Technological Forecasting & Social Change xxx (2008) xxx–xxx

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

How does a cluster relocate across the border? The case of information technology cluster in the Taiwan–Suzhou region

Chuan-Kai Lee *

Institute of Technology Management, National Tsing Hua University, Hsinchu, Taiwan

ARTICLE INFO

Article history:
Received 22 June 2006
Received in revised form 20 December 2007
Accepted 28 July 2008
Available online xxxx

Keywords:
Information technology
Clusters
Relocation
Taiwan
Suzhou
Industrial system
Institutional innovation

ABSTRACT

Since the end of the Cold War, cross-border regions have proliferated at the borders of formal socialist countries, especially in China. Existing accounts of these emergences treat them either at the macro-level, focusing on political initiatives, or at the micro-level, with emphasis on social and economic relations. This paper uses the Taiwan–Suzhou cross-border region as a case study for suggesting a meso-level approach, arguing that as a result of continuous interactions between individual Taiwanese information technology firms and opportunity structures generated by the selective opening of the Chinese border, the formation of cross-border high-tech regions is shaped and determined at the level of the industrial system. The industrial system acts as a platform for coordination and cooperation between local elites and foreign investors and among individual firms within this system. The formation of the cross-border high-tech region thus involves the relocation and institutional re-embedding of industrial systems across the border, which has been accompanied by the systemic building of Taiwanese firms on the one hand, and the institutional innovation of Chinese local states on the other.

1. Introduction

Since the end of the Cold War, cross-border regions have proliferated at the borders of formal socialist countries, especially in China. Although cross-border integration is no novelty in the history of nation states, a recent development is that the end of the Cold War has encouraged new efforts to reintegrate the post-socialist economies into the capitalist world market by using cross-border integration as a strategy to exploit opportunities relatively untapped by contemporary capitalism.

Yet the emergence of cross-border regions as new sites for economic action and political intervention raises the question of how these regions are to be created and governed. The existing studies look into this question from two discrete analytical levels. On the macro-level, the selective opening of the Chinese border and associated linkages with foreign regions is viewed as a result of the interactions between the policy gaming of Chinese central and local governments and the strategic alignment of trans-border actors [1,2]. This reflects the regionally biased distribution of foreign direct investment [3,4] and the uneven development of the coastal regions [5,6].

On the micro-level, attention has been shifted to the activism of individual actors, including local elites and foreign investors, through the activation and mobilization of social and economic relations. On the one hand, propelled by the central state's GDP-ism that evaluates the political performance of local officials based on the local economic growth rate, local cadres have been competing for inward investment by manipulating regulations in favor of foreign investors [7,8]. On the other hand, by taking advantages of ethnic ties that are based on common language and culture repertoire, overseas Chinese businessmen have formed "development communities" or "growth coalitions" with local cadres, through which they realize political–economic rents [9,10].

The merit of a macro-level analysis of cross-border regionalization is that it identifies the opportunity structures associated with the Chinese post-socialist transition. Instead of resorting to the big-bang policies that eventually led to the disintegration of the

* Address: 101, Sec. 2, Kuang-Fu Rd., Hsinchu 300, Taiwan.
E-mail address: cklee@mx.nthu.edu.tw.

0040-1625/$ – see front matter © 2008 Elsevier Inc. All rights reserved.
doi:10.1016/j.techfore.2008.07.005

formal Soviet Union, the gradual transformation of the Chinese economy as well as the selective opening of the Chinese border have opened up a window of opportunities for a new round of globalization. But one limit to this approach is that when it grants primacy to the central state, it tends to overlook the decentralized state structure that has characterized the Chinese post-socialist transition, which has given local states the power to innovate at some margin. Conversely, the micro-level approach gives pre-eminence to the agency of individual actors. Without touching upon the structural context in which individual actors operate, it accounts for the differences in their results by adopting "networking models" that are essentially distinct from one kind of actor to another.

However, between macro-level globalization and micro-level socio-economic networking, a link is missed for bridging opportunities structures and individual activities in the cross-border regional scale. The reason for building this bridge is two-fold. First, globalization requires an anchor point around which economic action and political intervention can be organized, to produce a suitable degree of structured coherence. For cross-border integration, a regionally based anchor point should be more appropriate than is currently imagined, which is more than often derived from the globalization of production (see, for example, global commodity chains in [11]; global production networks in [12]). Second, cross-border networking also needs a structured interface to bring together the myriad interactions among numerous decentralized yet interconnected actors. This interface will provide a locus for the activation and mobilization of social and economic relations, as well as for the formation of development communities and growth coalitions across the border.

The aim of this paper is to develop a meso-level perspective to bridge this gap. Making use the Taiwan–Great Suzhou Area[1] as a case study, the argument is that as a result of continuous interactions between individual Taiwanese firms and opportunity structures generated by the selective opening of the Chinese border, cross-border regionalization is shaped and determined at the level of the industrial system. The industrial system acts as a platform for coordination and cooperation between local elites and foreign investors and among individual firms within this system. The formation of cross-border regions thus involves the relocation and institutional re-embedding of industrial systems across the border, which is accompanied by the systemic building of Taiwanese firms on the one hand and the institutional innovation of Chinese local states on the other.

Given the evolutionary nature of institutional change, this paper adopts a descriptive rather than analytical methodology by following the movements of strategic actors from both the home and the host regions. To make the description clearer and more specific, two representative actors are chosen: BenQ[2] as the representative actor of Taiwanese firms, and Kunshan as the representative actor of Chinese local states, to focus on strategic movements in system building and institutional innovation respectively. The reason why Kunshan was chosen instead of Suzhou where BenQ is located is because Kunshan took the lead in several critical institutional innovations, which were then diffused into neighboring cities including Suzhou. The case study is based on two field trips that took place in Taiwan and the Great Suzhou Area from January to August 2004, and in July 2006. More than 70 interviews were conducted, and covered the leading systems firms in Taiwan's information technology (IT) industry, the leading figures in cross-border business communities, high-ranking officers in governmental agencies, industrial analysts at major consulting firms, and journalists from major business magazines. A variety of secondary data was also used, including governmental statistics, corporate reports, industrial and financial analyses, and business and commercial journals and newspapers.

2. Industrial system, regionalization, and cross-border regionalization

The use of the industrial system as a level of analysis for uncovering the dynamics of regionalization has been a common practice in regional studies [13–16]. The industrial system is viewed as both a governance structure and a process of regionalization, through which various actors and organizations are interwoven into an interdependent web of regionally based institutions. Different types of industrial systems have been investigated. Whereas a centralized industrial system tends to be organized around the hierarchical governance structure with foot-loose regionalization, a decentralized industrial system is often characterized by the networked governance structure and sticky regionalization. Centralized industrial systems, for example, have been found in some German industrial regions that have evolved around self-reliant networks [17], and the Japanese production system, which is based on hierarchical, captive supply chains [18]. Yet decentralized industrial systems have been widely documented in studies on industrial districts, including those in the Third Italy [19], Los Angeles [14], Silicon Valley [15] and its imitators (for example, Taiwan: see [20]; Bangalore: see [21]).

The systemic character of the industrial system approach means that it has the potential of delineating the interactive effects among technological, organizational and spatial change. An industrial system often evolves within specific technological, organizational and spatial fields determined by industrial sectors, governance structures and regional boundaries, so it has at the same time technological, organizational and spatial components, which mutually condition and constrain each other, so that the whole system works together with some differential overall performance [14]. The relationship between the industrial system and regionalization lies in the institutional embeddedness[3] of the industrial system in the region. The contextualization of interconnected firms with their communal economic and non-economic institutions provides the institutional space for

[1] The Great Suzhou Area refers to Suzhou and its subordinate cities including Kunshan and Wujiang.

[2] BenQ was founded in 1984, once a subsidiary of Acer (Taiwan's first and largest information technology firm), now listed among top ten firms in Taiwan's information technology industry, ranked first in the production of panel displays, handsets and some computer peripheries, and in the brand marketing of handsets and some computer peripheries.

[3] The concept of embeddedness borrows from [22], which refers to the extent to which economic action is embedded in structures of social relations. The industrial system approach concerns the embeddedness of economic action in regional institutions that constrain social relations, so it refers to institutional embeddedness as opposed to social embeddedness originally used by Granovetter.

Please cite this article as: C.-K. Lee, How does a cluster relocate across the border? The case of information technology cluster in the Taiwan–Suzhou region, Technol. Forecast. Soc. Change (2008), doi:10.1016/j.techfore.2008.07.005

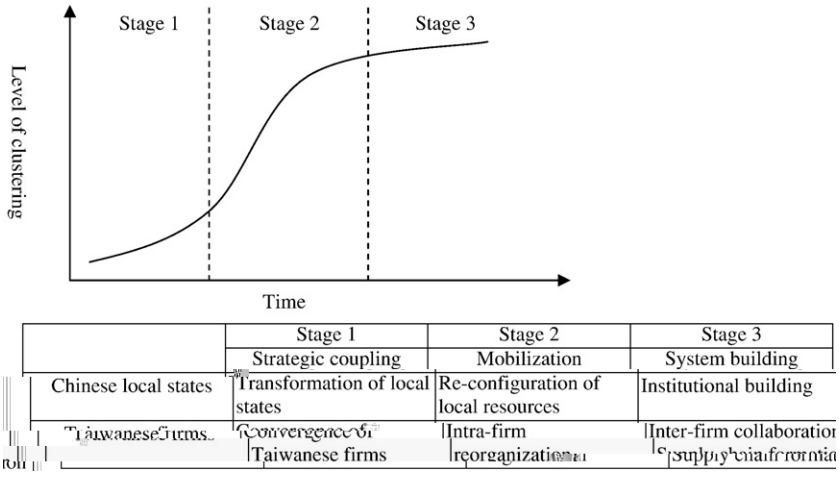

Fig. 1. Cross-border relocation and institutional building by stages.

facilitating economic collaboration, and hence for promoting regional development and growth [23,24]. The institutional embeddedness is thus the result of the evolutionary process of interactive adaptation among a variety of institutions in a region, including intra/inter-firm networks, social networks, public and private institutions. The difference in the structure of an industrial system and its socio-economic patterns of adaptation therefore leads to divergence in regional development trajectories and outcomes [25].

Viewed in this way, the formation of cross-border regions, or cross-border regionalization, thus involves the systemic relocation and institutional re-embedding of the industrial system across the border. This is a mutually constructed process between the home region and the host region. On the one hand, trans-regional actors attempt to rebuild a set of networks and institutions they have established in the home region, and regional actors manage to re-configure regional resources towards this new institutional building. But on the other, they both have to adapt to each other to take into consideration the different institutional environments of both regions. As a result, the re-embedded institutions are hybridized—rather a mutual construct of both regions, not merely a direct transplant from one region to another.

In the case of the Taiwan–Great Suzhou Area, this process could be divided into three stages according to the level of clustering of the Taiwanese industrial system (Fig. 1). In the first stage, the focus was the strategic coupling between the agents of the two sides, namely the Taiwanese investors and the Chinese local states. In order to find a suitable environment for institutional re-embeddedness, the Taiwanese investors would screen a number of candidate sites, which sometimes had to pass through several selection runs. However, the availability of the candidate sites was to some extent constrained by the preparation and readiness of the Chinese local states. The Great Suzhou Area was renowned for its particular form of rural industrialization of the Chinese economic reforms, which was based on collective enterprises run by township and village governments, or township and village enterprises (TVEs) [26,27]. To redirect their entrepreneurship from running enterprises to accommodating foreign direct investment, a transformation was thus called for in order to change the nature of the local states.

At the second stage, the key issue became the adaptation of both parties to each other's microenvironment. Taiwanese investors groped for ways to re-arrange resources across the border, while the Chinese local states tried to find methods of satisfying the demands of their investors in order to attract more investment. Just like in the previous stage, it was often the Chinese local states that took the first move, ahead of their customers.

The third stage witnessed a rapid growth in Taiwanese investment in terms of number and quantity. By the end of 2001, more than 1000 Taiwanese IT firms had moved into the Great Suzhou Area, contributing to more than half of the total foreign direct investment in that area (Table 1). Quantitative change brought qualitative change, in which both Chinese local states and Taiwanese investors underwent another stage of transformation. Contrary to the previous stages, in which the Chinese local states

Table 1
Taiwanese FDI in the Great Suzhou Area (2001)

Industrial parks	Number of Taiwanese firms in the IT industry [a]	Total FDI in the IT industry (billions of dollars)	Taiwan's share in total FDI in the IT industry (%)
Suzhou [b]	500 (76)	8.5	53
Kunshan	400 (70)	3.16	80
Wujiang	200 (21)	2.6	95

Source: [28–30].

[a] Figures in parentheses are the numbers of firms with investments exceeding US$10 million.

[b] Includes both Suzhou New District and Suzhou Industrial Park.

focused on the transformation of local resources, the targets of transformation at this stage were economic institutions, to build a new global production center. At the same time, the inflow of Taiwanese investors followed a growth pattern, from individual firms to a series of firms, and from discrete sub-sectors to a whole industrial system. This pattern was initiated by anchor tenants in sub-sectors in the IT industry, and then followed by their upstream and downstream suppliers to form complete supply chains. Once the major supply chains in the IT industry had been rebuilt, an interconnected industrial system thus emerged, in which these chains were interwoven with one another to emulate the flexibility and adaptability developed by the original industrial system in the home region.

The remainder of this paper documents the process of relocating and re-embedding the industrial system across the border. It first explores the embeddedness of Taiwan's industrial system, and then investigates its cross-border relocation and strategic coupling with the Great Suzhou Area. It uses Kunshan and BenQ as the examples to illustrate the mobilization of Chinese local states and Taiwanese firms respectively. A concluding section re-examines the relationship between the industrial system and cross-border regionalization, and briefly suggests directions for future research.

3. The institutional embeddedness of Taiwan's IT industrial system

A characteristic feature of Taiwan's IT industry is its decentralized yet interconnected industrial system, which has already been well documented and is often cited as the source of Taiwan's regional advantages [31–33]. This industrial system is composed of numerous interconnected and interdependent specialized producers, and is concentrated in the 50-mile industrial area linking Taipei to Hsinchu. Agglomeration creates a pooled market for workers with specialized skills, which benefits both workers and firms, enhancing experience exchange and information spillover. The mutual adjustment of interconnected firms allows the industrial system to handle abrupt crises and push each other towards the technology frontier. Experience sharing and mutual adjustment together drive the industrial system to continuously upgrade technological levels and develop new products.

In order to govern such a decentralized industrial system, networks are often regarded as the major method of integration and coordination [32], combining, decomposing and recombining the resources and capabilities of specialized firms from time to time, to allow the industrial system to function like an integral unit without sacrificing its flexibility. There are two kinds of networks. The first is the intra-firm network, which re-organizes resources and capabilities within the boundary of firms through vertical/horizontal integration and diversification. The second is the inter-firm network, which recombines resources and capabilities outside the boundary of firms, through system integration and supply chain combination. In this regard, networks are the nexus of integration mechanisms that encompass a broad range of organizational coordination, from intra-firm governance to inter-firm coordination to more complex arrangements [34].

Besides networks, regionally based institutions have also supported the governance of decentralized industrial systems. First, quite a few studies have pointed out that Taiwan's government played a critical and leading role in the development of the IT industry. Firstly, the Industrial Technology Research Institute (ITRI), set up in 1973, started to fill the technological gaps by conducting government-funded R&D projects [35]. Secondly, the state established the Hsinchu Science Park to host start-ups with generous tax breaks and financial supports, which later has proved very successful of creating an innovative environment [36,37]. Thirdly, the state also created several industrial consortia to promote technology learning and knowledge diffusion [38]. However, as private firms have commanded leadership in technological learning and industrial upgrading, the government has gradually changed its role from a leader to a supporter, redirecting its efforts toward building and updating economic infrastructure and institutions. For example, it has initiated e-commerce plans to set up platforms for global buyers, first-tier suppliers and second-tier suppliers in building and managing supply chains locally as well as globally, and has promoted the establishment of product development centers to take advantage of Taiwan's "first-tier suppliers' advantage" [39].

Second, technical communities, including national and transnational communities, have also played a supportive role in promoting industrial collaboration. Three types of communities can be identified. The first is the transnational technical community, which is composed of Taiwanese engineers who obtained graduate degrees in the US and spanned their activities across Taiwan and the US. They acted as intermediaries, linking Taiwan with the US to facilitate collaboration and talent circulation between the two countries [20]. The second is the regional research community, comprising scientists and engineers from research institutes and universities within the region, which served as the cradle of talent for the industry [40]. The third is the technocrat community, composed of engineering-trained bureaucrats who were responsible for implementing industrial policies within governmental agencies. These technocrats enjoyed a certain degree of autonomy in formulating policies, distributing research and development budgets and supporting industrial development as opposed to political intervention [41]. To promote the formation and development of these technical communities, industrial associations have created the environments for social interactions and business cooperation, including overseas associations [20], and industrial consortia [38].

4. Strategic coupling between Taiwan and Great Suzhou Area

In the early 1990s, China's central government started to shift the focus of its economic reform from the Shenzhen region to the Shanghai region, and initiated a series of projects to develop Shanghai as the new economic center of China [42]. The opening-up of Shanghai was based on a consideration of regional advantages. First, Shanghai is China's industrial nucleus and wealthiest region. Second, Shenzhen is too small to be a real "Dragon Head," whereas Shanghai has the necessary critical mass. Third, Shanghai is not tied to any specific foreign force and hence more likely to become China's financial center, whereas Shenzhen is too closely connected to Hong Kong. Fourth, Shanghai has access not only to her vast hinterland, but also to both northern and southern

Please cite this article as: C.-K. Lee, How does a cluster relocate across the border? The case of information technology cluster in the Taiwan–Suzhou region, Technol. Forecast. Soc. Change (2008), doi:10.1016/j.techfore.2008.07.005

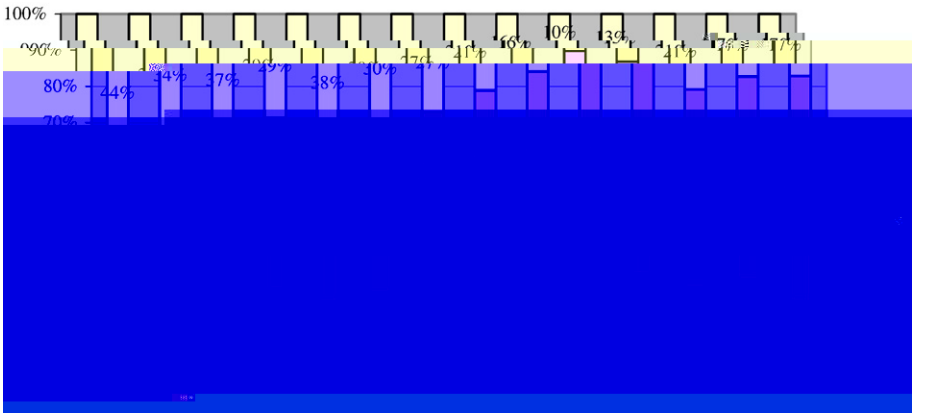

Fig. 2. Geographic distribution of Taiwan's Investment in China.

coastal areas. Fifth, Shanghai's human capital is the largest and most talented throughout China, especially in terms of manufacturing, finance and management [43].

At the same time, driven by cost pressures and lured by China's opportunities, Taiwan's firms in the IT industry also began to relocate their production to China. The deferred opening-up of Shanghai has given her the chance to learn from Shenzhen's experimentation, and hence allowed her to avoid the chaos and disorder that has characterized the Shenzhen region from the very beginning. According to a survey conducted by the Taiwan Electricity and Electronic Manufacturer Association (TEEMA), which was built on 748 samples of Taiwanese investors, the Shanghai region has outperformed the Shenzhen region in the following five aspects [44]:

- Clearer regulations and stronger enforcement (rule by laws, not by people);
- Continuity and stability of policies;
- Bureaucratic efficiency;
- Openness of local markets, especially opening more sectors for foreign investors; and
- Well-planned industrial parks.

As a result, the Shanghai region has gradually surpassed the Shenzhen region to become the primary destination for cross-Strait investment from Taiwan to China. Before 1992, the Shanghai region only attracted less than 20% of the amount of cross-Strait investment annually, but after 1994, the Shanghai region started to take the lead, and in 2004 it grasped 62% of the annual cross-Strait investment [45] (Fig. 2). During the same period, the IT sector has also overtaken traditional sectors to become the major driver of cross-Strait investment. From 1994 to 2004, the share of the labor-intensive sector in the amount of cross-Strait investment annually dropped from 67% to 21%, while that of the IT sector jumped from 26% to 56% [45] (Fig. 3).

However, instead of settling in Shanghai, Taiwanese IT firms preferred to choose smaller cities in the Great Suzhou Area. Up to 2001, Taiwan's investment has constituted 53%, 80% and 95% of all FDI in the IT industry in industrial parks within Suzhou, Kunshan and Wujiang respectively (Table 1). In Kunshan, also called "little Taiwan," Taiwan's firms alone contributed about 86% of the total local taxes collected in 2002 [46].

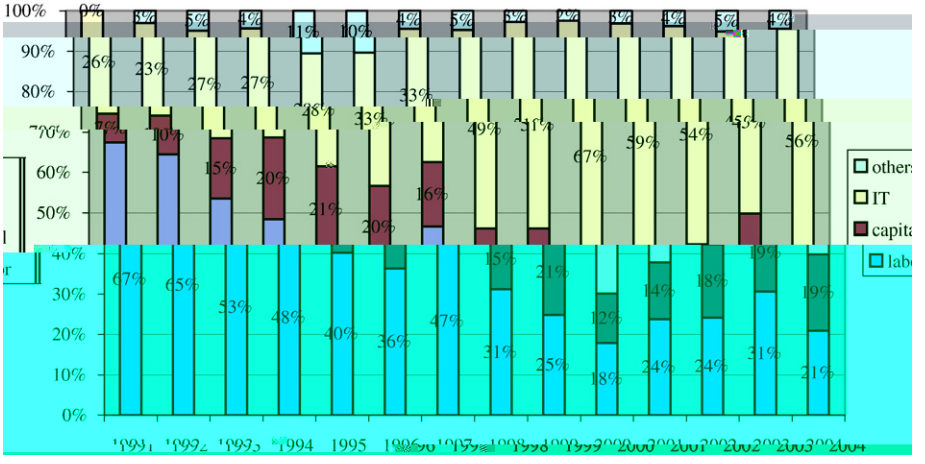

Fig. 3. Sectoral distribution of cross-Strait investment.

Please cite this article as: C.-K. Lee, How does a cluster relocate across the border? The case of information technology cluster in the Taiwan–Suzhou region, Technol. Forecast. Soc. Change (2008), doi:10.1016/j.techfore.2008.07.005

The matching of Taiwanese IT firms and the Great Suzhou Area was a strategic coupling between the demand side of the former and the supply side of the latter. From the demand side, small cities have three advantages. First, cost is still the primary concern in production relocation. Compared with Shanghai, which is notorious for its high land prices and limited supply of land, small cities are able to offer cheaper land, and more of it. Second, other than land, small cities are also more willing to offer better services in meeting the other demands of foreign investment, such as preferential treatment and administrative support. Third, relocating a large number of firms, or even a whole industrial system, involves a great deal of effort with respect to institutional building, which requires the close collaboration of local governments. In this regard, small cities provide more room for negotiation and collaboration vis-à-vis larger or higher-level cities. These advantages associated with small cities might be called "small government advantages," and have played an important role in experimentation and innovation during China's transition from a planned to a market economy. The smaller size and lower administrative hierarchy have granted these localities flexibility and adaptability, which allows them to adapt quickly to a changing environment.

From the supply side, the Great Suzhou Area has three advantages. First, it enjoys proximity to Shanghai, with convenient communications with Shanghai by way of railroads, waterways and highways. Second, being part of the Sunan region (literally the southern part of Jiangsu Province), it also has a historical legacy of strong local government, which can be traced back to before the Chinese Communist Party took power when modern industrialization started to arise in this region [47]. Third, the Great Suzhou Area also belongs to the cultural and historical area of Jiangnan (south of the Yangtze River), which is renowned for its standard of living and labor dexterity.

The cross-border movement of Taiwanese IT firms has made the Great Suzhou Area into one of the major players in the global IT industry. In 2003, this area alone produced 10 million laptop units, accounting for about a quarter of the world's total [48]. Taiwanese IT firms as a whole have also contributed to the rapid growth of the IT industry in China. In China's annual statistics, in the category of electronics and communications equipment manufacturing, foreign firms, mostly Taiwanese, accounted for 71.57% of the entire production value, 65.39% of value-added, and 72.21% of the sales value in 2000 [49]. As a result, China has become the second-largest IT producer in the world since 2002 [50].

5. Kunshan as the institutional innovator

5.1. The development of Kunshan model

In the process of local state transformation, Kunshan was among the first to take initiatives in institutional innovations. Since the mid-1980s, Kunshan has initiated a number of institutional reforms to improve local development conditions. First, it implemented an urban plan that envisioned further improvement in urban infrastructure and provided substantial land for industrial and population growth. According to this plan, it established the "Kunshan Economic and Technological Development Zone" (KETDZ), which was the first industrial park initiated and funded by local government. Second, in order to bring investment into this development zone, it persuaded several state-owned enterprises in Shanghai to set up branch factories in KETDZ, utilizing "tong-xiang" quanxi (interpersonal relationships based on the experience of being born and growing up in the same hometown). Third, by using social networks based on tong-xiang quanxi, it also successfully invited several high-ranking officials and well-known scholars, including Vice-Premier Zou Jia-Hua, Jiangsu Governor Han Pei-Xin, sociologist Fei Xiao-Tong and economist Xue Mu-Qiao, to visit KETDZ, to generate publicity and to receive more preferential treatment from the central and provincial governments. Fourth, in order to secure capital for local development, it also negotiated successfully with the provincial government to increase local retention of revenue. Fifth, it provided favorable policies to attract educated workers. From 1984 to 1993, the Kunshan government recruited about 7000 college and professional school graduates [51]. Due to these entrepreneurial efforts, Kunshan experienced rapid growth during the 1980s. By 1989, KETDZ had become the third largest in terms of production value, compared with the other 14 "Economic and Technological Development Zones" (ETDZs) endorsed by the central government [52].

To seize the opportunities generated by the opening-up of Shanghai, from the early 1990s, Kunshan began to reorient its targets, from domestic investment to foreign investment. There were two main aspects to this reorientation. First, Kunshan adopted a development strategy called "staggered position" (tsuo wei) to differentiate itself from Shanghai. According to the decision of the Chinese Communist Party's 14th Congress in 1992, Shanghai was positioned as the hub of the Yangtze River Delta (denotes the region surrounding the mouth of the Yangtze River), "by taking the development and opening-up of Pudong as the head…to build up Shanghai as one of global economic, financial and trade centers, to drive the Yangtze River Delta and the whole Yangtze River basin with an economic leap." [4] Kunshan's Party Secretary at that time, Li Quan-Lin, now the Vice-Governor of Jiangsu Province, suggested that Kunshan's objectives should be separated from those of Shanghai, meaning that if Shanghai focused on commerce, finance and trade, then Kunshan should focus on manufacturing.

Second, Kunshan was also among the first in the Great Suzhou Area to grant land to foreign investors. It invented a "land-granting system," which was innovative both in terms of property rights transfer and land development. To maintain the state-owned status of land, it granted only the land-use right to foreign investors for use fees in return. With the injection of these fees, it initiated a self-financing development process, in which investors brought in capital for the improvement of infrastructure and land conditions, which then attracted more investors, which then brought in more capital, which then triggered a new round of infrastructure construction.

[4] *The People's Daily*, Oct. 12, 1992: "Speed up the pace of reforming/opening-up and modernization construction to capture bigger victory in capitalism undertaking with Chinese characteristic: Jiang Ze-Min's Report in the CCL's 14th Congress".

Please cite this article as: C.-K. Lee, How does a cluster relocate across the border? The case of information technology cluster in the Taiwan–Suzhou region, Technol. Forecast. Soc. Change (2008), doi:10.1016/j.techfore.2008.07.005

Table 2
Anchor tenants in Kunshan

Anchor tenants	Establishment time (in China)	Major products	Top 1000 enterprise ranking in Taiwan (2003)
WUS Printed Circuit	1992	PCB	270
Honhai	1995	Desktop, motherboard, handset	2
Unicap Electronics	1997	PCB	461
Nan Ya	2000	PCB	49
Mitac	2000	Notebook	34
Compal	2000	Monitor, notebook, handset	6
Coretronic	2000–2001	LCD module	62
Wistron	2001	Desktop, notebook, handset	17
Twinhead	2001	Notebook	247
Micro-Star Intl.	2001	Motherboard	21
Ritek	2001	CD-R	59

5.2. From entrepreneurs to service providers

The local states also became targets of transformation. In the old model, the local states were themselves business corporations, so governmental resources to some extent could be regarded as corporate resources [53]. But in the Kunshan model, the new economic actors were foreign-invested enterprises (FIEs) that were partially to wholly owned by foreign investors, not by local government, so it was imperative to redraw the boundary between governments and enterprises, and to redirect the use of governmental resources toward meeting the needs of FIEs.

Kunshan adopted two strategies. The first was the "business friendly" (chin shang) strategy, which aimed to cater to a variety of needs and interests of FIEs by providing customized services, from choosing an appropriate site, to applying for investment approval, to winning preferential treatment, to building factories, to recruiting labor, to importing materials, to exporting final products, even to personal services. A journalist reported that the director of Kunshan's industrial park received a phone call at midnight from a Taiwanese investor's wife, asking him to find her husband, with whom she had lost contact during his trip to Shanghai. The director then sent three cars to search for this Taiwanese man, along three major roads that link Kunshan to Shanghai, and found the man asleep from exhaustion in his car.[5]

The second was the "anchor tenant" strategy for alluring more investors. An anchor tenant means a tenant that has the leadership or attraction to bring in followers, as well as raise the publicity of an industrial park. Therefore, by using such a tenant as the anchor, a local government would be able to pull in a series of firms that have close relationships with this tenant. Kunshan was the first to implement this strategy, which it called "chain-like investment-pulling" (lian tiau shih jau shang). In order to capture the anchor of a chain, the Kunshan government would provide the anchor with preferential treatment in terms of land price, tax exemption, infrastructure support, and administration services. After having successfully dragged in an anchor, the Kunshan government then targeted downstream and upstream firms connected to this anchor along its supply chain to persuade them to follow suit.

However, one anchor tenant is not enough for an industrial park that is able to accommodate thousands of firms. Therefore, the Kunshan government not only endeavored to pull in more anchors in a specific industrial sector, once they had successively pulled in one anchor in that sector, but also strived to attract anchors from other sectors. By broadening its industrial base across several sectors, by the early 2000s, Kunshan had successfully attracted anchors from the printed circuit board (PCB), motherboard, desktop, notebook, liquid crystal display (LCD) and handset industries (Table 2).

5.3. Institutional building

From 1994 to 1997, Kunshan encountered a bottleneck in investment-pulling. Its annual FDI held at US$500 to 600 million, arousing a sense of crisis among local cadres. They started to consult Taiwanese investors, and one of their main advisors, Wu Li-gan, suggested that they emulate Taiwan's Hsinchu Science Park in order to improve the export environment. The common practice for exportation was the so-called "955," which requires manufacturers to deliver 95% of their final products into the hands of customers within five days of receipt of the order.[6]

In response to the introduction of Taiwanese investors, Kunshan's political leaders stepped on a pilgrimage to Taiwan. The group included Kunshan's secretary of committee for the Communist Party of China, Zhang Wei-kuo, and the director of KETDZ, Hsuan Bing-lung.[7] Zhang and Hsuan visited Taiwan's export processing zones (EPZs) and the Hsinchu Science Park four and six times respectively, in order to gather information from Taiwan's officers. So many documents and materials were collected that they were carried home in "gunnysacks." They also invited retired Taiwan officers to Kunshan to discuss their experiences. For example, Yu Kuang-ya, the former director of Kaohsiung EPZ, was invited to Kunshan to lecture about the development of Taiwan's EPZs.

[5] *Nanfang Weekend*, Nov. 20, 2004: "The Eye-opening 'Suzhou Phenomenon' in the Political Circle".

[6] This was set by global buyers, such as Compaq, HP and IBM, as they embraced the Build-to-order model to outsource according to customers' orders. In order to meet this requirement, contract manufacturers have to build up a highly speedy and flexible production system to make the process of procurement, production and distribution as fast as possible.

[7] Wu Li-gan introduced some of his old friends, high-ranking Taiwanese officers, including the director of the Export Processing Zone Administration in Taiwan.

Please cite this article as: C.-K. Lee, How does a cluster relocate across the border? The case of information technology cluster in the Taiwan–Suzhou region, Technol. Forecast. Soc. Change (2008), doi:10.1016/j.techfore.2008.07.005

Table 3
Comparison of EPZs and FTZs

	EPZs	FTZs
Starting time	2000	1991
Number	38	15
Functions	– Export processing	– Export processing – Trade – Warehouses – Showrooms
Administrative level	– Administration: local government – Customs: Customs General	– Administration: local government – Customs: Customs General
Management	– Closed, gated zone – 24-hour customs services	– Open zone – 8-hour customs services
Tax policies	– Tax free for exported goods and services – No collection and no return	– Tax free for exported goods only – First collection and then return
Contract review and filing	– One stop shop	– Several procedures due to bureaucracy
Import/export declaration	– Via electronic measures by EDI	– Via manual measures by "export processing registration manual"
Custom procedures	– One unified process in declaration, approval and examination – No inspection during trans-shipment	– Discrete processes in declaration, approval and examination – Manual inspection during trans-shipment

Source: China Export Processing Zone: http://www.cepz.com.cn/.

After having absorbed the Taiwanese experience, they made another pilgrimage to Beijing to persuade the central government to allow Kunshan to set up an EPZ. According to Hsuan, he visited Beijing 84 times, meeting with eight leaders of ministries with responsibilities ranging from customs, taxes, foreign trade and investment, to Taiwanese affairs [46].

By 2000, Kunshan finally received the endorsement from the central government, which selected Kunshan and 14 other cities to be included in the first group of experimental sites for establishing EPZs. Compared with free trade zones (FTZs), which were introduced to China in the early 1990s, EPZs have enjoyed an overwhelming advantage of "speed." First, they specialize in export processing with non-stop customs services in gated zones, which granted them higher efficiency and security, as opposed to FTZs, which are troubled with overly diverse activities in open zones with only eight-hour-a-day customs services. Second, they streamline as many procedures as possible, from tax collection, contract review and filing, import–export declaration, to custom procedures, which have already reached state of the art in China when it comes to streamlining. Third, they adopt primarily electronic measures in routine operations, which improve bureaucratic efficiency tremendously, as opposed to manual measures (Table 3).

After the establishment of the EPZ, Kunshan immediately resumed its growth momentum in attracting FDI. Its contracted FDI doubled from 2000 to 2001, and then re-doubled from 2001 to 2002. This success soon attracted a number of followers, as well as competitors. According to CEPZ, a portal for China's EPZs, by 2003, the central government in China had approved 38 EPZs, of which about half were concentrated in cities and provinces around Kunshan.

6. BenQ as the system builder

6.1. Site selection

As described in the previous section, by the early 1990s, local states in the Great Suzhou Area had completed preparation and reorientation and were ready to accommodate foreign investment. They had developed industrial parks and the necessary infrastructure, earned preferential policies from the central government, and created a quasi-market of industrial land for foreign investors. In the Chinese saying, "everything is ready except the east wind," the east wind being foreign investors. Therefore, on the surface, Taiwanese investors seemed to have free will to choose from several sites offered by numerous local states in China, but in fact, they were attracted by only a small number of local governments, which had shown their sincerest intention and greatest ambition in attracting foreign investment at that time.

BenQ was among the first cohort of Taiwanese investors in the Great Suzhou Area. In order to screen possible sites located throughout the vast area of China, it organized an "expedition team," led by Lee Kuen-Yao (the Chief Executive Officer of BenQ) and a manager who had experience in selecting and building overseas production sites for BenQ. The members of the expedition team began their selection tour from the Shenzhen region, but very soon they screened it out, based on three points. First, although the Shenzhen region enjoyed the first mover advantage in attracting foreign investment, due to a lack of experience in planning and management in the beginning stages, industrial parks in the Shenzhen region tended to be disorganized and chaotic. Second, almost all the labor, including managers and workers, came from provinces outside the Shenzhen region, considered to be a disadvantage for the long-term development of the region. Third, the chaotic situation in the industrial parks and the influx of immigrant labor continuously deteriorated the environmental quality of the Shenzhen region, a factor viewed as detrimental to sustainable regional growth.

Anticipating that the economic center of gravity would shift from the Shenzhen region to the Shanghai region, the expedition team targeted the latter. It was wavering between Shanghai and Suzhou; the former was the center of gravity for the region, while the latter had considerable development potential. However, two factors were decisive in selecting Suzhou. First, given that

Please cite this article as: C.-K. Lee, How does a cluster relocate across the border? The case of information technology cluster in the Taiwan–Suzhou region, Technol. Forecast. Soc. Change (2008), doi:10.1016/j.techfore.2008.07.005

tours for three types of suppliers to visit the site directly. After the first round of persuasion, 14 out of 30 suppliers were willing to move. However, this collective movement was not based on a formal agreement, but on a "tacit understanding" between BenQ and its suppliers. One supplier said that although BenQ did not offer any procurement guarantees or equity cross-holdings, he believed that the clustering itself would attract more buyers.

This agglomeration effect did happen after the first group of suppliers moved in. By the late 1990s, more than 20 firms from the same sector had congregated in Suzhou; 7 were system firms like BenQ and 18 were supplier firms. The first challenge these firms faced was to build up local capabilities by training local engineers and workers, a strategy that one Taiwanese manager from BenQ called a "cultivating heart" process because it imbued a set of values, norms and disciplines into the minds of local engineers and workers. To cultivate by doing, BenQ started to move its production from Malaysia to Suzhou, first keyboard, and then monitor and scanner. In the beginning, most production segments were still carried out in Malaysia and only semi-finished products were shipped to Suzhou for assembly. However, after a three-year cultivating period, all keyboard production had shifted to Suzhou, and monitor production in Malaysia had been superseded by that in Suzhou.

Another challenge these firms faced was forming local supply chains by recruiting Taiwanese suppliers, as well as nurturing local suppliers. It was usually the case that the more critical a part or component in a supply chain, the later the supplier of this part or component will move to China. Therefore, in the beginning, many key parts and components had to be procured and shipped from Taiwan. But as the market expanded to a certain point, suppliers of key parts and components were also following their customers. For example, China Picture Tubes, the major supplier of the units that make up the core component of monitors, finally set up a branch plant in Wujiang in 2001. Therefore, by the early 2000s, except for integrated circuits (ICs), almost all the parts and components could be procured locally.

7. Concluding remarks

The Taiwan–Great Suzhou Area experience demonstrates that the institutional embeddedness of an industrial system is as important for promoting regional development at the regional level as it is at the cross-border level. As a governance structure, the industrial system offers a spatial organization for interconnected firms to organize and coordinate their economic activities within and across the border. As a process of regionalization, it unfolds the ways through which regional and trans-regional actors pull together their efforts toward systemic building and institutional innovation. The institutional re/embeddedness of the industrial system is thus the key to the success of both governance and regionalization of cross-border regions.

The case study also shows that the industrial system presents a viable anchor point for bridging globalization and localization. Globalization nowadays witnesses the spatial expansion of production, consumption and distribution, in which globalizers such as multinational corporations transcend the national boundaries to effectively organize their operations globally as well as locally. Yet localization is still significant as the process of real economic, political and social activities. As opposed to simple contrasts such as globalization and localization, or hybrid concepts such as glocalization, the industrial system suggests a substantive prop for holding on to capricious global trends on the one hand, and for linking up local relations on the other.

Yet the institutional re-embeddedness of industrial systems across the border is a mutual construct of both regions, not merely a direct transplant from one region to another. First, whereas intra/inter-firm networks still play a decisive role in governing the industrial system, a new group of agents, the cross-border managerial community, has been gaining governance capacity. This group has spanned its activities across the border to act as a vehicle for transferring capabilities and importing institutions from Taiwan to the Great Suzhou Area. It could be viewed both as a social group within the firm in terms of organizing and mobilizing resources, or as an interest group in the host region in terms of influencing local policies and setting up local agendas. Second, Chinese local states have also emerged as key actors in system and institutional building. Driven by the fierce competition for inward investment, they have spared no efforts in reconfiguring local resources and transforming local environments to cater to the needs of foreign investors. Third, underlying the close collaboration between Taiwanese firms and Chinese local states is the central state's GNP-ism, which evaluates the political performance of local officials based on the local economic growth rate [56]. This has encouraged local officials to develop a short-term view of economic growth rather than cultivating a long-term perspective directed toward technological learning and innovation. Therefore, in order to pursue the sustainable development of the cross-border region, both Taiwanese firms and Chinese local states need to be devoted to build more organic linkages with the locality, politically, economically and socially.

Future research should thus investigate the co-evolution of cross-border regions from the perspective of industrial systems. There are three possible directions for this. First, the re-embeddedness of the industrial system raises the question of how it is to be transfused and rebuilt, and how it is to be governed across the border. It is necessary to make a comparison between the original and the rebuilt industrial system, and observe their changing relationships. Second, China has developed a dualist model during its economic transition, in which the foreign sector has been isolated from the domestic one, while the domestic sector has also failed to develop organic linkages within itself [57]. It is worth investigating the development of the Chinese industrial system and its interactions with the Taiwanese industrial system in the context of cross-border regions. Third, the use of cross-border integration as mechanisms to introduce open-door policies could also been found in other developing countries such as Mexico (see the comparison of China and Mexico in [58]). The Taiwan–Great Suzhou Area case suggests that the Chinese experience differs from the Mexican one at least in two ways. As opposed to Mexico that is lack of a strong state (both central and local), Chinese local cadres have empowered more agency in institutional experimentation and innovation, which grants them the power to create the institutional space for political as well as economic mobilization and collaboration. Based on this, it is thus possible for them to induce the relocation of a whole industrial system like that of Taiwan's IT industry, not only to the Great Suzhou Area, but also to Shenzhen. This is another special feature that characterizes the Chinese experience. Therefore, it is also worth investigating the continuity and change of the Chinese experience vis-à-vis her counterparts worldwide in the future.

Please cite this article as: C.-K. Lee, How does a cluster relocate across the border? The case of information technology cluster in the Taiwan–Suzhou region, Technol. Forecast. Soc. Change (2008), doi:10.1016/j.techfore.2008.07.005

References

[1] C.T. Wu, Cross-border development in Europe and Asia, GeoJournal 44 (3) (1998) 189–201.
[2] M. Perkmann, N.L. Sum, Globalization, Regionalization and Cross-Border Regions, Palgrave, London, 2002.
[3] N.R. Lardy, The role of foreign trade and investment in China's economic transformation, in: A.G. Walder (Ed.), China's Transitional Economy, Oxford University Press, Oxford, 1996.
[4] Y. Wei, X. Liu, Foreign Direct Investment in China: Determinants and Impact, Edward Elgar, Cheltenham, 2001.
[5] C.C. Fan, Of belts and ladders: state policy and uneven regional development in post-Mao China, Ann. Assoc. Am. Geogr. 85 (3) (1995) 421–449.
[6] G.C.S. Lin, Red Capitalism in South China: Growth and Development of the Pearl River Delta, University of British Columbia Press, Vancouver, 1997.
[7] D. Zweig, Internationalizing China: Domestic Interests and Global Linkage, Cornell University Press, Ithaca, NY, 2002.
[8] G. Yeung, Scramble for FDI: the experience of Guangdong Province in Southern China, in: N. Phelps, P. Raines (Eds.), The New Competition for Inward Investment: Companies, Institutions and Territorial Development, Edward Elgar, Cheltenham, 2003.
[9] J. Smart, A. Smart, Personal relations and divergent economies: a case study of Hong Kong investment in South China, Int. J. Urban Reg. Res. 15 (2) (1991) 216–233.
[10] Y.T. Hsing, Making Capitalism in China: the Taiwan Connection, Oxford University Press, NY, 1998.
[11] G. Gereffi, M. Korzeniewicz (Eds.), Commodity Chains and Global Capitalism, Greenwood, Westport, CT, 1994.
[12] D. Ernst, L. Kim, Global production networks, knowledge diffusion, and local capability formation, Res. Policy 31 (8–9) (2002) 1417–1429.
[13] A.J. Scott, New Industrial Spaces: Flexible Production Organizations and Regional Development in North America and Western Europe, Pion, London, 1988.
[14] M. Storper, S. C hristopherson, Flexible specialization and regional industrial agglomerations: the case of US motion picture industry, Ann. Assoc. Am. Geogr. 77 (1988) 104–117.
[15] A. Saxenian, Regional advantage: culture and competition in Silicon Valley and Route 128, Harvard University Press, Cambridge, 1994.
[16] A. Markusen, Sticky places in slippery space: a typology of industrial districts, Econ. Geogr. 72 (1996) 293–313.
[17] U. Staber, Accounting for variations in the performance of industrial districts: the case of Baden-Württemberg, Int. J. Urban Reg. Res. 20 (1996) 299–316.
[18] M. Aoki, The Japanese firm in transition, in: K. Yamamura, Y. Yasuba (Eds.), The Political Economy of Japan, Stanford University Press, Stanford, CA, 1987.
[19] M. Piore, C. Sabel, The Second Industrial Divide: Possibilities for Prosperity, Basic Books, NY, 1984.
[20] A. Saxenian, J.Y. Hsu, The Silicon Valley – Hsinchu connection: technical communities and industrial upgrading, Ind. Corp. Change 10 (4) (2001) 893–920.
[21] A. Arora, V.S. Arunachalam, J. Asundi, R. Fernandes, The Indian software services industry, Res. Policy 30 (8) (2001) 1267–1287.
[22] M. Granovetter, Economic action and social structure: the problem of embeddedness, Am. J. Sociol. 91 (3) (1985) 481–510.
[23] A. Amin, N. Thirft (Eds.), Globalization, Institutions and Regional Development in Europe, Oxford University Press, Oxford, 1994.
[24] M.R. Jones, New Institutional Spaces: TECs and the Remaking of Economic Governance, Jessica Kingsley, London, 1998.
[25] S. Kratke, A regulationist approach to regional studies, Environ. Plann. A. 31 (1999) 683–704.
[26] W. Byrd, Q. Lin, China's Rural Industry: Structure Development and Reform, Oxford University Press, NY, 1990.
[27] S. Ho, Rural China in Transition: Non-Agricultural Development in Rural Jiangsu, Clarendon Press, Oxford, 1994 1978–1990.
[28] TRI, A Survey of Taiwanese IT Industry Layout in Kunshan, Topology Research Institute (Chinese), Taipei, 2002.
[29] TRI, A Survey of Taiwanese IT Industry Layout in Suzhou, Topology Research Institute (Chinese), Taipei, 2002.
[30] TRI, A Survey of Taiwanese IT Industry Layout in Wujiang, Topology Research Institute (Chinese), Taipei, 2002.
[31] J. Y. Hsu, A Late-industrial District? Learning Networks in the Hsinchu Science-based Industrial Park, Taiwan, unpublished PhD dissertation, University of California at Berkeley, Berkeley, CA, 1997.
[32] D. Ernst, What permits David grow in the shadow of Goliath? The Taiwanese model in the computer industry, in: M. Borrus, D. Ernst, S. Haggard (Eds.), International Production Networks in Asia, Rivalry or Riches? Routledge, NY, 2000.
[33] D.S. Chen, Making It Integrated: Organization Networks in Taiwan's Integrated-circuit Industry, Socio Publishing, Taipei, 2003 (Chinese).
[34] A. Grandori, G. Soda, Interfirm networks: antecedents, mechanisms and forms, Organ. Stud. 16 (2) (1995) 183–214.
[35] C.W. Hsu, H. Chiang, The government strategy for the upgrading of industrial technology in Taiwan, Technovation 21 (2001) 123–132.
[36] M. Castells, P. Hall, Technopolis of the World: the Making of Twenty-first-century Industrial Complexes, Routledge, London, 1994.
[37] K. Kraemer, J. Dedrick, C.Y. Hwang, T.C. Tu, C.S. Yap, Entrepreneurship, flexibility, and policy coordination: Taiwan's computer industry, Inf. Soc. 12 (1996) 215–249.
[38] J.A. Mathews, The origins and dynamics of Taiwan's R&D consortia, Res. Policy 31 (4) (2002) 633–651.
[39] M.C. Liu, S.H. Chen, International R&D Deployment and Locational Advantage of Developing Countries: a Case Study of Taiwan, Chung-Hua Institution for Economic Research, Taipei, 2003.
[40] J. Dedrick, K. Kraemer, Asia's computer challenge: Threat or opportunity for the United States and the world? Oxford University Press, NY, 1998.
[41] R. Wade, Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization, Princeton University Press, NY, 1990.
[42] Z.X. She, G. Xu, G. Linge, The head and tail of the dragon: Shanghai and its economic hinterland, in: G. Linge (Ed.), China's New Spatial Economy: Heading Towards 2020, Oxford University Press, Hong Kong, 1997.
[43] P. Werner, Economic Transition in the People's Republic of China and Foreign Investment Activities: the Transfer of Know-how to the Chinese Economy through Transnational Corporations: the Case of Shanghai, Peter Lang, Frankfurt, 2001.
[44] TEEMA, A Survey Report on the Evaluation of Investment Environment and Risks in China, Taiwan Electrical and ELectronic Manufacturers' Assoication (Chinese), Taipei, 2001.
[45] MOEAIC, Statistical Reports of Cross-strait Investment, Investment Commission, Ministry of Economic Affairs (Chinese), Taipei, 2005.
[46] L.C. Po, N. Pun, Making Transborder Governance: a Case Study of Taiwanese Capital and Kunshan's Institutional Innovation, chenghi yu sheji, vol. 15, 2004, pp. 59–91, (City and Design, Chinese).
[47] J. J. Zhang, Marketization and Democracy in China: Two Regional Experiences, unpublished PhD dissertation, University of California at Berkeley, Berkeley, CA, 2003.
[48] Asian Pulse, Suzhou Becomes World's Leading Notebook PC Production Base, Asia Pulse, Sydney, 2001.
[49] X.J. Jiang, Foreign Sector in China's Economy: Its Contribution to Growth, Structural Upgrading and Competitiveness, The Chinese People's University Press, Beijing, 2002 (in Chinese).
[50] MIC, Annual Report on Taiwan's Information Industry 2003, Market Intelligence Center, Taipei, 2004, (in Chinese).
[51] Y.H.D. Wei, Beyond the Sunan model: trajectory and underlying factors of development in Kunshan, China, Environ. Plann. A. 34 (10) (2002) 1725–1747.
[52] S.S. Yang, The Road of Kunshan, Jiangsu People's Press, Nanjing, 1991 (Chinese).
[53] A.G. Walder, Local governments as industrial firms: an organizational analysis of China transitional economy, Am. J. Sociol. 101 (2) (1995) 263–301.
[54] Z.C. Zhang, A Journey of Cultivating Heart: BenQ's Cultural Legend at Suzhou, Tsi-Su, Shanghai, 2003 (Chinese).
[55] CCIS, 2004 Business Group Research in Taiwan, China Credit Information Service (Chinese), Taipei, 2004.
[56] D. Zweig, Development communities on China's coast: the impact of trade, investment, and transnational alliances, Comp. Polit. 27 (1995) 253–274.
[57] J.H. Wang, China's dualist model on technological catching up: a comparative perspective, Pac. Rev. 43 (6) (2007) 1084–1104.