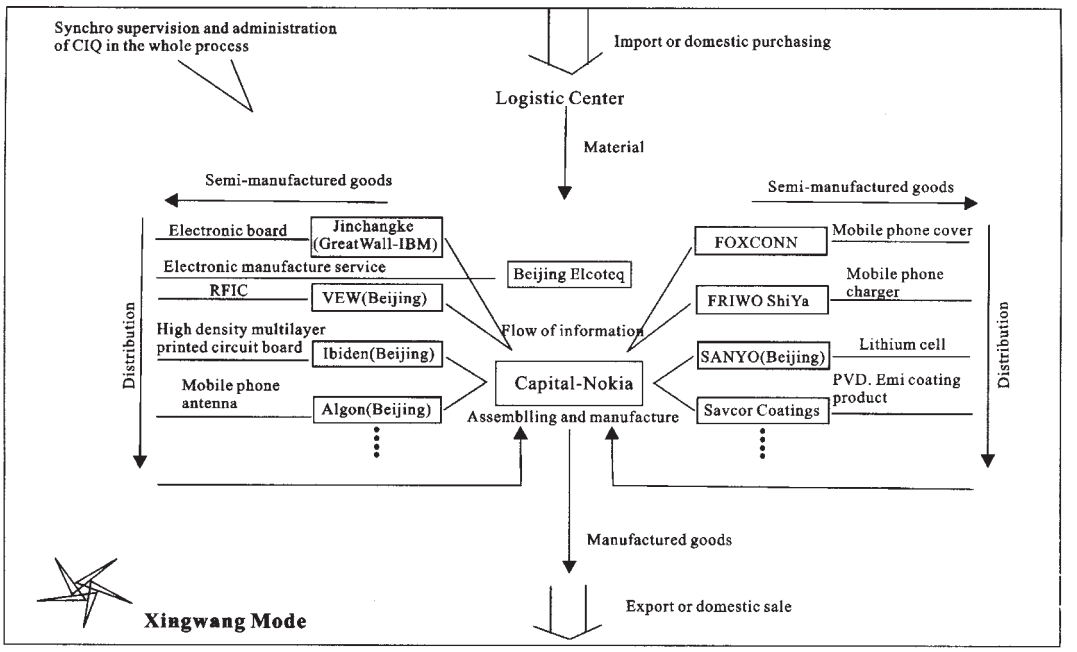

Fig. 3 Xingwang Mode and Xingwang (International) Industrial Park

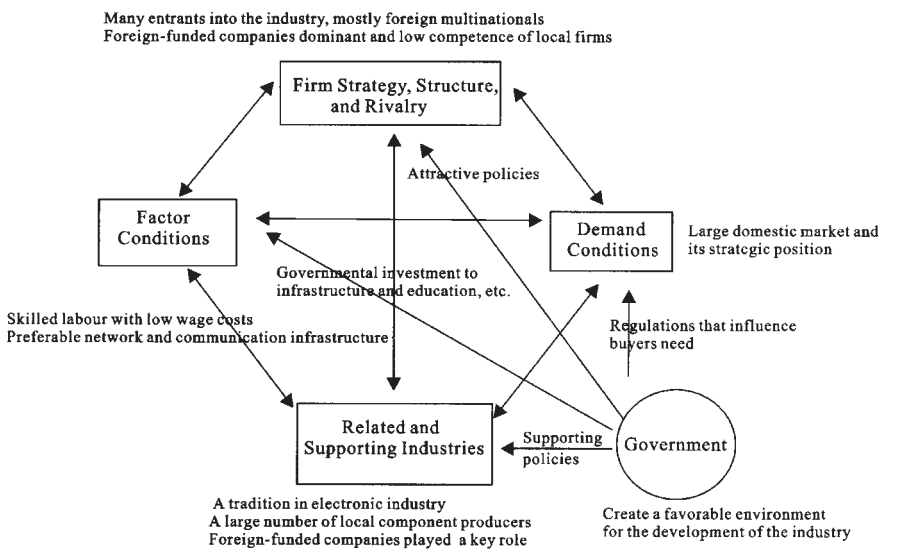

Fig. 4 Factors driving the growth of Beijing's MCI Cluster

nationals. As the largest mobile communication market in the world, China has 116×10^6 customers in 2001, which will reach 250×10^6 in 2005 according to the forecast. Attracted by the large market demand, most foreign mobile communication companies regard the investment in Beijing as their most important strategy for the future development. Furthermore, with the rapid popularization of mobile telephones in China, especially in Beijing, the local mobile communication market is becoming mature and demand of local customers is becoming more sophisticated these years, which also push the development of the industry greatly.

Moreover, factor conditions of Beijing are also important enticements for foreign investment. As the capital of China, many universities, research institutes, enterprises and companies, governmental and non-governmental organizations concentrate in Beijing, which not only creates a large market demand, but also provides a large number of skilled workers with low wage costs (by Western standards). Besides, abundant lands with low prices, and location as a hub of communications (Beijing has one of the largest international airports of China) and the capital city (convenience to contact with both the local government and the central

government) also are advantageous factors of Beijing. Furthermore, Beijing's massive investment in the city's infrastructure, especially in the communication networks, also acts as an important force to impel the development of Beijing's mobile communication industry in these years.

Drastic competition of major foreign mobile communication producers in the domestic market accelerates the formation of the cluster by promoting co-innovation, specialized division and competitive cooperation of enterprises, as rivalries also stimulate local firms to grow up. Through introducing foreign capital and advanced technologies or allying with each other, some local producers, such as Capital Group, CECT, etc., have showed their vigor, even if they are still in lack of competence.

Major foreign mobile communication producers' entrancing into Beijing's mobile communication industry also attracts their own global partners and suppliers to co-locate in Beijing, such as the "Xingwang Mode". So, foreign-funded companies also play a key role in the related and supporting industries. Since most foreign mobile communication producers have their own suppliers in their globally extended production chains, they have developed little relationship with local component firms. As a result, many local component producers cannot benefit from the growth of the mobile communication industry, as foreign companies are still weakly embedded in the local environment.

Besides, it should be emphasized in the case of Beijing's MCI cluster that the government plays an essential role in the formation of the cluster by influencing the four determinants of the "diamond" (Fig. 4) and creating opportunities for the development of the industry. In fact, the key to understanding the formation of Beijing's MCI cluster is the interaction between foreign multinationals and the local government[①]. The change of Beijing's economic development strategy as a capital city, which emphasizes the development of the hi-tech industry, has provided an opportunity for the mobile communication industry. By offering preferential policies, such as tax concessions, efficient administrative service and improving local environment, the government has been successful in attracting foreign multinationals. With their entrance into the industry, foreign mobile communication producers have helped to enhance the competence of Beijing's mobile communication industry, bring on the growth of local firms and accelerate the formation of the cluster. Hence, due to the pivotal role of the local government and foreign multinationals, Beijing's MCI cluster has come into being with some special characteristics, which we will discuss in the following section.

4 CHARACTERISTICS OF BEIJING'S EMERGING MCI CLUSTER

There are three critical dimensions of the concept of industrial cluster: the interdependence or linkage, time or stage of development and geography (FESER, 2001). Following the three dimensions, we can describe Beijing's MCI cluster basically as a value-chain, young and emerging, and geographically concentrated but non-localized cluster. Moreover, Beijing's MCI cluster is also highly export-oriented and multinationals-dominated, and policy-oriented and government-dominated, which are two special characteristics of Beijing's MCI cluster.

4.1 Export-oriented and Multinationals-dominated

In the context of economic globalization, China is playing a role as the "world factory", and many multinationals have chosen China, the east coastal regions in particular, as their production base for the world market. As a matter of fact, Beijing's MCI cluster can be viewed as one production base of the global mobile communication industry. So, the cluster is highly export-oriented and multinationals-dominated.

The role of multinationals in the development of a cluster has been wide discussed. It was criticized by PORTER to regard foreign multinationals as main participants of a cluster, especially in developed economies. However, he also argued that foreign multinationals could be an important factor in the economic development at its early stages and could seed a cluster if indigenous firms themselves could eventually gain competitive advantages (PORTER, 1990). So, generally speaking, foreign investment bears a relatively positive influence on the cluster's development in its early phases, especially in a developing country. Beijing's emerging MCI cluster, for example, has benefited from foreign multinationals, which have brought capital, and techniques, created job opportunities and helped train local workers, and impelled the local firms to grow.

① YANG You-ren, 2001. A Preliminary Study of the Regional Development Mode of the Microelectronic Industry in the Mainland of China; A Discussion of the Research Methods on the Spatial Clustering. Prepared for the seminar about the Urban and Regional Development in the Mainland and Taiwan of China (in Chinese).

However, over-reliance on foreign multinationals is risky. In the case of Beijing's MCI cluster, because it is still growing and definitely very young, rapid progress in a short term is easily attainable by the abundant foreign fund. But due to reduced value chain and weak links to local suppliers, foreign multinationals are still poorly embedded in the local business environment, which, as a consequence, will limit the potential of the cluster to upgrade in the long run. Moreover, as an export-oriented cluster, which is sensitive to the external market, the cluster can not be stable. Therefore, total dependence on foreign multinationals makes the cluster fragile. The region can not develop more advanced forms of competitive advantage and will be victimized if the foreign multinationals decide to relocate themselves in the phase of industrial consolidation (BIRKINSHAW and JULIAN, 2000). So it is important for the government to realize that the regional competitive advantages come from the indigenous firms, which always view the region as their base and energize the process of creating advanced and specific factors (PORTER, 1990).

But, in the case of Beijing's MCI cluster, the trial of Nokia and its "Xingwang Mode" raise some interesting questions. A mobile communication terminal producer, Nokia has attracted a great many components and accessories producers, which, as Nokia's strategic partners, have concentrated in Xingwang. This has helped fill the gap in the production chain of Beijing's mobile communication industry, form a complete industrial cluster, and enhance the competence of the whole industry. It seems that the multinationals are creating their own cluster of foreign-owned activity and upgrading it continuously, although the direct production linkages between local firms and foreign multinationals are not established. As figured by PORTER, in some cases, multinationals would have more enduring reasons for upgrading their investment in the nation over time (PORTER, 1990). But, he still believed that the ideal was to make the region a base and to promote the growth of indigenous enterprises. So, the influence of "Xingwang" on the development of Beijing's MCI cluster is still unclear in the long run.

4.2 Policy-oriented and Government-dominated

As analyzed above, the local government directly affects the formation of Beijing's MCI cluster. As the role of the government has been discussed in the last section, here we will summarize it in more detail, which is as follows:

(1) To create factors and circumstances of hi-tech industry development. The change of Beijing's economic development strategy and the adjustment of industrial structure highlight the development of Beijing's hi-tech industry (LI and LU, 2002b). The efforts of the government to promote the development of Beijing's hi-tech industry include: 1) Governmental investment in S&T research (accounting for 45% of the total investment of Beijing in 2000) and education. 2) Governmental investment in the city's infrastructure, especially in its transportation and communication. 3) Related supporting policies and regulations, such as "Policies to Make Further Improvement of Beijing's Hi-tech Industry (Apr. 1999)", "Regulations to Encourage the Students Studying Abroad to Return to Start Up the Enterprise of Beijing (Apr. 2000)" etc., which have helped attract advanced human resources and encourage innovation and start-ups. 4) Cooperation with enterprises and local universities and research institutes to create a favorable regional innovation environment.

The efforts of the government have caused Beijing's hi-tech industry to grow rapidly since the 1990s. Under the situation, as the most important part of Beijing's hi-tech industry, the mobile communication industry has also witnessed a rapid development after 1995.

(2) To attract foreign investment. In addition to the improvement of local environment, the government offers attractive policies (such as tax concessions), coupled with low land price, grants, convenience to obtain local skilled labor, and convenient and efficient services, including registration service, production service and media service, etc.

(3) To construct industrial parks and science & technology parks. Many industrial parks and science & technology parks have been built up in Beijing since the 1990s and Zhongguancun Science & Technology Park (including five zones: Haidian, Changping, Fengtai, Yizhuang and Electronic Town) is one of the largest parks, where 90% of Beijing's hi-tech industry is concentrated. The concentration of Beijing's mobile communication industry mainly occurs at two zones of Zhongguancun S&T Park, namely Yizhuang (BEDA) and Electronic Town (ETBM).

Moreover, the government sets up administrations to attract investment on the park, manage and serve the enterprises in the park, to foster their growth with special policies. By this means, it has helped promote the spatial concentration of Beijing's hi-tech industry (with the mobile communication industry included) (LI and LU, 2002a).

Therefore, Beijing's MCI cluster can be considered as a cluster constructed entirely by the government, and it

is highly policy-oriented and government-dominated. Some policies of the government are certain to help the cluster to develop, but over intervention can result in some negative effects, such as unnecessary and inefficient allocation of government resources, distortion of the market, and constraints over the potential vigor of local firms, etc.

5 CONCLUSION AND POLICY IMPLICATIONS

Beijing's MCI cluster is emerging as far as the competence of the industry and its spatial concentration are concerned, although it is not the Porter-style cluster because of the low competence of indigenous firms. The formation of the cluster can be explained by means of the factor and demand conditions of Beijing, especially the multinationals, which have caused the industry to grow, and the cluster to form. Also, the government played an important role in many ways. All in all, Beijing's emerging MCI cluster is non-localized, which is highly dominated by the multinationals and the local government. The special characteristics of Beijing's emerging MCI cluster bear some policy implications for its further development.

Firstly, some policies of the government, which aim to assist the development of the industry, have certainly been met with some success. As a pusher, the government provides the factors, resources, information and the opportunities necessary for the development of the industry. Such policies should be strengthened. However, according to the cluster thinking, the government should put emphasis on the industrial cluster in its entirety, especially on the existing or emerging cluster, but not on specific industries or sectors. So, the government should recognize the importance of the whole cluster of Beijing's mobile communication industry.

Accordingly, the emphasis of the policy should be laid on facilitating the cluster's development and upgrading. The government should create the environment for the cluster by influencing the four determinants as a whole system. In addition to improving infrastructure and eliminating local disadvantages of the "diamond", the roles of the government also include removing obstacles, relaxing constraints, and eliminating inefficiencies that impede productivity and innovation in the cluster (PORTER, 2000).

Secondly, we must admit that foreign multinationals will still play a pivotal role in the further development of the cluster. However, it should not be ignored any longer to improve the competence of local firms. Foreign multinationals should not be only one component in the local economic development strategy and absolutely an evolving one, and at some stage the focus of the government should be shifted to indigenous enterprises (PORTER, 1990).

The government should help enhance the linkages between multinationals and local firms by encouraging multinationals to employ local workers (which helps train local labor force), to purchase inputs of goods and service which are produced by local firms (of course, which improve local firms' competence to satisfy the demands of the multinationals), and develop the cooperation in R&D or production between multinationals and local firms. Moreover, it also should encourage the alliance, innovation, and the spin-off of local firms by relevant policies, subsidies, and measures.

Finally, the technology development should be focused not only on acquiring technology transferred from foreign companies, but also on the independent innovation by local firms. Presently, some local firms, such as Capital Group and Datang, have got strong ability in the R&D of the third generation mobile communication products (CDMA). Based on the ability, they have developed a potential and competence to stand up against the competition in this field.

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