GLOBAL PRODUCTION NETWORKS, STRATEGIC COUPLING AND THE DYNAMICS OF INDUSTRIAL UPGRADING IN THE PEARL RIVER DELTA, CHINA

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SUMMARY

The central focus of this thesis is how strategic coupling between latecomer regions and the global economy affects local industrial upgrading and how institutional and spatial conditions matter during the process of local upgrading. My motivation derives from dissatisfaction with the contemporary literature of global value chain and regional development in explaining industrial upgrading in the Pearl River Delta (PRD) in China.

This thesis argues that latecomer regions strategically couple with the global economy in different ways which lead to dynamic outcomes of local upgrading. In order to explain the dynamics, this thesis conceptualizes a fourfold typology of strategic coupling including: *captive, cooperative, reciprocal and absorptive coupling*. The variety results from different configurations of knowledge gaps and power relations between local actors in latecomer regions and foreign firms in the global economy. This thesis further argues that these knowledge gaps and power relations are not only influenced by inter-firm governance patterns, but also subject to changing capabilities of local firms and institutional-spatial contexts in which they are embedded. The more developed is synergy within strategic coupling, the more upgrading will occur.

This thesis empirically investigates into the development of the PRD from the 1980s to the 2000s and finds that the region has been upgraded from an agricultural backwater into one of the worlds' leading manufacturing hubs. Starting with captive coupling, the PRD's regional trajectory of upgrading has gradually become divergent among different industries.

In the electronics industry, captive coupling has been developed and reinforced whereby foreign invested enterprises (FIEs) dominate the pace of upgrading and the achievement of

local upgrading is limited. In the apparel industry, captive coupling has evolved into cooperative coupling in which local private enterprises have taken over the dominant role of FIEs and achieved substantial upgrading. In the automotive industry, reciprocal coupling has been developed in the form of joint ventures between local state owned enterprises and global automakers under strong national intervention. Process upgrading has been significantly achieved in the joint ventures and their local suppliers. This thesis has yet to identify the formation of absorptive coupling in the PRD, but it would probably be developed in the apparel industry in future. The PRD case demonstrates that the domestic market, regional supply networks and competitive dynamics within global production networks (GPNs) are the most important assets for fostering local upgrading. Successful cases of local upgrading largely derive from the synthesis of various assets, rather than relying on one single type of assets.

The key contribution of this thesis is the conceptualization of causality between strategic coupling and local upgrading based on the case of the PRD. It provides a geographical interpretation of value chain governance and offers a typology of strategic coupling as a critical complement to the GPN framework. The end of this thesis suggests policy makers to devote more attention to local upgrading which should be treated as an ultimate solution for improving regional competiveness, rather than to focus on promoting industrial growth merely.

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ABBREVIATIONS

ATC: Agreement on Textiles and Clothing

CEPA: Closer Economic Partnership Arrangement

CKD: Complete knock-down

CM: Contract manufacturers

DRAM: Dynamic random access memory

EIAD: Electronics Industrial Association of Dongguan

EMS: Electronics manufacturing service

EPE: Export-processing enterprise

FAW: First Auto Work

FG: Flying geese

FIE: Foreign invested enterprises

FSBF: Front shop-back factory

GAERI: Guangzhou Automotive Engineering Research Institute

GAC: Guangzhou Automotive Corporation

GAIG: Guangzhou Automotive Industrial Group

GAIA: Guangdong Apparel Industrial Association

GADA: Guangdong Apparel Designer Association

GDP: Gross Domestic Product

GHARI: Guangqi-Honda Automotive Research Institute

GPN: Global production network

GVC: Global value chain

IC: Integrated circuit

ICT: Information and communication technology

IPR: Intellectual property right

IRB: Institutional Reviewing Board

IVA: Industrial value added

JIT: Just in time

MFA: Multi-Fibre Agreement

NIE: Newly industrialized economy

NIS: National innovation system

OBM: Original branded manufacturer

ODM: Original design manufacturer

OEM: Original equipment manufacturer

PCB: Printed circuit board

PRD: Pearl River Delta

RCA: Revealed competitive advantage

REG: Relational economic geography

R&D: Research and Development

SFR: Small input, fast output, and rolling development

SKD: Semi-completely knock down

SME: Small and medium-size enterprise

SOE: State owned enterprises

SPS: Single-point supply

TNC: Transnational Corporation

TVE: Township and village enterprise

Chapter 1 Introduction

1.1 Why study industrial upgrading in the Pearl River Delta?

Industrial upgrading has been acknowledged as one of the most critical issues for latecomer firms to improve their competitiveness and succeed, when they enter the global economy. As a latecomer region, the Pearl River Delta (PRD) in the People's Republic of China (hereafter China) has been integrated into the global economy since the national 'open-door' reform[1] in 1978. From 1979 to 2009, GDP in this region increased by about 15 - 17% annually (GDSY, 2010).[2] This record has far surpassed that of the four Asian Dragons: Hong Kong, Singapore, South Korea and Taiwan, which grew at around 7% - 8% per year during their economic take-off in the 1960s and the 1970s. The PRD has thus been considered as the fifth Dragon (Chui et al., 1997; Clark and Kim, 1993; Sung et al., 1995). However, whether the region has achieved industrial upgrading is in question. Are local firms upgraded or marginalized over time? How do they get upgraded or fail to upgrade? Theoretically, why should we study industrial upgrading in such a latecomer region and what have we not known yet? A recent episode helps contextualize the importance of these questions.

In February 2011, when Barack Obama met Silicon Valley's top luminaries in a dinner party in California, each guest was asked to come with a question for the President. But when Steven Jobs of Apple spoke, President Obama interrupted and asked a question of his own:

[1] It refers to the program of economic reforms called "Socialism with Chinese characteristics" in China that was started in December 1978 by reformists within the Communist Party of China led by Deng Xiaoping.

[2] The GDP data are at current prices adjusted according to GDP index of Guangdong province in statistics yearbook with 1980 as the base year.

"what would it take to make iPhones in the United States?" Mr. Jobs replied briefly and negatively: those jobs were not coming back. Eleven months after the meeting, a *New York Times* report entitled *How the U.S. Lost Out on iPhone Work* detailed the answer of Mr Jobs (Duhigg and Bradsher, 2012).[3] The report showed that lower wage was no longer the key reason that Apple's products had to be made overseas. It was the speed, flexibility, supply networks and a large amount of engineers (with more than high school but not necessarily a bachelor's degree) that the U.S. plants could not match.

In the beginning of the 2000s, Apple products were largely made within the United States. But by 2004, Apple had turned to overseas manufacturing. By 2011, almost all of the 70 million iPhones, 30 million iPads and 59 million other products Apple sold were manufactured outside the United States. The components of these products were procured from about 160 suppliers, many of which were located in Japan, Korea, Singapore, Taiwan and China.[4] Eventually, these components were assembled by a few contract manufacturers (CMs), particularly by two Taiwanese firms - Foxconn and Quanta in the PRD.

Cited in the *New York Times* report, a former high-ranking Apple executive commented that "the focus of Apple's works in Asia came down to two things: factories in Asia can scale up and down faster and Asian supply chains have surpassed what's in the United States. The result is that we can't compete at this point". The reason was also pointed out by another former high-ranking Apple executive that the whole supply chains are in China now and the speed and flexibility of Foxconn's manufacturing capabilities are 'breathtaking'. The

[3] The *New York Times* report on 21 Jan 2012, available at: http://www.nytimes.com/2012/01/22/business/apple-america-and-a-squeezed-middle-class.html?_r=2&ref=general&src=me&pagewanted=all

[4] Apple's *Report of Supplier Responsibility* in 2011, available at: http://www.apple.com/supplierresponsibility/

comments imply that the story is not all about the manufacturing capabilities of Foxconn, but also involves the supply chains and networks behind it in the PRD.

When Apple delivered their orders to suppliers in Asia, Apple's American suppliers were also moving to Asia as well. Corning Inc. is an American-based supplier of Apple which manufactures large panes of strengthened glass. In the past few years, Corning continued employing more than 1,000 Americans to satisfy the flood of orders for iPhones. But Corning now decided to establish new factories in South Korea and China. Hence Corning could get closer to the assembly plant and save production and logistic costs; and more importantly get closer to its Asian clients which are imitating Apple by using large panes of strengthened glass from Corning. But this relocation did not guarantee Corning's success (Duhigg and Bradsher, 2012).

A local firm in the PRD has been upgraded and is now challenging Corning's position. Competition has arrived from the Lens One Technology Co. (LOT) collocating with Foxconn in Shenzhen. The owner of the LOT is a Chinese engineer who has been working in the glass pane industry in the PRD for about twenty years. Before serving Apple, the LOT was making panes for watches, clockers or components used in electronics products. By learning from Foxconn, the LOT has developed an integrated production system in its relatively smaller industrial parks. Meanwhile, it has heavily invested in precision technologies in strengthened glass making and cutting. These efforts have qualified the LOT's competence. When Apple was developing iPhone 4, the LOT pro-actively contacted Apple and eventually won over large orders of strengthened glass from Corning. By the end of 2010, the LOT had made over 40 million pieces of glass for iPhones 4. Corning's managers complained that Chinese

governments did everything for firms like the LOT and even subsidized all the R&D expenditures. This comment might be exaggerated, but the worry was true.[5]

While the *New York Times* report reflected the anxiety of the American President and manufacturers over the loss of competiveness, the PRD's media and authorities also showed great anxiety over the sustainability of the region. Since the mid-1980s, the PRD has been critiqued for over dependence on labor-intensive industries and lacking in industrial upgrading (Li, 1997; Liang, 1989; Yan et al., 2008). Shenzhen's municipal leaders have repeatedly claimed that the city is facing four challenges of sustainability: land, energy, environment, and population, and thus they must promote industrial upgrading that may not favor labor-intensive firms like Foxconn.[6] A recent local news report argued that the PRD was seriously losing competitiveness due to raising labor wages and living costs.[7] One important sign was that Vietnam replaced the PRD as the largest subcontracting base for Nike's products in 2010. There are also new challenges to PRD's industrial growth, such as shortages of land resources, raising labor wages, environmental degradation and increasing raw material costs and so on (Huang and Chen, 2009). All these problems point to industrial upgrading as an ultimate solution (Yu and Zhang, 2009). Pressures for industrial restructuring and upgrading also increased after the string of suicides in Foxconn's industrial town in 2010.[8]

To mitigate these pressures of restructuring and upgrading, the Guangdong government

[5] Source of LOT's information: a Chinese news analysis from *21 Century Economic Broadcast* published on 17 Sep 2010, at: http://www.21cbh.com/HTML/2010-7-19/4MMDAwMDE4NzM4MQ_3.html

[6] News reports from Shenzhen's official website, available at: http://www.sznews.com/zhuanti/content/2009-04/21/content_3710541.htm

[7] *Yangchen Evening Paper*, news report on 4 July 2011, available at: http://news.iqilu.com/china/gedi/2011/0704/500882.html

[8] The Foxconn suicides occurred between January and November, 2010, when eighteen Foxconn employees attempted suicide with fourteen deaths. See a detail analysis on *Financial Times* by John Gapper on 21 Sep 2011, at: http://www.ft.com/intl/cms/s/0/9f0fb872-d88e-11e0-8f0a-00144feabdc0.html#axzz1lhi1lwn9

has tried to transform the PRD from a low-cost manufacturing site into a high-end manufacturing zone since the mid-2000s. In 2008, a policy named 'dual transformation' was launched specific for promoting regional upgrading.[9] It aims to relocate low value-added industries from the PRD to peripheral areas within Guangdong Province; and to attract higher value-added industries and talents to the PRD. This policy is informally phased as the strategy of 'emptying the cage for new birds'.[10] For the first time, industrial upgrading officially has become a regional political imperative. Although doubting 'where the new birds are', local cadres have actively enforced this policy for seeking the alleged 'good sake' of regional economy, as well as the advancement of local cadres' own political careers. By March 2011, official reports had asserted that the progress of regional upgrading was 'satisfactory'. 35 designated industrial parks in Guangdong had been built in the past three years which accommodated about 2,000 firms relocated from the PRD. These firms produced a total industrial output of 200 billion *yuan* in 2010. A large area of land was vacated to create space for establishing new industries, but the actual figure was not disclosed.[11]

The above episode implies that, during the restructuring of Apple's global production network, the PRD has improved its regional manufacturing capabilities by developing certain competitive edges beyond the advantages of lower wage costs. This improvement has enabled the region to manufacture some high value-added products like iPhone, rather than processing only cheap and undifferentiated components. However, this contrasting view of the competitiveness of the PRD has opened up some critical questions. How does the PRD

[9] It means moving low skilled labor out and attracting new talents in. see: http://www.gd.gov.cn/gdgk/gdyw/201106/t20110617_144739.htm

[10] It means releasing lands from low value-added manufacturing to accommodate more high value-added industries (see http://www.gd.gov.cn/ghgy/ywsd/201108/t20110831_148650.htm).

[11] An official news report on the progress of regional upgrading, available at: http://www.gov.cn/jrzg/2011-03/25/content_1831697.htm

manage to develop such competitiveness? Are foreign firms (e.g. Foxconn) the key contributors to this accomplishment? Is local upgrading (e.g. the LOT) significant? Do regional policies play a positive or negative role during the upgrading process?

Before answering these questions, a common thread should be pointed out that: industrial upgrading in the PRD is not a self-contained process within a single firm, but involves firms and non-firm actors at different geographical scales. There are *foreign firms* like Apple's subcontractors, Foxconn and Corning that have further embraced developing regions as an important part of their business. There are *local firms* like the LOT that has experienced upgrading through working for foreign firms. There are also *pro-active local and regional states* that try to accelerate the pace of regional upgrading by manipulating territorialized resources, such as land and policies. The engagement of these actors becomes as a critical context in which industrial upgrading should be reexamined. Will the engagement produce a different outcome of upgrading comparing with the circumstances in developed regions? How does this difference inform us about existing theories and research in economic geography? All these questions become my primary motivation for investigating into industrial upgrading in such a latecomer region in China.

1.2 Missing links in the literature of industrial upgrading

Industrial upgrading refers to a process that firms move from processing simple items to conducting higher value-added activities in their portfolio of operations such as manufacturing complex parts and products, constructing integrated production systems, conducting research and development activities, brand creation or marketing and so on. Examining the progress of latecomer (local) upgrading is a critical issue because it determines

whether a latecomer firm can sustainably survive in intensifying global competition. If the firm fails to upgrade, it tends to be marginalized at a truncated position making undifferentiated and low value-added products. Sooner or later, it will be replaced by other low-cost producers.

There are four types of upgrading: product, process, functional and sectoral upgrading (Humphrey and Schmitz, 2002b). Recent studies, mainly in the global value chain (GVC) literature, argue that the mechanism of local upgrading is related to a process of knowledge diffusion from global lead firms to their suppliers. Global lead firms have dominant governance power over suppliers in their value chains. They tend to offer limited upgrading opportunities in order to prevent nurturing suppliers that may mature and become their new competitors (Gereffi et al., 2005; Humphrey and Schmitz, 2001). Under this asymmetrical power relationship, local firms are at a disadvantaged position. But they may launch collective action to increase bargaining power or to pursue indigenous innovation with the help of state institutions (Giuliani et al., 2005; Hobday and Perini, 2005; Lundvall, 2007; Schmitz, 2004; Viotti, 2003). Is this the necessary destiny of latecomer firms in the pursuit of upgrading? By probing into both geographical and non-geographical studies, this thesis has identified some important missing links in the existing literature that can shed light on an alternative understanding of latecomer upgrading (Chapter 2).

Within the discipline of economic geography, there is a wide range of studies that have already documented (dis)industrialization, regional development, industrial clustering, global industrial shifts and the changing geographies of production (see the series reviews in Bathelt, 2003, 2006; Bathelt and Glückler, 2005; Reimer, 2007; Yeung, 2000, 2001, 2002b). However,

none of these analyses takes industrial upgrading as the central analytical concern, but instead tackles some related issues such as learning, innovation and industrial restructuring. They also do not bring together intra- and extra-forces that shape regional development to examine the process of upgrading in the context of global integration.

Beyond the discipline of geography, industrial economics, economic sociology and development studies have paid tremendous attention to revealing the typologies, mechanisms, trajectories and politics of upgrading with both empirical and theoretical depth (Gereffi, 1999; Gereffi and Frederick, 2010; Gereffi et al., 2005; Giuliani et al., 2005; Humphrey and Schmitz, 2002b; Ozawa, 2005; Schmitz, 2004). However, these studies tend to hold a either firm-centric or state-centric view toward industrial upgrading and explain it under a rigid analytical trajectory. Scholars in the GVC literature argue that local upgrading is ultimately determined by the patterns of inter-firm governance whereby global lead firms define the local upgrading of their suppliers. Development studies keep emphasizing the role of states in promoting indigenous innovation against the control of lead firms. But in what ways will different inter-firm or firm-state relations impact local upgrading? More importantly, these studies have yet to acknowledge the influence of geographical factors, such as local (social or cultural) contexts, regional assets (labor, nature resources and markets), and competitive dynamics in the global economy. In other words, this thesis finds that the analytical driver of the geography of industrial upgrading is unclear (Chapter 2). Geography here does not mean the spatial structure of industrial upgrading, but rather refers to the ongoing process in which multi-scalar forces produce an outcome of upgrading under certain economic and institutional contexts. The synthesis of two different strands of literature above identifies two missing

links.

First, in the context of a globalizing region, industrial upgrading is not a purely autonomous or self-contained action of a single firm, but should be related to the collective endeavor of a group of actors which are interconnected through the process of global integration. However, we have not known much about how different patterns of integration between latecomer regions and the global economy would affect the outcomes of local upgrading.

Second, the earlier works have found the power asymmetry between lead firms and local suppliers within value chains, but these works have yet to recognize influences from the institutional and spatial contexts in which the value chains are embedded. These institutional-spatial conditions may underpin local firms and reshape their asymmetrical power relations. The power dynamics of local upgrading remains unclear.

How can these missing links be resolved? I argue that a broader analytical framework is needed. For this purpose, this thesis draws upon an analytical framework in recent geographical studies which attempt to identify the right balance of the internal and external forces that shape regional development in globalization (Coe et al., 2004; Henderson et al., 2002; Pike, 2007; Poon et al., 2006). These efforts have conceptualized the integration between latecomer regions and the global economy as a process of *strategic coupling*, referring to "a mutually dependent and constitutive process involving shared interests and cooperation between two or more groups of actors who otherwise might not act in tandem for a common strategic objective" (Yeung, 2009a: 332). This strategic coupling is considered as a key mechanism to the rapid growth of latecomer regions in East Asia in which local

firms and nation states coordinate, mediate, and arbitrage regional assets to meet TNCs' demands (Coe et al., 2004; Yang, 2009; Yeung, 2009a). This concept enables this thesis to analyze both economic and institutional (political or social) influences from firms or non-firm actors (state institutions) in the process of local upgrading. However, its current conceptualization is a bit fuzzy. The typology of strategic coupling remains ambiguous and we have not known sufficiently how local upgrading occurs in strategic coupling. Situated in such an intellectual context, my thesis attempts to fill in a theoretical gap in the understanding of the casual relations between strategic coupling and industrial upgrading.

1.3 A relational perspective on industrial upgrading

The key research question driving this study is how strategic coupling between latecomer regions and the global economy affects local upgrading. Drawing upon the empirical case of the PRD, my research objectives are threefold. First, I examine how industrial upgrading takes place in the region through the process of strategic coupling and who the key drivers are. Second, I identify the types and evolution of strategic coupling developed through multi-scalar forces. Finally, this thesis attempts to explain the outcomes of local upgrading in relation to the variety of coupling as well as the alternative pathways of local upgrading under different institutional-spatial conditions.

The analytical tool this study deploys is a relational perspective in economic geography (see Chapter 3). The relational perspective focuses on the role of networks (actors and structures), relationality and power relations between economic actors in shaping the organization of economic activities over places (Bathelt and Glückler, 2003, 2011; Boggs and Rantisi, 2003; Jones, 2009; Yeung, 2005). The process of upgrading is relational because

when and where a firm decides to upgrade is subject to diverse influences embedded in intra-, inter- and extra-firm relations. On the one hand, these relations provide various channels for firms to accumulate the necessary resources for upgrading. On the other hand, implementing an upgrading action may receive supports or constraints from other stakeholders that may be suppliers, customers, strategic partners or other institutional actors (e.g. governments). Studying these relational features is not novel in economic geography. My effort is to examine especially the influences of these relational effects on local upgrading.

The relational perspective is an appropriate analytical tool for this study. It highlights actor specificity, relationality and the embeddedness of economic relations in institutional-spatial contexts. Hence, it enables this study to consider extra-firm influences together with inter-firm governance conceptualized in the GVC literature. Meanwhile, the relational perspective does not treat power in an absolute or pre-determined manner, but rather views it as a relational effect subject to different conditions or contexts embedded in economic, social or political fabrics. More specifically, it is subject to the mutual interests and possessed resources of actors. In such a way, this perspective guides my study that considers the influences from multi-scalar forces and power dynamics among different actors for pursuing respective aims of upgrading. Adopting this perspective, however, we should be aware of two potential problems. On the one hand, networks per se do not lend to causal explanation. On the other hand, students of this perspective should avoid being preoccupied by network-privilege analysis (see a detail critique in Sunley, 2008).

This thesis proposes the *central* argument that industry upgrading in a globalizing region

is mainly driven by strategic coupling which in turn is constituted by the interactive effects among local firms, foreign firms and regional institutions. The upgrading outcomes depend on the evolutionary patterns and power dynamics of strategic coupling. A fourfold typology of strategic coupling is conceptualized as the explanatory variable for understanding upgrading, including *captive coupling*, *cooperative coupling*, *reciprocal coupling* and *absorptive coupling*. This variety of strategic coupling is derived from the different configurations of technology and market gaps between local firms and foreign firms:

- When both technology and market gaps are large, *captive coupling* tends to be developed whereby foreign firms fully define local upgrading. The deeper local firms are captive to foreign partners, the faster will upgrading be facilitated.
- When technology gap becomes small but market gap is still large, *cooperative coupling* is formed through which local firms work for foreign firms under moderate power relations. The more developed are their complementarity and mutual interests, the higher is the potential for upgrading.
- When market gap becomes small but technology gap remains large, *reciprocal coupling* can be developed. Firms couple for exchanging technology and market resources possessed exclusively by each partner. Under this nuanced situation, the more balanced are power relations, the more synergy is there for upgrading.
- When both gaps are small, *absorptive coupling* can possibly take place in which local firms work with foreign firms to absorb knowledge and implement local upgrading autonomously. The more capable are local firms of multi-tasking within GPNs, the more will upgrading occur.

The primary concern of local firms is to reduce the gaps with foreign firms so that they can move away from captive coupling and eventually achieve absorptive coupling. However, as interpreted in the last section, previous studies mainly believe that lead firms have overwhelming power in defining the pattern of governance and the gaps (Bair, 2005; Gereffi et al., 2005; Pietrobelli and Rabellotti, 2011). Local firms have little power to bargain with lead firms, unless they invest heavily in indigenous innovation or launch joint actions (Clark and Kim, 1995; Giuliani et al., 2005; Hobday, 1995; Schmitz, 1999, 2004). Contrary to this over-deterministic view of governance and upgrading, this thesis offers an alternative understanding by examining the casual relations between coupling and upgrading.

Although the governance pattern is defined and enforced by global lead firms, local firms may mobilize resources embedded within specific institutional-spatial contexts to leverage the control of lead firms. This local initiative does not necessary challenge the power of lead firms. In contrast, local firms may bypass the power or leverage the power by fostering more synergy with lead firms. Hence lead firms may be willing to share more or co-develop knowledge with local firms. Therefore, although the pattern of industrial governance does not change, local firms may be able to develop different types of strategic coupling, thus achieving various forms of industrial upgrading, particularly functional upgrading. The possibility depends on the availability of assets at different scales (local, regional, national and global). This thesis aims to exemplify this mechanism of local upgrading.

There are two main empirical tasks for this study to accomplish: (1) to examine the formation of strategic coupling in the PRD and the correspondent outcomes of upgrading; (2)

to identify the institutional-spatial conditions that enable local firms to leverage the governance power of lead firms. In doing so, this thesis contributes to the literature in three ways (see details in Chapter 9). First, the relational framework provides a more realistic account for investigating into the geography of industrial upgrading beyond the GVC literature. Second, the typology of strategic coupling serves as a critical supplement to the GPN studies as well as relational economic geography. Last but not the least, this thesis offers alternative strategies of upgrading beyond the limited options provided in the governance literature and development studies.

1.4 Empirical contexts

The PRD is the largest alluvial delta in Guangdong Province in China (see Figure 1.1). In 1985, the PRD area was officially named as an economic-open zone with specific economic privileges, including 4 cities and 13 counties. In 1994, the PRD was extended to 9 cities and 6 counties. The Greater-PRD (GPRD) was conceptualized later referring to the PRD plus Hong Kong and Macao. In 2003, Guangdong provincial governments proposed a concept of the "Pan-Pearl River Delta" (PPRD) to represent a much broader economic area which includes eight provinces, one autonomous region, Hong Kong and Macau which are connected by the drainage area of the Pearl River. In this thesis, the PRD only refers to its economic definition as the area of the Delta in 1994. After rounds of adjusting administrative divisions, the PRD currently includes 9 cities and 10 counties with an area of 41,698 km^2 (see Figure 1.2).

Figure 1.1 location of the Pearl River Delta in China

Source: adapted from China's Regional Development Report (Li & Fund, 2011:7).

Figure 1.2 Urban structure of the Pearl River Delta in China

Source: compiled by author.

The PRD had a long tradition as a national window of foreign trading for hundreds years due to its geographical location: close to Southeast Asia and far from the political center of China. It was a national foreign trading port and also the origin of the Chinese diaspora widely scattered in North America, Europe, and South East Asia (Cartier, 2001; Johnson and Peterson, 1999; Lin, 2004; Skinner, 1985). However, during the period of Mao Zedong (1949–1976), the PRD was disfavored by the central government in terms of state investments and other preferential industrial policies. The main reason was because of its location at a vulnerable costal frontier with undesirable proximity to the capitalist's enclaves of Hong Kong and Macao. Moreover, this region lacked basic industrial and natural resources to support heavy industries which were selected as strategic industries in national development schemes at that time (Yang, 1990). From 1949 to 1979, state owned enterprises (SOEs) in Guangdong only received 2.2% capital investments from the central government (Sit and Yang, 1997: 195). These deliberate policy actions of the central government resulted in the PRD's lack of regional assets, such as a strong industrial base, at the eve of the Open-Door reform in 1978.

After 1978, the central state strategically turned to reshape the PRD into a vanguard of China's national economy for export-orientated industrialization. Most of the marketization policies were implemented here first and then transferred to inner regions once the policies worked well (Enright et al., 2005; Wu, 2005).

At a national scale, instead of giving financial or material supports, China's post-reform regime gave the PRD greater leeway than its peer regions to practice market forces, attract foreign direct investment (FDI) and promote exports, thus integrating with the global

economy. This institutional leeway satisfied both the interests of local initiatives and global capitalists so that they could practice capitalism without violating relevant laws about public ownership in China (Chen and Pu, 1999; Enright et al., 2003; Ning, 1998; Xu, 1988). This national liberalization policy was framed as the 'Lead One Step Ahead' policy and resulted in a specific form of 'Red Capitalism' in China in which market logics of capitalism were practiced in the name of market socialism (Lin, 1997; Vogel, 1989). As shown in Table 1.1, the liberalization policy decentralized great autonomous power to Guangdong, particularly to the PRD in a very flexible manner, such as the central-local fiscal arrangement (Sung et al., 1995).

Table 1.1 The 'Lead One Step Ahead' policy framework

Category	**Contents**
Five-year fiscal plan	· fixed sum of 1 billion *yuan* per year, while all the remaining revenues are kept for its own use; · self-reliant in respect of investment; · a bigger share of foreign exchange earnings; · renewed annually with minor changes
Power decentralization	· greater planning power at provincial level · allowed to access the global economy via Hong Kong connections; greater authority to approve foreign investment projects;
Special economic zones	· Shenzhen and Zhuhai; · lower taxation for foreign firms; · larger jurisdiction in policy reform;
Financial system	· allowed to set up independent provincial investment company, greater authority in commerce;
Labor	· greater power in labor management including reforming its labor system and the power to raise bonuses above the national level;
Price system	· greater power in pricing at provincial and urban levels;
Corporation	· encouraging the development of township-village enterprises;

Sources: Chen and Pu, 1999; Vogel, 1989; Sung et al., 1995.

Another reason for the PRD to be chosen for economic reform is its geographical location and underdeveloped industries base. As locating far away from the political center,

which was regarded as a disadvantage before the opening reform, the PRD was considered as an appropriate place for practicing marketization within the socialist state of China. Any possible failure of the reform within this region would not generate devastating effects on the mainstay of China's economy. The region also has geographical proximity to the capitalists' enclaves of Hong Kong and Macao located in the edges of the PRD. This locational advantage makes it easier to attract foreign investments. The insignificance of the PRD's industrial base was also an advantage. Because the PRD almost had no heavy or complex industries, attracting foreign investments would not create much pressure for local economic restructuring. Moreover, to a certain degree, the PRD is not as indispensable as other regions, such as the Yangzi River Delta (YRD) which was regarded as the economic center of China, the industrial heartland in North East China (e.g. heavy industrial base in Manchuria), and even the inland industrial base in South West China (Xu and Li, 1990). Apart from these institutional and geographical factors, the existing overseas social connections also served as a regional asset that facilitated the industrialization of the PRD. These connections had been constrained before 1978. Encouraged by both central and local authorities, these social networks had effectively brought in foreign investments after the 1978 reform. These investments were mediated by oversea Chinese residing mainly in Hong Kong, Taiwan, South East Asia and North America (Hsing, 1996; Lin, 1997; Sung et al., 1995).

After three decades of rapid industrialization, the PRD was transformed from an agricultural backwater into one of the world's leading manufacturing hubs. Dozens of industrial clusters have been developed in various sectors, such as electronics, home appliance, telecommunication equipment, toy, automobile, watch and clock, textile, apparel,

footwear, plastics, ceramics and biochemical and so on (Enright et al., 2005; Sung et al., 1995).

Table 1.2 Economic profile of the PRD in China

Items	**PRD**	**Percentage of GD**	**Percentage of China**
Land Area (km^2)	54733	30%	0.57%
GDP (billion, *yuan*)			
1980	12	48%	2.6%
1990	101	65%	5.4%
2000	842	78%	8.5%
2009	3215	81%	9.5%
Utilized foreign investments (billion, USD)			
1980	0.1	46%	4.8%
1990	1.3	61%	12%
2000	10.4	72%	17%
2009	17.5	90%	19%
Export Value (billion, USD)			
1980	0.6	28%	3.4%
1990	18	80%	29%
2000	85	92%	34%
2009	342	96%	28%
Total population (million, persons)			
1990	23.7	40%	2.1%
2000	42.9	57%	3.3%
2009	47.9	50%	3.6%
Total employed labor(million, persons)			
2000	19.1	48%	2.6%
2009	32.6	58%	4.2%
Total Retail Sales of Consumer (billions, *yuan*)			
2009	1084	73%	8.2%

Sources: Guangdong Statistic Yearbook in 2010, 2001, 1995; the Pearl River Delta and the Yangzi River Delta Statistic Yearbook 2010; National Statistic Yearbook of China in 2009, 2001.

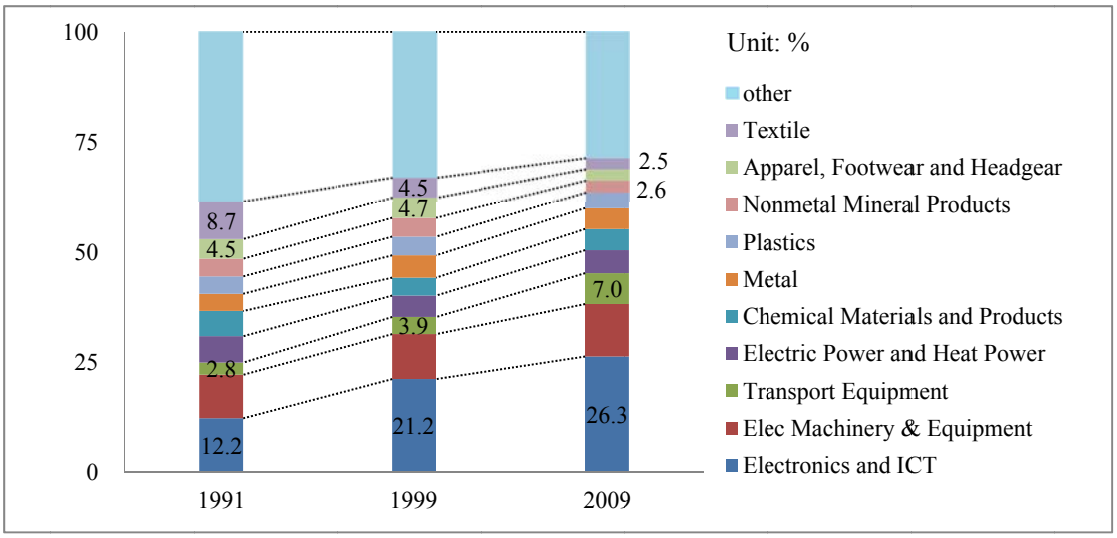
The achievement of industrial growth is significant. Indicators in Table 1.2 above show that the PRD has become a frontier of the national economy. In the terms of GDP, the PRD's share in Guangdong Province increased from 48% in 1980 to 81% in 2009 and from 2.6% to 9.5% share in China. During this process, the PRD served a key platform of foreign investment and trading of the country. Most of the foreign investments of Guangdong

agglomerated in the PRD: from 41% in 1980 to 90% in 2009. The tendency of export-oriented industrialization was apparent. The export value of the PRD sharply increased in the past decades. By 2009, the PRD had accounted for almost the entire export (96%) of the province and some 28% of the national export value at the same time.

Along with the remarkable economic growth, the industrial structure of the PRD has been changed in favor of industries with higher value added, such as information and communication technology, electronic machinery and equipment, electronics and transportation equipment (see Figure 1.3). During the 1980s, the PRD mainly relied on light and traditional manufacturing industries to kick-start industrialization such as the textile, apparel, footwear, toy or electronics industries. Since 1990s, three key industries showed the tendency of regional restructuring and sectoral upgrading. As the cornerstone of the regional economy, the electronics industry (including electronics product, ICT and electronic machinery) became more dominant over time. Its regional share grew continuously from 22% in 1991 to 38% in 2009. Meanwhile, the influence of traditional industries (textile and apparel) was reducing. Their regional shares of industrial output decreased from 13% in 1991 to 5% in 2009. In contrast to this decline, the transport equipment industry achieved the most significant growth from 2.8% in 1991 to 7% in 2009. The growth of this industry was mainly contributed by the rise of the automotive industry through specific national support (see details in Chapter 8). Apart from these three major industries, some new- or high-tech industries were emerging in the region as well, such as aerospace, biomedical, nuclear-power equipment, green energy (solar energy photovoltaic and wind power), and environmental

protection and so on. The total industrial output of these industries reached 400 billion *yuan* in 2008 (GDEIC, 2010:18).

Figure 1.3 Changing industrial structure of the PRD (1991-2009)



Note: in percentage of total industrial output.
Sources: Guangdong Statistic Yearbook in 1992, 2000 and 2010.

The above aggregate empirical data point to industrial upgrading in the PRD. Previous studies have offered some reasons for industrial growth, such as the importance role of foreign investments, economic decentralization from the central government, and the land reform policy (Lin, 2009a; Shen et al., 2000; Sit and Yang, 1997; Yeh et al., 2006). But these studies have not really considered the issue of industrial upgrading.

According to Yeung (2009:328), "East Asian experiences in regional development should be understood in its historical and geographical contexts, primarily because of the simultaneous presence of three key ingredients - local firms (public or private), developmental state institutions (often at the national level), and lead firms in GPNs". These three ingredients (actors) are not unique, but they occur in different historical moments in developed regions in Western Europe and North America. To this point, the standard

analytical toolkits in the previous literature of economic geography are insufficient to explain the dynamics in the PRD. The PRD does not own promising regional/relational assets which have sustained industrial upgrading and growth in developed regions, such as thick institutional networks (Amin and Thrift, 1994), abundant associational economies (Cooke and Morgan, 1998), strong untraded interdependencies (Storper, 1997b), regional innovation systems (Cooke et al., 1997; Scott, 1998) or regional learning networks (Hassink, 2005; Hudson, 1999; Morgan, 1997).

What then are the regional assets that the PRD's firms utilize in their pursuit of upgrading? What would the local upgrading trajectories be? Compared with Asian NIEs which went through rapid industrialization in an earlier stage (Beeson, 2004; White, 1988), will the PRD case offer a different story or new theoretical insights in terms of upgrading studies? Bearing these questions in mind, this thesis considers the PRD as an appropriate case. The region deserves more scrutiny of its upgrading beyond rapid industrial growth.

1.5 Thesis structure

The thesis is organized into 9 chapters. This chapter has provided an overview of the research questions, objectives and the intellectual contexts of the thesis. The empirical field has also been introduced. Chapter 2 critically reviews the multi-disciplinary base of literature on industrial upgrading, including economic geography, economic sociology, industrial economics, development studies and business studies. This effort situates this study in a solid ground for answering a question that why is this study of the geography of industrial upgrading needed and what we have not known yet.

Chapter 3 proceeds with an analytical framework drawing upon an analytical perspective

in relational economic geography, specifically related to the GPN studies. Based on this framework, I elaborate on the formation, typology and power dynamics of strategic coupling and how the variety of coupling produces the dynamics outcomes of upgrading. Chapter 4 lays out the methodology that has guided the operationalization of this study. After a brief justification of methodological commitment, I introduce the contexts of conducting fieldworks in China and the PRD and then detail methods and the implementation, including data collection, research sampling, a questionnaire survey, interviews and participation observation. In this study, I conducted 110 interviews and received 69 sets of completed questionnaires. A discussion of research ethics is provided at the end of this chapter.

As the first empirical chapter, Chapter 5 examines the extent of industrial upgrading and the formation and transformation of strategic coupling in the PRD. This work shows how huge knowledge gaps and highly asymmetrical power relations form captive coupling in the 1980s. Since 1980s, the PRD has started to move away from captive coupling. This tendency is illustrated by the divergent performances of key actors, changing trading partners, the fading role of Hong Kong firms and emerging new regional assets in the PRD. During this process, various types of coupling are developed or reinforced. Even decoupling has emerged in a few cases.

The main empirical analyses of this thesis are developed in Chapters 6, 7 and 8 which delineate different scenarios of strategic coupling and the corresponding outcomes of upgrading. These empirical chapters examine three key industries that represent regional industrial change: electronics, apparel and automotive (see section 1.4). The constellation of these industries demonstrates upgrading through different industrial specificities in terms of

knowledge complexity (from low to high), industrial organizations (from simple to sophisticated) and governance types (from relational to modular).

Chapter 6 is about the electronics industry in which local firms and TNCs constitute to the main story. The chapter begins with a discussion of the global industrial tendency and the features of modular governance in the electronic industry. The central analysis rests in the formation and retention of captive coupling in this industry. This phenomenon is explained by the knowledge gaps, strategies and power relations between foreign firms and local firms under the modular governance. By demonstrating three case studies, this chapter shows various local upgrading strategies in captive coupling and the potential formation of cooperative coupling.

While captive coupling is reinforced in the electronics industry, Chapter 7 delineates an impressive scenario of local upgrading in the apparel industry. The analytical focus is placed on how local firms manage to move away from captive coupling to cooperative coupling. Two industrialized towns and two local firms are used to illustrate this upgrading trajectory. It further explains why changing power relations and synergy within cooperative coupling is the key to understand local upgrading trajectories that constitutes the 'changing rules of the game'.

Different from previous two chapters, Chapter 8 tackles the automotive industry in which firm-state relationships are the primary determinant of industrial upgrading. These firm-state relationships are essential to the formation of reciprocal coupling. By interpreting the current debate, this chapter examines the role of state power and corporate power in the automotive industry. It shows how reciprocal coupling is formed in the automotive industry in

the PRD based on the interplay among strong interventions from Chinese central state, pro-active SOEs and global lead firms (automakers). Drawing upon a comparative study between two joint ventures, this chapter demonstrates how synergy is better developed within a balanced power relation and how it influences local upgrading within the joint ventures and their regional supply networks.

As a conclusion, Chapter 9 provides a heuristic summary of key findings, theoretical contributions and policy implications of this study. A self-assessment points out the main accomplishments and limitations of this study. Finally, a future research agenda is discussed.

Chapter 2 Towards the geography of industrial upgrading? A critical review

> There is a gap [in the studies of industrial upgrading] as many of us have seen. But in what ways and to what extent does geography matter? We are still not clear about it (Timothy Sturgeon[1], on 1 Dec 2011).

2.1 Introduction

Since decades ago, mainstream economic geographers have devoted tremendous efforts to investigate regional development in relation to (dis)industrialization, global industrial shift, agglomeration and production organization, as well as recent research focuses such as institutional influences, clustering, innovation and networked regional economies. However, these studies have yet to place the issue of industrial upgrading as the central analytical concern. To a large extent, industrial upgrading is treated as equal to a process of industrial growth or development without its distinct economic-geographical features.

In the era of globalization, to a late-comer, attracting foreign investments or export-oriented industrialization has become a well-known pathway of promoting regional economic development. Particularly in East Asia, these strategies have been adopted and significantly boosted regional industrial growth since the second half of the 20th century (Clark and Kim, 1995; Gereffi, 1999; Hobday, 2001; Webber, 1994). However, when a latecomer region has achieved substantial industrial growth, whether industrial upgrading is accompanied is in question. On the one hand, the prosperity of regional economy as a whole

[1] Currently as a senior research affiliate in the Industrial Performance Center of the Massachusetts Institute of Technology, Timothy Sturgeon is one of the leading scholars in the studies of industrial upgrading. This comment was made during the workshop on *Value Chains, Production Networks, and the Geographies of Development* in Singapore, December 2011.

does not guarantee benefits for all stakeholders. Local firms may not be able to catch up with transnational corporations (TNCs) and hence can only earn marginal profits. TNCs capture and distribute most of the value created within the region. Under this shallow forms of industrial growth and global integration, local firms in latecomers regions may be stuck in low value-added and undifferentiated manufacturing works (see critiques in Dicken, 2007; Steinfeld, 2004). If the firm fails to upgrade, it will be technologically and organizationally marginalized at a truncated position within GPNs. Sooner or later, it will be replaced by other low-cost producers. In this sense, examining the progress of late-comers (local) upgrading is a critical issue. How does industrial upgrading, particularly local (firm) upgrading, happen? What are the geographical conditions that may facilitate or hinder the process of local upgrading? Economic geographers have yet to answer these questions.

This chapter provides a critical assessment of the contemporary literature on industrial upgrading. It covers a multi-disciplinary base, including economic geography, economic sociology, industrial economics and development studies. The assessment is organized into two sections according to geographical and non-geographical studies. The next section reviews geographical studies. It shows how geographers have implicitly tackled different dimensions of industrial upgrading and the missing links. The third section focuses on non-geographical studies including two main strands of literature (1) the GVC approach; (2) latecomer economies in development studies. These studies have been the mainstream of contemporary upgrading research for almost two decades. A thematic summary of these two sections is showed in Table 2.1. Critical assessments are developed for each of the two sections in which important missing links are identified. This chapter ends with a discussion

of the ways in which a synthesis of both geography and other discipline can shed light on the study of industrial upgrading.

Table 2.1 Research Themes and Insights in Studies of Industrial Upgrading

Research themes	**Key authors**	**Analytical focus**	**Insights for upgrading studies**
Industrial Restructuring	·Allan Scott ·Ash Amin ·Doreen Massey ·Eric Schoenberger ·Gorden Clark ·Meric Gertler ·Michael Storper ·Ray Hudson ·Richard Walker	· Imperatives of capitalism · Spatial fixes and accumulation · Industrial reallocation · Spatial division of labor · New industrial space, Neo-Marshallian nodes · Flexible/Lean / Post-Fordism production system · Industrial restructuring cost · Internationalization of firms	· Incentives of capitalists · Structural forces of upgrading · Patterns of global shifts · Industrialization as a form of upgrading
New regionalism, & cluster	·Allan Scott ·Anders Malmberg ·Ash Amin ·Nigel Thrift ·Michael Storper ·Phil Cooke ·Peter Dicken ·Peter Maskell ·Richard Florida ·Ron Boschma ·Ron Morgan	· Embeddedness · Pro-active states & associational economies · Relational assents · Institutional thickness · Learning regions & collective learning · Regional innovation system · Untraded interdependency · Economies of agglomeration & clustering · Horizontal production networks	· Supportive or challenging institutional environment · the embeddedness of firms · Synthesis of cluster · Mechanisms of collective learning
Learning and innovation in global production network	·AnnaLee Saxenian ·Harald Bathelt ·Henry Yeung ·Nebahat Tokatli ·Neil Coe ·Peter Dicken ·Philips Kelly ·Ron Boschma	· Formation and dynamics of global production networks · Strategic coupling · Network and scale of innovation · Pro-active states & transnational corporations · Home-base advantages of local firms the global economy	· Global integration of regional economies · Upgrading as a form of network restructuring · Reposition through upgrading · Channels of knowledge diffusion
National strategy and latecomer	·Alice Amsden ·Bengt-Åke Lundvall ·Chalmers Johnson	· Flying geese paradigm · Sequences of domestic industrial upgrading;	· Bargaining power of states; · National strategies

economy	·Christopher Freeman ·Gordon White ·Kaname Akamatsu ·Shigehisa Kasahara ·Terutomo Ozawa	· Export-oriented industrialization · Roles of developmental states · Firm-state relations · National innovation system	of upgrading · Networks and systems of learning and innovation
Industrial Governance	·Gary Gereffi ·Hubert Schmitz ·Jennifer Bair ·John Humphrey ·Khalid Nadvi ·Peter Gibbon ·Rapheal Kaplinsky ·Stafano Ponte ·Timothy Sturgeon	· Commodity chain/Global Value Chain · Value chain governance · industrial standard governance · Asymmetrical power relations in value chains · Collective efficiency and joint action · Supply chain management · Competitiveness management	· Incentives, strategies and typologies of upgrading · General mechanisms of upgrading · Upgrading as a governance issue · Global governance and knowledge transfer
Local practices of upgrading	·Carlo Pietrobelli ·Dieter Ernst ·Elisa Giuliani ·Hubert Schmitz ·John Humphrey ·Michael Hobday ·Michael Porter ·Roberta Rabellotti	· Industrial specificity of upgrading · Local resistance to governance · Latecomer strategies · Catching-up politics for developing economies · Industrial policy and regional politics · Competitiveness of clustering	· Global governance and local resistance · Protectionism for domestic upgrading · Local strategies for upgrading

Source: author's summary.

2.2 Industrial change and regional development

In the geographical literature, the issue of industrial upgrading is normally subsumed in a wide range of work related to global industrial restructuring and the changing geographies of production (see a series of reviews in Bathelt, 2003; Bathelt, 2005, 2006; Reimer, 2007; Yeung, 2000, 2001, 2002b). This section reviews this strand of literature including: the new spatial division of labor, global industrial relocation, capitalist imperatives, debates about flexibility, the new regionalism, clustering economy, and learning/innovation in production networks. Industrial upgrading is implicitly addressed in these studies, such as adopting new

organization forms or production modes; developing new technologies or products; as well as functional restructuring in the forms of vertical integration or specialization.

2.2.1 Industrial change and capitalist's imperatives

Earlier works on industrial change in regional development were focusing on deindustrialization in developed regions. Capitalists' imperatives and capital-labor relations were considered as driving forces in shaping the spatial reorganization of production in which firms exploited maximum usage of their labor with lower costs among various regions (Harvey, 1982; Hudson, 1988; Massey, 1979, 1995).

By investigating the spatial restructuring of British regional economies in the 1960s, Massey (1979, 1995) argued that this relocation did not result from regional industrial policies, but from the locational behaviors of capitalists. The behaviors changed as a response to geographical inequality in different conditions of production. Rounds of industrial changes constructed an uneven economic landscape so as to sustain industrial growth. This view was considered as a Marxist view in contrast to the neo-classical industrial location theory. It explained the new spatial division of labor by three conditions (Dicken, 1976; Frobel et al., 1980; Hudson, 1988). First, inexhaustible disposable labor became available in South/East Europe and other developing countries. Second, the standardization of technologies enabled production disintegration in which less sophisticated segments were separated from the core manufacturing activities. Third, the available of modern transport and communication technologies enabled the dispersion of production segments among distant places at a global scale. In Harvey (1982)'s account, this process was driven by the imperative of accumulation (e.g. decreasing profits) through two forms of spatial fixes: new investments in the built

environment (temporal deferral) and new investment in new production sites (spatial displacement). In these studies, industrial growth was related to the changing capitalists' imperatives as a renewal process of accumulation regimes. These production regimes were no longer constrained within an isolated place with endowed technical, organizational and cost factors, but evolved into a networked spatial organization operating in different regions.

Storper and Walker (1989) also attributed the underlying forces of industrial transformation to the capitalist's imperatives and the rise of new industries, new products or new production skills. Radical technological upgrading served as breaking points which led to a series of periodic industrial shifts in the centers of industrial growth, such as the shift from UK to the United States, from West Europe to East and South Europe, or the shift from the Northeast to the Southwest of the United States. These industrial changes embodied a sense of upgrading referring to the improvement of "capacity to control the pattern of economic events but that these events represent opportunities to restructure the inherited system of production" (Clark and Kim, 1993:1).

In general, studies of industrial changes in economic geography shared a common understanding that the capitalist imperatives played a dominant role at a global scale. Considered as a Marxist view, the imperatives of industrial change were mainly tied to organizational skills for the control of labor and the profit-seeking nature of capitalists. This view was revisited in recent studies about Thailand's economic recovery (Glassman, 2001, 2007). In the case of Thailand, the renewal of spatial fixes (industrial restructuring and asset reinvestments) was driven by the capitalist logic of accumulation based on a combination of home-country and host-country contexts.

Although the Marxist approach has articulated the capitalist imperative in driving industrial change, it tended to hold an essentialist view on the fundamental conflict of capitalism, and focused more on global or structural forces without recognizing forces at other geographical scales (Jessop et al., 2008). As Storper (2001:158) argued, "[t]he strong point of Marxism is that it considers capitalism as a system…But this has also become its greatest limitation: it has never been able to go beyond large-scale descriptions to cause-and-effect analyses of the detailed internal dynamics and processes of capitalism…[and never] being able to analyze the real margins of variation which are possible within the system".

2.2.2 Adopting new production organizations: the 'flexibility' debate

Along with the ebb tide of Marxist geography in the late 1980s and the early 1990s, economic geographers gradually turned to focus on diverse industrial shifts and the changing organization of production at the global scale. New patterns of production organization emerged, such as the 'flexible production' or the lean production system, to replace mass production hitherto known as 'Fordism' in the contemporary world economy (Amin and Thrift, 1992; Gertler, 1988; Schoenberger, 1988; Scott, 1988a, b; Walker, 1988). Proponents in this strand of literature emphasized the improvement of efficiency by upgrading production systems in a more flexible manner. But the opponents argued that this type of systematic upgrading would have negative impacts to the stability of production and labor management, thus reducing efficiency (Gertler, 1988). The shared understanding in this debate was that networked forms of production organization were becoming prevalent and replaced the traditional production modes of Fordism and Taylorism. This shift can be considered as

process upgrading in Schmitz's (2002b) account.

One of the well-known studies was the case of 'Third Italy' where a large group of small and medium-size enterprises (SMEs) agglomerated and developed dense horizontal production relations in the pursuit of flexile specialization (Piore and Sabel, 1984). The prosperity of Third Italy was considered as the 'second industrial divide' that represented an episodic upgrading of industrial system from mass production to flexible specialization, in contrast to the previous 'first' industrial divide that referred to the shift from craft production to mass production since the 1900s. Based on the study of Silicon Valley, Scott (1988b) added further weight to the heated debate on flexible production as new industrial spaces in which high-tech enterprises agglomerated and specialized in certain component production for lower transaction costs and better interactive learning. Firms in the information and communication technology (ICT) industries were the main forces in constructing this kind of new industrial spaces. The automotive industry was also revealed as another representative industry adopting this change (Hudson, 1994, 1997; Schoenberger, 1987). Many automotive manufacturers in North America and Eastern/Western Europe upgraded their production systems by adopting the 'just-in-time' production or the 'lean' production system which was derived from Japanese automotive assemblers such that Toyota and Honda.

During adopting the flexible production system, firms also improved their managerial skills to cope with new systems (Gertler, 1993). Experiences from industries in EU regions showed that new investments were put into automated production technologies and research and development (R&D) for reducing employment and improving efficiency in processing materials (Hudson, 1997; Rainnie, 1993). Meanwhile, various rounds of corporate merger and

acquisition activities were conducted so that firms could concentrate their governance power to control globally decentralized production sites. Scholars also documented this change in traditional industries such as the apparel industry (Essletzbichler, 2003; Essletzbichler and Rigby, 2001; Park, 1994). Instead of following this shift towards flexible production systems, latecomer firms in East Asia mainly relocated mass production to places with lower production cost, such as from Japan to South Korea, Hong Kong, Taiwan and then China. Rather than using labor-saving technologies, these East Asian firms tended to adopt different employment strategies such as hiring illegal foreign workers, recruiting part-time workers, training highly skilled employees, and substituting labor with automation (Hsu and Chiang, 2001; Kim, 1993; Leung, 1993; Tsay, 1993).

In explaining the mechanism of this organizational upgrading, geographers argued that the motivation for adopting the 'flexible' production system came from the internal limits of Fordism due to its fixed-purpose and dedicated machinery system. It also resulted from the increasing demands for a quicker response to changing market conditions (Schoenberger, 1988, 1989). However, being flexible was not the universal solution for all firms, and was only suitable in certain industries and regions. In the case of the chemical industry in Teesside, North England, Chapman (2005) pointed out flexible specialization was not be a proper strategy for the technological improvement of local firms, because they suffered from the heave burden of sunk costs through investing in new production lines. Consequent critiques also pointed out that successful cases of adopting flexibility actually covered just a small range of places, such as South Italy, Silicon Valley and East Europe. Moreover, the flexible production model was mainly related to small firms in infant industries (Glasmeier, 1994;

Schoenberger, 1989; Storper, 1995).

Although adopting flexible production has its own limits, geographers have recognized the significance of this emerging network form of production organization at both regional and global scales. Region was conceptualized as a crucial platform for a new round of vertical or horizontal integration among firms with tighter inter-firm relationships and greater demands of proximity and trust (Amin and Robins, 1990; Harrison, 1992). Moreover, different regions were seen as interconnected, thus generating neo-Mashallian nodes of production spaces (Amin and Thrift, 1992). The flexibility debate has indeed shed important light on the geography of industrial restructuring by articulating a process of regionalization when firms and regions adopt new production system.

2.2.3 Intra-regional foundations of industrial growth: an institutional perspective

Since the mid-1990s, geographers' interests gradually moved from the 'new industrial space' to institutional factors that facilitated regional development, such as relational assets, institutional thickness, associational economies, learning networks, regional innovation system and the untraded interdependency of firms (Amin and Thrift, 1994; Cooke et al., 1997; Cooke and Morgan, 1998; Florida, 1995; Morgan, 1997; Saxenian, 1994; Storper, 1997b). This strand of literature was termed *new regionalism* in Lovering (1999). The proliferation of these studies showed a distinctive shift from the earlier concern with input-output relations and transaction costs to non-cost-based factors within a region, such as institutional environment/arrangement, inter- or extra- firm networks and state institutions. These factors influenced the strategies and behaviors of economic actors due to the 'embeddedness' of economic actions in political/social/cultural contexts (Dicken and Thrift, 1992; Granovetter,

1985; Park, 1996). These institutional factors did not directly increase profits or reduce production costs for *in situ* enterprises, while playing an important role in facilitating learning and innovation, fostering collaboration and cultivating mutual trust. In the era of globalization, these factors were considered as new assets to sustain regional competiveness (Amin, 1999; Barnes and Gertler, 1999; Boschma, 2004; Maskell and Malmberg, 1999a; Storper, 1995).

There was a wide range of studies recognizing the importance of regionalized inter-firm collaboration, networking policies and associational economies since the early 1990s. Many of these works were related to the literature of regional innovation systems (Bergman and Feser, 2001; Christopherson and Clark, 2007; Cooke, 2008; Cooke et al., 1998; Hobday, 2008). An effective regional innovation system would be a self-organizing, open system which translates ‘exploration' knowledge from inside or outside the system, through examining the performance and commercialization of knowledge/technologies (Cooke et al., 1997). Continuous innovation as well as upgrading thus can be fostered within such a system. The components of regional innovation systems include regional production structures and supportive knowledge exploitation/generation sub-systems which consist of public/private research laboratories, universities and colleges, technology transfer agencies, vocational training organizations (Asheim and Coenen, 2005). Apart from governmental agencies and organizations, key actors which operationalize these intermediary sub-systems are the so called knowledge entrepreneurs. They solve problems or seek solutions, financial engineers like venture capitalists, business angels and management accountants, and varieties of specialist consultants, incubator and accelerator managers, even well-functioning knowledge transfer offices in universities (Kenney, 2000).

Scholars in this vein considered various ties of proximity, mutual interaction, and associational economies as the positive channels and facilitators of knowledge sharing, spillover and learning (Amin, 1999; Boschma and Lambooy, 1999; Cooke, 2008; Martin, 2000). In the investigation of some developed regions, such as Baden-Württemberg in Germany and Emilia-Romagna in Italy, Cooke and Morgan (1993) revealed the network relations between firms and public or quasi-public intermediary agencies had contributed to substantial regional economic growth. Cooke and Morgan (1998) further explained that pro-active associational economies were the key actors in cultivating inter-firm cooperation, public-private networks, and public welfare (e.g. education or infrastructures) which contributed to regional prosperity. Based on the cases of regional development in EU and Wales, scholars pointed to the important role of pro-active regional institutions in transferring micro-level innovation into meso-level innovation, underpinning the so called 'learning regions' (Florida, 1995; Hassink, 2005; Hudson, 1997; Hudson, 1999; Morgan, 1997).

In contrast to looking at specific institutional arrangements, another group of studies conceptualized the importance of the 'untraded interdependencies' (Scott and Storper, 2003; Storper, 1995, 1997b). This concept served as a critique of the previous flexibility debate that focused only on trade-based relations and transaction costs. Examining regions in Emilia-Romagna, Tuscany, Veneto and Marches in Italy; Silicon Valley, Orange County and Hollywood in the United States, Stoper (1997) argued that regions has become a nexus of untraded interdependencies in global capitalism. In those regions, conventions of production were developed to reduce uncertainty, to facilitate technological upgrading and to foster innovation. The case of British Motorsport Valley provided a vivid example of the benefits of

untraded interdependency existing among hundreds of small firms within a radius of 50 miles area (Henry et al., 1996; Pinch and Henry, 1999).

Geographers further focused on clusters and innovation since the late 1990s. In these studies, cognitive and cultural approaches were applied to unpack the pattern of learning, knowledge diffusion and innovation within regions (Malmberg and Maskell, 1999, 2002, 2006; Maskell, 2001; Maskell and Malmberg, 1999b, 2007; Scott, 2006; Todtling and Trippl, 2004). The analytical origin of these studies derived from an evolutionary approach and a resource-based view of firms in institutional economics (Barney, 1991; Nelson, 1994; Nelson and Winter, 1982). According to these studies, "sustainable competitiveness of firms and regions is built on specialized learning capabilities and continuous upgrading of an existing knowledge base" (Maskell and Malmberg, 1999b:181).

Examining industrial clusters in fifty largest metropolitan regions in North America, Florida (2002) demonstrated a positive relation between the spatial clustering of diverse industries and the outputs of innovation. The cases of Silicon Valley and Hollywood in the US illustrated how successful clusters were sustained by intensive interactive learning activities within localized business networks (Scott, 1998, 2005). Trippl and Otto (2009) investigated the restructuring process of old clusters in Styria and Saarland, and pointed out that knowledge-intensive-oriented adjustment was one of the most effective ways to vitalize clusters. In Cambridge's biotechnology cluster, firm-university relations became vital because they fostered technological upgrading and commercialization within the cluster (Casper and Karamanos, 2003). In Italian textiles and clothing clusters, Dunford (2006) identified a 'magic circle' of mutual learning and innovation. The circle was formed by a large group of

interdependent clusters surrounding Milan as the center where knowledge about technologies and managerial skills were highly circulated. Channels of knowledge diffusion could be frequent staff turnover, shared suppliers, informal collaboration (e.g. collective discussion), industrial gossip and trackside observation.

In sum, the analytical focus of cluster studies rested in the articulation of various types of learning mechanisms, such as interactive innovation, diffusion of tacit knowledge, face-to-face communication and knowledge spillover derived from the economies of agglomeration and the localization of learning activities (Boschma, 2004; Hudson, 1999; Maskell et al., 2006; Maskell and Malmberg, 2007; Scott, 1998; Scott and Storper, 2003). A basic typology of knowledge channels is summarized according to formal/traded and informal/untraded relations (see Table 2.2).

Table 2.2 Types of linkages to external sources of knowledge and partners

	Static(Knowledge Transfer)	**Dynamic(Collective Learning)**
Formal/Traded relation	*Market relations* • contract research • consulting • licenses • buying intermediate goods	*Formal networks* • R&D collaborations • shared use of R&D facilities
Informal/Untraded relation	*Spillovers* • recruiting specialists • monitoring competitors • participating in fairs, conferences •reading scientific literature, patent specifications	*Informal networks* • informal contacts

Source: Figure 2 in Trippl et al. (2009:448).

Indeed, the ‘new regionalism’ approach has demonstrated a solid account of intra-regional factors that sustain regional industrial growth. But this approach has two

fundamental limits. On the one hand, it tends to be inward-looking and treats region as an analytical entity, thus neglecting exogenous forces beyond regions (see detail critiques in Lovering, 1999; MacKinnon et al., 2002). On the other hand, the causality between institutional influences and regional growth is still unclear. Dense institutional environment does not necessarily lead to better performance of firms. Over institutionalized environment may produce lock-in effects to reduce the competitiveness of firms over time (Grabher, 1993).

2.2.4 (Global) Networks of production and innovation

While the institutional approach holds a more intra-regional perspective, some geographers have highlighted the role of exogenous forces in shaping regional industrial development and upgrading. In line with development studies, geographers have devoted substantial efforts to documenting the rise of many latecomer regions that have benefited from their integration into the global economy (Clark and Kim, 1993, 1995; Huchet, 1997; Sit and Yang, 1997; Yeung.G, 2001; Young and Lan, 1997). Since the 2000s, drawing upon a network approach, economic geographers have further refined their analytical focuses on the mechanisms of global integration in terms of global-local relations, network structure and the embeddedness of firm networks (Bathelt et al., 2004; Boschma and Wal., 2007; Bunnell and Coe, 2001; Coe et al., 2008b; Dicken et al., 2001; Henderson et al., 2002; Hsu et al., 2008; Todtling and Trippl, 2005). Scholars in this vein have argued for two propositions. First, the global economy is contributed by TNCs embedded in GPNs which integrate different regions at a global scale. Hence, plugging into GPNs is a necessary step for a region to achieve continuous and substantial industrial growth (Coe et al., 2004). Knowledge diffuses within production networks, rather than circulates within a region. Second, local factors (e.g.

economic, social or political) can play a significant role in facilitating the integration process, while stronger regional capacities would benefit more from the integration (Amin and Cohendet, 1999; Fan, 2011).

The propositions above have been partly verified based on the experiences in East Asian regional development. In the case of Hsinchu Science-based Industrial Park in Taiwan, it kept upgrading with technological edges based on the efforts of an international technological community. Comprising Taiwanese business elites and overseas returnees, this technological community has provided a flexible and responsive channel for long-distance knowledge transfer between Taiwan and Silicon Valley (Hsu, 2004; Hsu et al., 2008; Saxenian, 2002; Saxenian and Hsu, 2001). In other industrial parks in Taiwan, Tainan and Taichung industrial parks, significant industrial upgrading was sustained by intensive technological transfer from Japanese electronics lead firms to Taiwanese partners/manufacturers within the same GPNs in the LCD and machinery industries (Yang et al., 2009).

A nuance contribution was made by Coe et al. (2004) which conceptualized the integration between latecomer regions and the global economy as a process of *strategic coupling*. Drawing upon the automobile industry in Thailand, the authors illustrated how local firms achieved substantial growth and upgrading by plugging with the GPN coordinated by BMW in German. Yeung (2009a) provided a heuristic account towards different approaches of strategic coupling among East Asian latecomer regions including: the Yangzi River Delta and the PRD in China; Seoul and Gyeonggi-do areas in South Korean; Taipei-Hsinchu area in Taiwan; Penang, Selangor and Johor regions in Malaysia; Bangkok and Eastern region in Thailand. Through the process of strategic coupling, local firms in these regions gained access

to advanced technology and market resources embedded in various GPNs. Some local firms in these regions even upgraded into new lead firms (Yeung, 2007a). In China, similar cases studies were also conducted in such diverse industries (the automotive, ICT and textile industries) among different cities, such as, Beijing, Shanghai, Wenzhou, Suzhou and Dongguan (Depner and Bathelt, 2005; Liu and Dicken, 2006; Wei et al., 2007; Wei et al., 2009a; Yang, 2007).

Although local firms received significant growth among these latecomer regions, geographers also critically pointed out the potential of shallow upgrading, because the channels of knowledge diffusion were mainly controlled by global lead firms. They tended to develop certain technological enclaves (Wang and Lin, 2008; Wang and Lee, 2007); or exclusively transferred technologies through backward-linkages which connected with their home countries, rather than the host countries (Xiao and He, 2010; Yang and Liao, 2009). To overcome these problems, strong local initiatives and home-base advantages were suggested as a complement, such as state efforts, low R&D costs or local cultural and social advantages (Wei, 2002, 2010; Yeung, 2007a; Zhou, 2008b; Zhou and Tong, 2003). In Turkey's apparel industry, geographers identified another strategies specific to industrial upgrading: plugging into different GPNs and exploiting less-regulated markets by trading 'imperfect products' (Tokatli, 2003, 2007; Tokatli, 2008; Tokatli and Kizilgun, 2004). This strategy enabled Turkish firms to earn sufficient profits and critical time for knowledge accumulation. They therefore managed to upgrade from full-package into brand-name manufacturing and marketing.

2.2.5 Critical assessments: where is the geography of industrial upgrading?

This section has so far reviewed sequentially four strands of literature that are considered as relevant studies of industrial upgrading. Although they have different limitations, their common problem is that the geography of industrial upgrading is unclear or implicit. As stated in Chapter 1, geography here does not mean the spatial structure of industrial upgrading, but refers to the ongoing process in which actors strategize and implement industrial upgrading in a locality with specific economic, institutional, and spatial contexts. On the one hand, industrial upgrading has not been well studied yet in mainstream economic geography. By and large, industrial upgrading is treated synonymous as industrial growth, learning or innovation, while some of it distinctive features, such as conducting high-value added activities or diversifying corporate functions through organizational learning, are neglected. On the other hand, the analytical perspectives of earlier studies tend to rest at a single spatial scale, either global or regional, while lacks a multi-scalar perspective for investigating how actors from different scales implement the strategies of upgrading in a latecomer region.

In a globalization era, industrial upgrading has become an increasingly critical issue, particularly for latecomer regions and firms. However, the prosperity of a latecomer region does not guarantee benefits for all stakeholders. Although a latecomer region can achieve substantial industrial growth through export-oriented industrialization, this major growth may be contributed by TNCs at the same time when local firms are further marginalized. Even though local firms manage to experience significant industrial growth, the overall achievement may still be shallow. Local firms may focus narrowly in low value-added segments that produce undifferentiated products based on labor-intensive modes of

production. In other words, though local firms actively participate in value creation, they may be excluded from much of the value distribution and capture. Even worse, firms may be technologically and organizationally locked into a peripheral position within a particular GPN. In this circumstance, local firms are highly uncompetitive and powerless. They will be easily replaced by the subsequent relocation of TNCs, the discrimination of policy makers or the rise of other low-cost producers. Therefore, industrial upgrading can serve as a useful lens for investigating the detail mechanisms of regional development and the evolutionary dynamics of the global economy. However, situated in such a context of globalizing regional development, the analytical insights and toolkits in the existing geographical literature are insufficient to explain the dynamics of industrial upgrading.

The literature on capitalist industrial change and the flexibility debate renders a sense of systematic imperatives to industrial growth in terms of profit-seeking accumulation regime and production efficiency. Whenever a region is losing competitiveness, the solution would be either relocation, or adopting flexible production. But these interpretations are too narrow for explaining the varieties of industrial development in today's global economy. In the literature on new regionalism and industrial clusters, scholars either praise positive institutional factors or attribute the failure of regional economic growth to institutional lock-in. These intra-regional factors are related to learning or innovation and have not examined upgrading activities *per se.* Moreover, many of these East Asian regions do not develop similar kinds of institutional thickness, associational economies, strong untraded interdependencies and regional innovation systems. In those regions, there is a relative absence of substantial relational assets and learning regions capable of generating indigenous technologies and

innovation (Yeung, 2009a). Therefore, the distinctive contexts of Asian regions further legitimize the necessity of studying industrial upgrading.

In the past decades, the analytical focus on regional industrial change has gradually shifted from a global level to a meso level (regional, industrial); from the societal structure to the local institutional conditions of networked economies. But these studies tended to explain industrial change through the imperatives of capitalists and the need of adopting new production organization. Many other influential factors were absent in their analyses, such as proactive state institutions and institutional environment. In the literature on new regionalism, scholars tended to focus on the meso-level analysis in which most of their attentions were rested in many institutional factors in terms institutional environment and arrangement. An actor-less view tended to be developed in which some basic features and practices of firms were omitted, such as strategies and performance and. This actor-less view also overlook the dark sides of networking which may generate conflict, tension, misinterpretation or distrust in an over-socialized region (Grabher, 2006; Lowe, 2009).

As a complement to previous studies and premised on a network approach, the GPN studies develop a more balanced analytical framework which recognizes multi-scalar force in shaping regional development. One key contribution of this approach is the conceptualization of strategic coupling as a crucial mechanism to explain the globalizing process of latecomer regions. The GPN framework captures the changing pattern of global integration and shows the value of actor specificity in conducting economic geographical research. However, this approach has yet to place the topic of industrial upgrading as their central analytical focus. A latecomer region can achieve substantial industrial growth by taking industrial opportunities

provided by lead firms within GPNs. But how and why will local upgrading happen? Will different types of coupling produce a different outcome of upgrading? What are the geographical conditions that may facilitate or hinder the process of local upgrading? Economic geographers have yet to provide answers to these questions. Particularly, at a micro-level analysis, the typology of upgrading and the strategies of local firms in upgrading have not been well examined (I detail the critique and conceptualize of strategic coupling in Chapter Three).

In sum, the issue of industrial upgrading is seldom examined directly in the existing geographical studies. While the geography of industrial upgrading remains unclear, scholars outside geography have devoted remarkable efforts in revealing the mechanisms of industrial upgrading.

2.3 The latecomer economy: mechanisms, governance and politics of industrial upgrading

In non-geographical studies, there are plenty of sound works about industrial upgrading among the disciplines of economic sociology, institutional economics and other development studies (see table 2.1). The first part of this section reviews main theories tackling the divers of latecomer economy pertinent to upgrading, including the 'flying geese' (FG) paradigm, the developmental state literature, the national innovation system (NIS) literature. These three theories are considered as state-centric approaches. I then present a firm-centric approach in the GVC literature. It is probably the most influential field in the contemporary studies of upgrading. While the first two sections illustrate the role of more powerful actors (nation

states and global lead firms), the penultimate part of this section reviews the upgrading of less powerful actors (local firms or suppliers). Overall, these studies articulate the mechanisms of upgrading in terms of incentives, strategies, driven forces, typologies, trajectories, barriers, governance and politics.

2.3.1 The drivers of national upgrading: the state-centric approaches

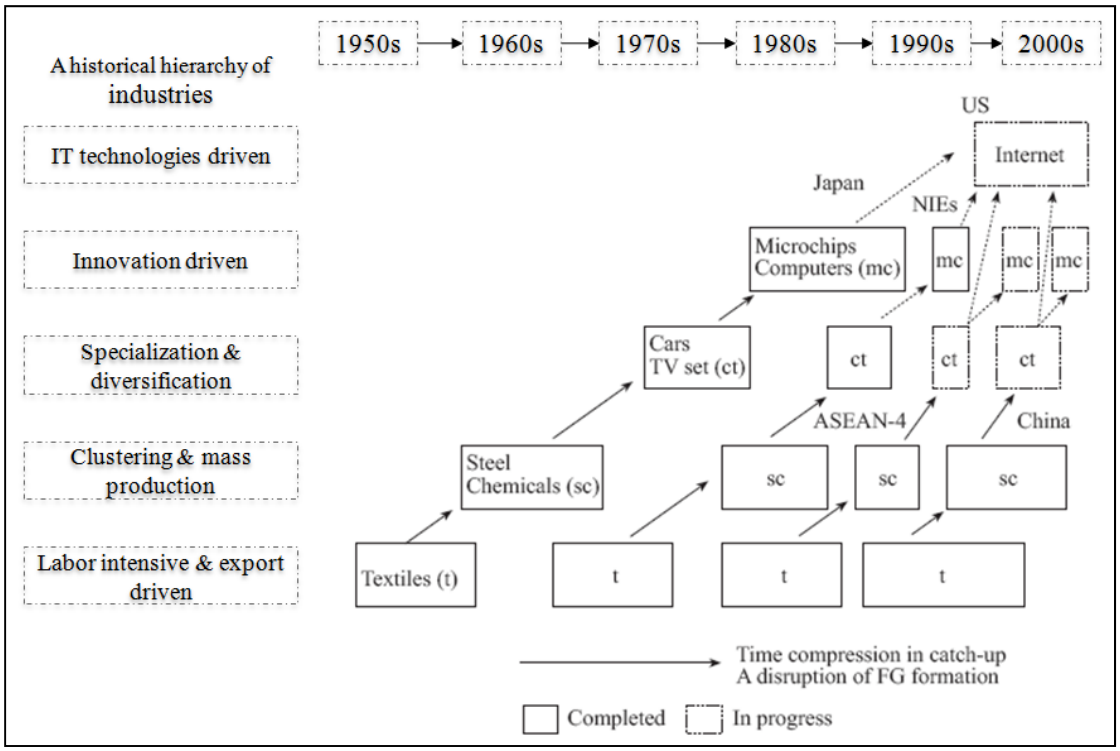
The upgrading of global lead firms is mainly related to the literature of innovation. My specific attention of this thesis is on the upgrading of latecomer economy, rather the global economy as a whole. The common thread of the FG, developmental state, and NIS literature is that nation states can be pro-active actors in stimulating domestic industrial upgrading through direct intervention or providing institutional supports. The key is to facilitate knowledge sharing, diffusion and reproduction. However, they either over emphasize the effectiveness of state capacity, and regard states as the key actors while not firms in private section during the process of upgrading.

As many latecomer regions have acquired unprecedented degree of openness and growth, such as the ones in East Asia, firms and states in those regions find themselves are competing in a common platform but under unequal terms. The latecomer economy thus bears a special meaning in the era of globalization not as just simple as economic development (Storper et al., 1998). Plenty of studies have been devoted to identify nation-states as a key driver to industrial upgrading in East Asia. The FG paradigm was a much earlier influential work developed in the 1930s and popularized in the 1960s (Akamatsu, 1961; Kasahara, 2004; Ozawa, 2002, 2005). The first generation of FG paradigm concerned the state-led industrial development as a process of moving from import

substitution to export orientation. The second generation of FG paradigm proposed an industrial sequence of upgrading on the basis of shifting comparative advantages under strong state intervention.

Akamatsu's (1961) FG paradigm was considered as the third version of FG that identified the international division of labor in East Asia as an unbalanced growth model. This model was "aligned successively behind the advanced industrial nations according to their different stages of growth" (Ozawa, 2005:9). The postulated logic was that the production of commoditized goods would continuously move from the more advanced countries to the less advanced ones. Ozawa (2002, 2005) updated the FG model into an industrial-specific sequential development in the forms of various spatial clustering among Asian countries (see Figure 2.1). In Ozawa's account (2005:28), the latecomer upgrading was an outcome of "incessant learning which has been made possible in terms of crafting economic policies and pre-arranging the requisite institutions designed to make the best use of the prevailing politico-economic conditions both at home and overseas at each stage of catch-up". However, the FG paradigm tended to hold an over-optimistic view to the upgrading of the East Asian late-comers. It predicted that Japan would continuously be the leading economic power in East Asia dominating the sequence of industrial upgrading in other Asian countries. It neglected influences from other forces, such as various regionalized forces based on class-divided systems (Hart-Landsberg and Burkett, 1998). Moreover, the mechanism of technological transfer in the FG paradigm was over simplified as a process of reverse engineering and learning by doing (Kasahara, 2004).

Figure 2.1 Sequences of industrial upgrading in East Asian NIEs



Source: adapted from Figure 7.1 in Ozawa (2005:141).

Sharing many similarities with the FG paradigm, scholars developed another strand of literature termed as a 'developmental state' mode of capitalism for explaining the rise of East Asia in the late twenty century (Amsden, 1989, 1997; Bagchi, 2000; Huff, 1999; Johnson, 1982; Wade, 1990; White, 1988). The main characteristics of a developmental state were: being a 'rational planed' state, autonomous bureaucracy, close firm-state relationships and strategic preferential industrial policies. These characteristics were considered as effective institutional infrastructures for developmental state institution to achieve domestic upgrading against competitive pressure and the external control of TNCs in market-led countries, such as the United States. A key prerequisite for fulfilling this upgrading process was the existence of a 'pilot agency' (Chu, 2002; Douglass, 1994; Huff, 1999; Kohli, 1994). In Japan's context, it was the celebrated Ministry of International Trade and Industry (MITI) the main focus in Johnson (1982) and Ozawa (2005). In their explanations, the successful

upgrading of Japan highly depended on the consistency of industrial planning in which the MITI played the role as both a protector and a promoter. However, the key problem with the developmental state approach was that it overemphasized the significance of state capacity and close firm-state relations. In fact, these institutional infrastructures might go wrong and cause serious negative impacts to domestic economies. Moreover, state supports might be limited. They were effective in boosting technological imitation, transfer or diffusion, but did not necessarily do better than the private sector in stimulating innovation (Beeson, 2004; Ozawa, 2005).

More recent studies extended analytical scopes from nation-states to a national innovation system since the late 1980s and the early 1990s. The NIS literature implied the issue of upgrading by articulating interactions and synergy within national production systems, industrial complexes and inter-firm networks that shape domestic technological innovation and diffusion (Lundvall, 1985, 1992, 2007). This concept was widely diffused through the study on the NISs of Japan and South Korea (Freeman, 1987, 1994, 1995). Scholars in this vein proposed that state institutions should focus on constructing knowledge infrastructures (universities and research institutes) and wider institutional settings including the national education systems, labor markets, financial markets, intellectual property rights, market regulations and welfare regimes. These factors are deemed as determinant factors to the innovation/upgrading capability of states (Lundvall, 2007). Nevertheless, there were insufficient empirical evidences to support and legitimate the NIS framework as a system. As Ernst (2007) has argued, a NIS is hardly considered as nationally bounded system, while it is permeated with each other through the international linkages of knowledge diffusion,

particularly upon GPNs.

2.3.2 A firm-centric approach in studies of global value chain

In contrast to the state-centric approaches, the GVC approach in economic sociology and development studies rests its analytical focus on corporate actors in value chain governance. It has become the most influential work in the contemporary studies of industrial upgrading. The GVC approach derives from the commodity chain research. A commodity chain was originally defined as a network of labor and production process whose end result was a finished commodity (Gereffi and Korzeniewicz, 1994a). It was then conceptualized as a GVC (Gereffi, 1999; Gibbon, 2001; Kessler, 1999). Based on empirical studies from developing countries, the GVC proponents shared similar understandings as below (Bair and Gereffi, 2001; Dunn et al., 2006; Gereffi, 1999; Gereffi et al., 2005; Humphrey and Schmitz, 2002b; Pomerleano and Shaw, 2005; Schmitz, 2004; Staritz et al., 2011; Sturgeon and Kawakami, 2011).

Upgrading is a general nature of firms to secure survival and competitiveness through innovation, learning or acquisitions. There are generally four types of firm-level upgrading (Humphrey and Schmitz, 2000, 2002a, b; Schmitz, 2004):

(1) *Process upgrading*: transforming inputs into outputs more efficiently by reorganizing production systems or introducing superior technologies, e.g. installing new processing lines or improving processing skills;

(2) *Product upgrading*: moving into more sophisticated product lines in terms of increased unit values, e.g. making better products, adopting new design, adding new component into the products;

(3) *Functional upgrading*: acquiring new, high value-add or superior functions, such as from simple processing into full package production, from OEM to ODM/OBM[2], or adding other functions like design, marketing, management, branding and retailing;

(4) *Sectoral (Chain) upgrading*: applying the competence acquired in a particular function to move to a new sector which is more skilled, complicated or higher value-add, so as to reap the economies of scopes.

Lead firms, suppliers and the patterns of value chain governance constitute the scenario of upgrading in which lead firms play a determinant role with strong bargaining power over their suppliers. The bargaining power of lead firms originates from their market and technological advantages. Suppliers tend to be less powerful because they are substitutable. Suppliers can initiate local joint actions or increase the capability of integrated production in order to increase their bargaining power, but these efforts cannot fundamentally reshape the asymmetrical power relation.

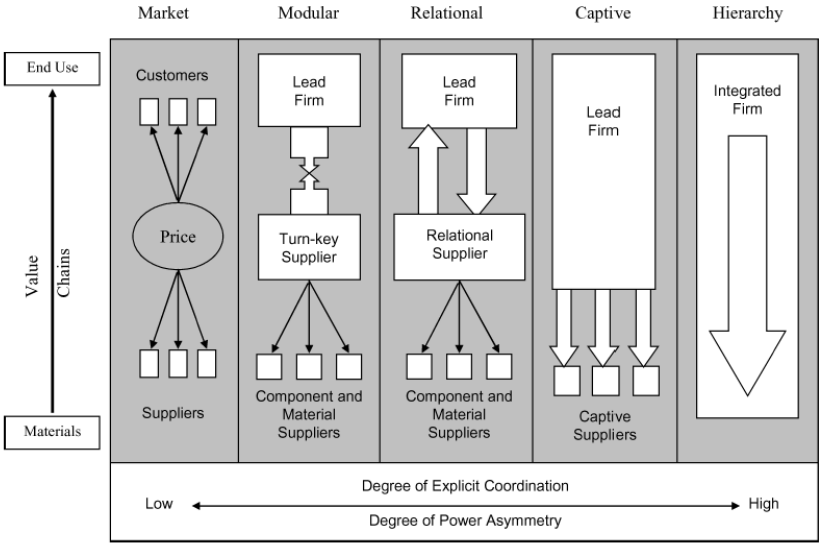
To maintain production stability and industrial standards, lead firms would help local suppliers in product and process upgrading, but they tend deliberately to block functional upgrading because this upgrading will challenge their market positions. In other words, lead firms define the content and extent of local upgrading. Hence, by inserting into value chains, producers in developing countries can experience fast product and process upgrading. But they will make little progress in functional upgrading, while developed country producers engage less difficulty in these two kinds of upgrading.

[2] OEM: original equipment manufacturer; ODM: original design manufacturer; OBM: original brand manufacturer.

By investigating into how the US lead firms shaped their offshore production networks and fostered upgrading in East Asia, studies found a dichotomy pattern of governance known as *buyer-driven* and *producer-driven* value chains (Gereffi, 1996, 1999). In the apparel industry in East Asia, which represented the buyer-driven mode of governance, lead firms were the gate keepers of upgrading opportunities. Whether East Asian suppliers/subcontractors could upgrade was determined by their abilities to establish close linkages with a diverse array of lead firms from the United States and West Europe. Empirical studies of Japan, South Korea, Hong Kong, Taiwan and Singapore supported this argument that lead firms were the primary sources of material inputs, capital, technologies and managerial knowledge in those chains. The dichotomy between the buyer-driven and producer-driven mode of governance was consequently critiqued to be oversimplified in understanding the global economy (Gereffi, 2001a; Humphrey and Schmitz, 2001).

As a response, Gereffi et al. (2005) developed a five-fold governance framework based on three variables: complexity of information and knowledge transfer, extent of knowledge codification, and supplier capabilities (see Figure 2.2). The various configurations of these variables reflect different extent of transaction costs that lead to the formation of five types of governance including market, modular, relational, captive and hierarchy. The more are local suppliers depended on buyers, the less power will they have in the partnerships with global buyers. Vice versa, the more powerful are global buyers, they would be more able to control the diffusion of knowledge and define the content of industrial upgrading among their suppliers.

Figure 2.2 Five types of global value chain governance



Source: adapted from Figure 1 in Gerreffi et al. (2005:89).

Based on this topology, the GVC approach highlights the strength of governance power in explaining the possibility of upgrading in respective types of chains. In traditional industries where technologies are simple and increasingly become standardized and matured, like the bicycle, toy, bag, textile and apparel industries, the governance pattern tends to be *captive,* while is changing *into relational* governance more recently (Bair and Gereffi, 2001, 2003; Frederick and Gereffi, 2011; Galvin and Morkel, 2001; Gereffi, 1999, 2001b; Gereffi et al., 2005; Morris et al., 2011). Lead firms subcontract most of the manufacturing works and become global buyers which local suppliers or subcontractors are captive to. This is because the most important competitive edges in those industries are no longer production technologies, but design, marketing and distribution capabilities. Latecomer upgrading in these industries tends to be achieved through learning by doing, organizational acquisition and technological assistance from global buyers. The captive governance would be changed into relational governance when local suppliers manage to develop strong capabilities of integrated production. In this case, local suppliers reduce dependency on a single lead firm,

but are still under global industrial governance. Global buyers reinforce the parameters set within value chains and extend the parameters as industrial standards for suppliers to follow at a global scale (Nadvi, 2008; Nadvi and Wältring, 2004).

Among industries with highly sophisticated and rapidly changing technologies, such as the electronics and other high-tech industries, the governance pattern tends to be *modular*. Due to high technological and capital entry barriers, firms in these industries progressively prefer technological modularization and standardization that integrates a customer's needs for direct monitoring and control. Hence lead firms may concentrate on maintaining their technological cutting edges by adopting industrial specialization and outsourcing strategies simultaneously in fierce market competition (Cattaneo et al., 2010; Gibbon and Ponte, 2008; Nadvi and Halder, 2005; Principe and Honday, 2003; Sturgeon and Kawakami, 2011). Suppliers tend to develop strong technological competences and become quick followers of global lead firms. Otherwise, they would be marginalized into manufacturing peripheral parts or products with trivial profits. The recent emergence of platform developers diversifies the modular governance at a global scale which provides more upgrading opportunities to suppliers, while also increases the risk of technological lock-in (Chesbrough and Kusunoki, 2001; Sturgeon and Kawakami, 2011). I will further explain this dynamics in section 6.2 in Chapter 6.

In some industries with sophisticated technologies and complex production networks such as the automotive industry, upgrading opportunities for suppliers are fewer under the captive and modular governance. As the GVC scholars have argued, this is because technologies are too complicated to be fully codified; meanwhile transaction costs and asset

specificity are also high due to the consolidation of global lead firms (Freyssenet and Lung, 2000; Gereffi, 2001b; Gereffi et al., 2005; Kaplinsky, 2004; Sturgeon and Biesebroeck, 2011). A small group of global auto assemblers play a dominant role in supervising their production bases in different clusters at a global scale. Even their key suppliers, which have strong technological cutting edges in certain components, are subject to this governance mode.

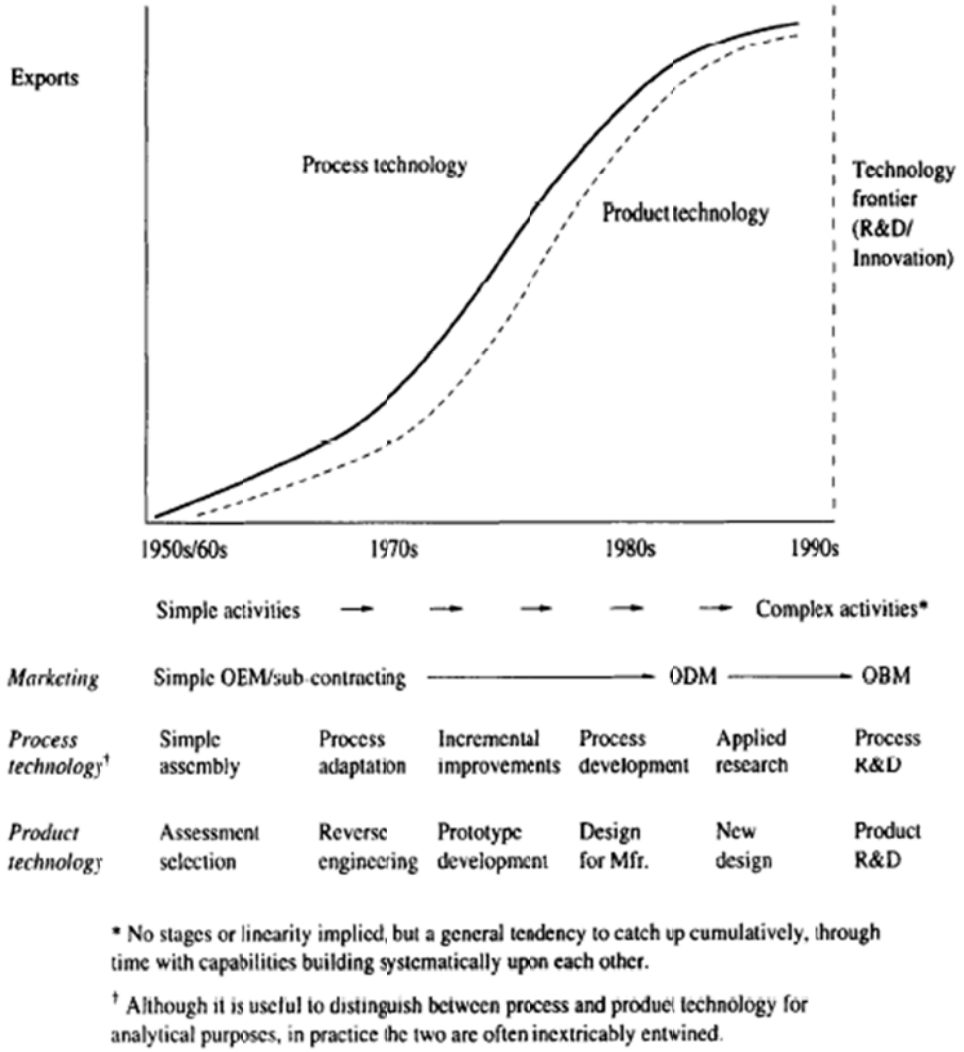
2.3.3 Local upgrading in the global economy

The above two sections review the important role of global lead firms and nation states in the process of local upgrading. In contrast to them, there is a growing body of literature investigating how local firms (or suppliers) struggle for upgrading through various means. Three groups of studies are presented.

The first group of studies comes from Hobday's works on the trajectories of latecomer upgrading in Japan, South Korea, Taiwan, Hong Kong, Singapore, and other East Asian NIEs (Hobday, 1995, 1998, 2001, 2008; Hobday and Perini, 2005; Hobday and Rush, 2007). Lessons from East Asian NIEs show some common characteristics. Most of the successful cases of upgrading came from the firms which served as 'quick followers' of their lead-firm counterparts. This view resonated with the GVC literature. Local suppliers did not heavily rely on indigenous innovation, but learned and acquired advanced technologies through various forms of cooperation with lead firms, such as joint ventures, technological licensing, subcontracting and strategic alliance. A general trajectory was summarized in Figure 2.3. Latecomers firms are narrowed to occupying simple production segments at the earlier stage. Product upgrading was driven by lead firms. Process upgrading tended to come later than product upgrading and often brought significant improvement in productivity. The latecomer

firms experienced less functional upgrading unless national states provided substantial investments, such as the cases in the automotive and electronics industries in South Korea and Taiwan.

Figure 2.3 The trajectories of industrial upgrading in East Asian NIEs



* No stages or linearity implied, but a general tendency to catch up cumulatively, through time with capabilities building systematically upon each other.

† Although it is useful to distinguish between process and product technology for analytical purposes, in practice the two are often inextricably entwined.

Source: Figure 1 in Hobday, (1995:1184).

The second group of studies focuses on upgrading in clusters located in Latin American countries in which sectoral specificity and knowledge diffusion mechanisms were the analytical foci (Giuliani, 2005; Giuliani et al., 2005; Pietrobelli and Olarte, 2002; Pietrobelli and Rabellotti, 2004, 2011; Pietrobelli and Saliola, 2008). Examining twelve industrial

clusters and forty firms in seven countries, including Brazil, Chile, Colombia, Peru, Mexico, Costa Rica, Giuliani et al. (2005) identified that sectoral specificity had significant influence on the content and extent of upgrading (see Table 2.3). Pietrobelli and Rabellotti (2011) examined the learning opportunities diffused from GVC to domestic markets and how national innovation systems reacted to facilitate this process. Collective action among local firms was revealed as an important ways of facilitating local upgrading.

Table 2.3 The sectoral specificity of industrial upgrading

Industries	**Types of Upgrading**	**Rationale**
traditional manufacturing	Active product and process upgrading; rare functional upgrading	Knowledge circulation within clusters, vertical joint actions among suppliers and buyers and multilateral horizontal cooperation
natural re Sources-based industries,	Process and product upgrading, rare functional upgrading	Intensive application of advanced technologies, public research institutes and the horizontal joint actions of local associations; rare functional upgrading because of the strict control of industrial standards on food production;
complex-product industries	Few cases of upgrading	Little interaction between leader firms and local suppliers
specialized-supplier industries	Active product, process upgrading and Functional upgrading	Thick horizontal cooperative relations and active associational economies, collective initiatives, such as joint R&D activities, joint participation to trade fairs.

Source: adapted from Giuliani et al. (2005).

The third group of studies focuses on local response as a resistance to the governance imperatives of lead firms (Humphrey and Schmitz, 2002a; Schmitz, 2004). The governance power of lead firms is endowed by their capabilities in production-parameter setting in their value chains. The purpose of enforcing parameter setting is to maintain product definition[3] and avoid the risk of supplier failure[4] (Humphrey and Schmitz, 2002b). A fundamental

[3] It means that lead firms tend to provide precise product specification to suppliers and monitor them.
[4] It means the situation that suppliers fail to follow product definition and make their buyers become vulnerable.

imperative of chain governance was identified based on industrial clusters in Mexico, Brazil, Italy, Span, German, Taiwan, Pakistan, India and other developing regions (Humphrey, 2003; Humphrey and Schmitz, 2001, 2002a, 2008; Schmitz, 1999, 2004; Schmitz and Knorringa, 2000). Global lead firms would help local firms to upgrade in order to serve them better. However, these lead firms would impede upgrading whenever they felt competitive pressures from their local suppliers. As a response, local firms launched joint actions to bargain with lead firms. For instance, in the blue Jeans clusters in North America (e.g. Paso and Torreon in Mexico), local manufacturers were seriously confined to translating buyer's specifications into practical knowledge even though that knowledge was necessary for production (Bair and Gereffi, 2001, 2003; Bazan and Navas-Alemán, 2004; Navas-Aleman and Bazan, 2005). In the literature on competitiveness and corporate restructuring, scholars suggested that probably the most valuable strategy for local firms to leverage the governance power of lead firms was to agglomerate together and plug into multiple value chains (Hoskisson et al., 1994; Kaplinsky, 2000; Porter, 1996, 1998, 2000, 2003). For instance, investigating into the local automobile-industry in Brazil and India, Quadros (2004) demonstrated that local firms developed certain tolerance to strict governance by inserting into multiple value chains which connected to North America and Europe.

2.3.4 Critical assessments: whether the geography of industrial upgrading?

This section has shown how non-geographers have articulated the mechanisms of upgrading in the global economy. These studies have informed our understandings of how late-comers pursue industrial upgrading through various means. The state-centric approaches, represented by the studies of FG paradigm, developmental state and NIS, have demonstrated

the important role of nation-states in upgrading in terms of planning preferential industrial policies, forming specific institutions and cultivating indigenous innovative environment. Premised on a firm-centric approach, the GVC literature has revealed dynamics between inter-firm organizations and upgrading in relation to transaction costs and the power of corporate governance. This strand of literature makes significant contributions by leading us to appreciate the importance of value chain governance that brings upgrading opportunities for late-comers. As a complement, studies of latecomer economies show us the trajectory, industrial specificity and local resistance in upgrading. These studies have reaffirmed my concern that industrial upgrading is a crucial issue that constitutes the ongoing dynamics of the global economy. According to these studies, the upgrading process apparently cannot be simplified into a trade-based process of development. It involves changes of technological capacities and corporate functions. It is also more than a process of innovation, as latecomer firms may upgrade through a deliberate strategy of learning that focuses on the mastering and improving of the absorbed technologies from their partners (Viotti, 2003). More importantly, the dynamics of strategic actions and power relations is involved during the process of upgrading. With respect to these contributions, I offer two critiques from a geographical perspective.

First of all, these studies have yet to articulate the spatiality of industrial upgrading and thus do not help us appreciate the influences of geographical factors, such as local contexts, regional assets and resources embedded in GPNs.

In the state-centric approaches, scholars adopted the ‘nation-states’ as an analytical unit, while neglected the geographical heterogeneity at sub-national scales (regional and local). In

other words, these studies are embedded in methodological nationalism. These scholars tended to treat domestic economic environment as homogenous territories and considered the environment as a nationally bounded system. Hence they argued for the 'national stages of development' as a reproducible model. But this assumption would be highly problematic when applied to a large territorial country, like China, India and the United States (Chan, 1993). As Bernard and Ravenhill (1995:171) argued, "rather than Japan's development trajectory being replicated in country after country, industrial diffusion [in East Asia] has been characterized by shifting hierarchical networks of production and partial diffusion into diverse politic-economic contexts at differing historical junctures". In studies of NIS, scholars critiqued that the 'national systems' were seldom nationally bounded, but were interwoven by the transnational production networks composed by TNCs and suppliers (Ernst, 2002; Ernst, 2005; Ernst and Kim, 2002). Empirical studies from East Asian regions also affirmed that the diverse trajectories of regional development were produced by regionalizing production networks arching over the globe rather than by nationalized production systems (Kim, 1993; Lüthje, 2004; Yeung, 2007a; Yeung, 2009a).

The GVC approach is also insufficient in explaining latecomer upgrading because of its vague spatial ontology. The value chain is conceptualized as a global-local dichotomy of linear structure without contexts. The rationale of the GVC approach lies on sectorally and organizationally specific realities which are the distinctive features of the *chain* metaphor. Hence it overlooks a critical issue that the embeddedness of value chains. It neglects a fact that the strategy of firms is not fully autonomous, but embedded in spatial contexts in terms of institutional conditions and territorialized assets (Hess, 2004). To this point, Bair (2005:153)

argued that “closer attention to the larger institutional and structural environments in which commodity chains are embedded is needed.” (see more detail critiques in Coe et al., 2008a). Moreover, the GVC approach premises on the determinant power of global lead firms and tends to hold a view that local upgrading, particularly functional upgrading, will necessarily challenge the power of lead firms. Although scholars in the GVC approach have pointed out the efforts of clustering and joint actions from local firms to increase their bargaining power, the global-local nexus still gives no place for analyzing regional and national influences. I argue that incorporating regional and national forces into upgrading studies is important, because these forces may enable local firms either to leverage the power of global lead firms, or to nurture more mutual interests with them. In doing so, local upgrading may not necessarily create tension within the value chain. Even more synergy can be identified once local firms develop certain competitive advantages by utilizing institutional assets embedded at regional and national scales. This critical potential has been identified in recent works adopting the GPN approach and I will detail the potential of power dynamics in the next chapter.

Second, these studies of upgrading prefer to be either state-centric or firm-centric in investigating upgrading. This mono-actor perspective has failed to appreciate the synergy among all stakeholders.

The state-centric approaches largely focus on the roles of national institutions and pay insufficient attention to the actual process of technological transfer and absorption at a firm-level analysis. As I have pointed out in section 2.3.1, most of their analyses are quite partial because of their methodological nationalism, while the actual performances of firms

are often neglected. These studies often take upgrading for granted because they consider knowledge spillover would happen alone with the prosperity of foreign investment and international trade, but few of empirical surveys are provided to verify this mechanism (Kasahara, 2004). To this point, geographers have shown some evidence pointing to the disappointed outcomes of knowledge spillover from foreign investments (Wang and Lin, 2008; Wang and Lee, 2007; Young and Lan, 1997). The GVC approach explicitly articulates the performance of firms in upgrading, while it is premised on a firm-centric approach as I have critiqued in section 2.3.2. Institutional-spatial influences are absent in the value-chain analyses. How can the problem of mono-actor perspectives be overcome? I would argue that a broader analytical framework is needed to incorporate both approaches. This work can lead us to appreciate the synergy among all key actors, such as global lead firms, platform developers, CMs, local suppliers and various state institutions and so on.

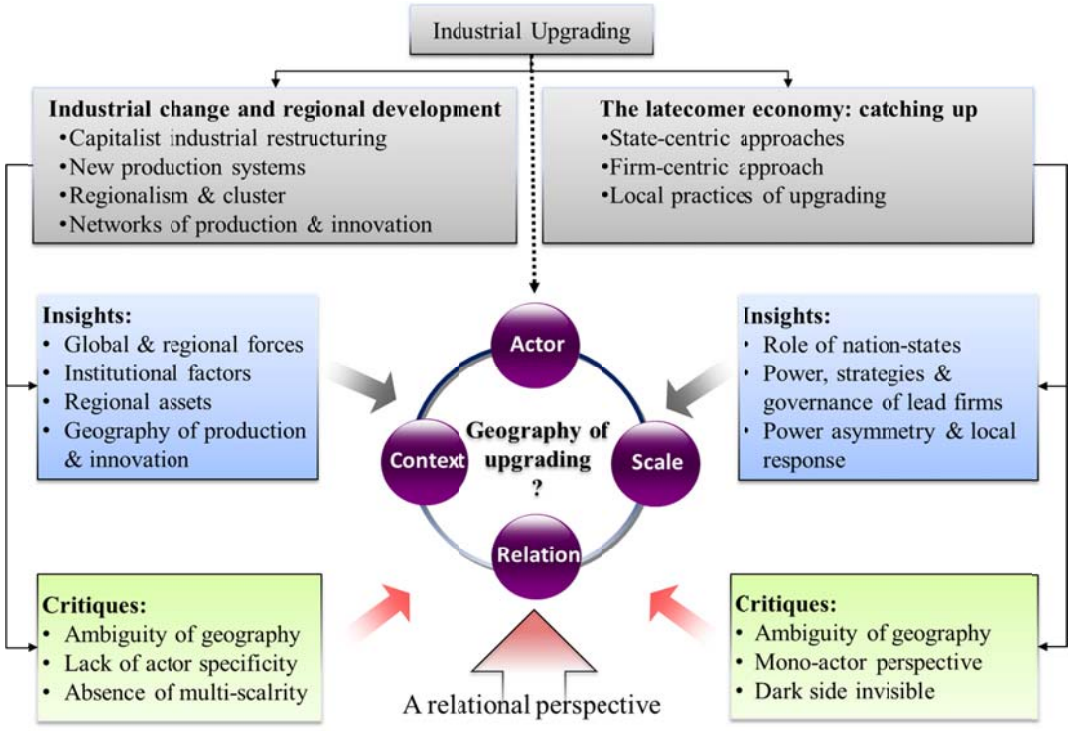
2.4 Conclusion: Whither the geography of industrial upgrading?

This chapter provides a critical review of the contemporary studies of industrial upgrading in both geographical and non-geographical literature. The review helps me position the entire thesis upon a solid ground for answering two basic questions: why studying industrial upgrading is needed; and what we have not known yet. I have summarized the main content of this chapter in Figure 2.4.

In relation to the geographical literature, I post a 'where' question in the sense that the issue of upgrading is hardly found in mainstream economic geography. It tends to be subsumed into various relevant topics. Based on my assessment, I argue that studying

upgrading is valuable, because it leads us to examine regional development in a more critical manner by looking at the catching-up process of local firms. Economic geographers indeed have tackled relevant issues about upgrading which provide some insights for this study, such as global and regional forces of industrial changes, institutional factors in shaping new regional economies, regional assets that underpin region competitiveness, as well as the geography of production and innovation in the era of globalization. These insights guide me to situate this study in a context of globalizing regional development and to pay specific attention to the interaction between firms and state institutions. But these studies have yet to appreciate the variety of upgrading and the power dynamics within value chains/production networks in the process of upgrading. I thus suggest geographers should focus more on actor's behaviors in the process of upgrading, such as incentives, strategies and practices, which could be considered as a micro-level analysis to a certain degree.

Figure 2.4 Summary of the literature review and research positioning



Source: compiled by author.

When looking for insights outside geography, I propose a 'whether' question. Non-geographical studies have unpacked the mechanisms of upgrading in three different approaches: state influence, lead-firm governance and local practices. But the geography of these studies is ambiguous. These studies guide me to appreciate the power dynamics and upgrading strategies within various types of value chains. But is industrial upgrading replicable among developed and developing regions? What are the geographical conditions that facilitate or hinder the process of upgrading? How will different institutional-spatial contexts reshape the power, as well as the strategies of upgrading?

By recognizing both insights and limitations of the precedent studies above, I propose a 'whither' question of how a geographical investigation can shed light on the study of industrial upgrading. According to the synthesis of intellectual insights in Figure 2.4, this study identifies two critical missing links pertinent to the geography of upgrading.

First of all, in the context of a globalizing region, latecomer upgrading is not a purely autonomous or self-contained action of a single firm, but is produced by lead firms, local firms and state institutions through the process of global integration. The earlier works have informed us the features of global forces and regional forces respectively. But we have not known much about how different patterns of integration between latecomer regions and the global economy would affect the outcomes of local upgrading.

Second, coming from different scales, these actors are not just rooted in various value chains, but are also embedded in respective institutional-spatial relations. Due to such institutional-spatial embeddedness, the process of local upgrading is neither a purely autonomous process of indigenous learning, nor a pre-determined outcome under different

governance patterns. Instead, local upgrading is also subject various institutional-spatial conditions. The earlier works have informed the powerful role of global lead firms and the problems of the external dependence of local firms. But we have not known much about how those institutional-spatial conditions would enable local firms to leverage the power of lead firms. In other words, the power dynamics of local upgrading is unclear.

In order to fill in these gaps, a broader analytical tool is needed that can incorporate both firms and non-firm actors from different scales; and then involve economic, institutional and spatial relations within one single analytical framework. I argue that the relational perspective in economic geography can serve this purpose. Derived from relational thinking in regional development in the 1980s, this perspective focuses on revealing the "complex nexus of relations among actors and structures that effect dynamic changes in the spatial organization of economic activities" (Yeung, 2005:37). The preoccupation of the next chapter is to develop my analytical framework, conceptualization and propositions based on this relational perspective.

Chapter 3 The dynamics of latecomer upgrading: a relational framework

3.1 Introduction

In an era of globalization, the territorial ensembles of economic development, such as places, cities and regions, are interconnected into complex production networks (Amin, 1998, 2002). What makes globalization different from earlier stages is that the global shift of production networks breaks up a commodity chain into many segments which are geographically separated among different while interconnected sites. By plugging into these overarching production networks, firms in latecomer regions can receive the opportunities of upgrading to learn from TNCs. To many latecomer economies presently, attracting foreign investment or export-oriented industrialization has become a well-known tool for promoting economic growth. However, whether latecomer firms are able to catch up with foreign firms and achieve industrial upgrading is in question. Without upgrading, local firms are not competitive and highly substitutable.

In order to upgrade, the GVC literature suggests latecomer firms to insert into value chains as the quick followers of global lead firms. Latecomer firms have a chance to climb up the value-added ladder step by step, if they fulfill all requirements set by lead firms (Gereffi et al., 2005; Schmitz, 2004; Sturgeon and Lester, 2004a). But the problem is that local upgrading is limited because the content and extent is defined by the governance patterns of TNCs. As a

response, development studies suggest that national forces (e.g. state intervention) can be a key ingredient for promoting domestic industrial upgrading against the control of TNCs. Economic geographers contribute to the debate by pointing out various regional and local factors that shed light on the regional pathways of industrial upgrading. The common thread of development studies and economic geography is the belief that institutional factors, such as states and associational economies, can be pro-active actors in facilitating the process of industrial upgrading.

How can these two strands of literature be reconciled? One emphasizes the dominant role of lead firms and the other highlights institutional influences. According to my critical review in Chapter 2, a broader analytical framework is needed to incorporate three key actors (global lead firms, state institutions and local firms) and their contexts into analyses (see Figure 2.4). This chapter provides a means of doing this. Instead of focusing on corporate power or state power alone, this study investigates into the interaction among key actors to explain the dynamics of local upgrading. This attempt is built on the concept of *strategic coupling*. In the context of globalizing regional development, it represents to the pattern of integration between latecomer regions and the global economy. The central research question driving this study is how different patterns of strategic coupling affect local upgrading. This research question is resonated with Hubert Schmitz who has argued that the pattern of global integration is the focus of latecomer development:

> A key concern in industrial policy [for developing countries] is how to configure the relationship with the global economy…the choice open to them [developing countries] is not therefore whether to integrate into the global economy, but how: fast or slowly, comprehensively or selectively, taking the low or the high road (Schmitz, 2007:417).

My research question includes three issues: (1) how does industrial upgrade happen within the process of strategic coupling and who are the key drivers; (2) how does strategic coupling evolve and lead to upgrading; (3) in what ways can geographical factors, such as the institutional-spatial contexts of firms, reshape power relations and local strategies within the coupling relationships, thus facilitating or hindering upgrading. Through examining these issues, I argue that industry upgrading in a globalizing region is mainly driven by strategic coupling which in turn is constituted by the interactive effects among local firms, TNCs and regional institutions. This central argument helps readers understand the ongoing dynamics of upgrading in latecomer economies, rather than deem it as a pre-determined trajectory based on stylized governance patterns or a necessary outcome of industrial promotions assisted by state institutions.

To legitimize my central argument, this chapter is organized into five sections. The next section elaborates on my epistemological selection of the relational perspective in economic geography. It articulates how the relational perspective leads us to reinterpret industrial upgrading. The third section develops a relational framework for conceptualizing casual relations between strategic coupling and industrial upgrading in the context of globalizing regional development. Actors' strategies, relations, power, knowledge gaps are key factors that shape the formation of strategic coupling. The penultimate section theorizes four types of strategic coupling that produce local upgrading in different ways. Four propositions are developed for empirical examination. In conclusion, I discuss how my analytical framework and conceptualization contributes to the literature.

3.2 A relational perspective on industrial upgrading

This section reviews the debate about relational economic geography and articulates why a relational perspective is suitable and needed for this study. A further discussion interprets the relational fabric of upgrading on the basis of the previous conceptualization of industrial upgrading in the literature of industrial governance and strategic management.

3.2.1 The perspective of relational economic geography

The original idea of relational economic geography (REG) can be dated back to the late 1970s according to the relational thinking and the discussions of extra-regional processes in understanding regional development (Dicken, 1976; Massey, 1979). These works were gradually developed into a new strand of conceptual work known as the 'relational turn' in economic geography (Amin, 1998; Bathelt and Glückler, 2003; Boggs and Rantisi, 2003; Ettlinger, 2001; Jones, 2009; Yeung, 1994, 2005). Since the 2000s, this perspective has been deployed by geographers to articulate the formation of the network forms of production and innovation in the process of globalization, such as the GPN literature (see Chapter 2). The analytical focus of the relational perspective is the "complex nexus of relations among actors and structures that effect dynamic changes in the spatial organization of economic activities" (Yeung, 2005:37). Scholars have debated about this relational perspective in recent studies.

From a proponent's sympathetic critique, contemporary works in REG are not 'relational enough'. Most of the works are only conducted in a "*thematic* sense, focusing on various themes of socio-spatial relations without theorizing sufficiently the nature of relationality and its manifestation through power relations and actor-specific practice" (Yeung, 2005:37).

Bathelt and Glucker (2003:125) located the essence of REG in analyzing "intensions and strategies of economic actors and ensembles of actors and the patterns of how they behave". Yeung (2005) argued that, in order to operationalize a 'relational thinking', geographers needed to move from focusing on relations *per se* to unraveling the fabrics of relations. For instance, further efforts are suggested to examine relationality and different types of emergent power in a relation.

From an opponent's view, the REG approach tends to be too 'relational' and too abstract so that it has a risk of losing much of its content and analytical capability (Sunley, 2008). The general critique is that REG focuses on relations *per se* and does not identify causal mechanisms. It thus becomes 'immune' to empirical evaluation. The REG approach is also characterized as preferring a loose analytical framework and privileging a network-centric view. Therefore REG may lack a coherent research agenda and tends to restrict on a micro-level analysis that acts like a post-essentialist or post-scale approach based on a flat spatial ontology.

This thesis does not read these two views as hostile, but as complimentary. Both the opponents and proponents have recognized the weaknesses of the REG approach in identifying causal mechanisms, whereas their prescriptions for overcoming this limit are different. Yeung (2005:48) argued to "unpack relational geometries[1] imbued with causal power capable of producing spatial change", whereas Sunley (2008:19) suggested to recognize the durability of economic habits and routines which rendered the patterns of economic relations as the "reproduction and transformation of sets of rules and conventions".

[1] This refers to the spatial configurations of heterogeneous relations among actors and structures through which power and identities are played out and become efficacious (Massey, 1979; Yeung, 2005:38).

Sunley's (2008) suggestion points to an evolutionary approach in economic geography which focuses on revealing differentiated spatial systems that cause the evolution of economic actors (Boschma and Frenken, 2006; Boschma and Lambooy, 1999; Martin and Sunley, 2006). However, the evolutionary approach has difficulty in explaining economic behaviors within a shorter time span. So far, it still has difficulties in operationalizing empirically key concepts, such as routines, path dependency and lock-in (see the debates in a special issue lead by Boschma and Frenken, 2009). To this point, the REG approach provides a more realistic and feasible epistemological toolkit for examining upgrading in a latecomer region which is under rapid industrialization. The merits of the relational perspective are that it does not privilege any forces and actors at different scales; it highlights various relational factors, but not solely looks at network forms of organization *per se*. Hence the REG approach can incorporate both firms and non-firm actors from different scales; and then involve economic, institutional and spatial relations within one single analytical framework. More importantly, adopting the relational perspective enables this study to bridge REG with the GVC literature, because network/chain analysis is a common thread in these two strands of literature. In doing so, this study is capable of analyzing value chain governance, inter-firm networks and the embeddedness (institutional-spatial contexts) of these networks within a single analytical framework.

3.2.2 Conceptualizing industrial upgrading: in what sense is it relational?

Through this epistemological lens of REG, the phenomenon of industrial upgrading is reinterpreted as a group of interconnected firms and non-firm actors which cooperate and compete with each other for their own upgrading strategies in a specific spatial context. The

question is in what sense industrial upgrading is relational.

In a simplest way, industrial upgrading is "to make better products, make them more efficiently, or move into more skilled activities" (Schmitz, 2004:1). More specifically, industrial upgrading is "a process of improving the ability of a firm or an economy to move to more profitable and/or technologically sophisticated capital and skill-intensive economic niches" (Gereffi, 1999:52). There are four general types of firm-level upgrading including process, product, functional and channel upgrading (see section 2.3 in Chapter 2). At an aggregated level, such as a regional scale, industrial upgrading would have two forms (Boschma, 2004; Gereffi, 1999). First is the improvement of regional competiveness through the development of vertical integration and the intra-regional division of labor. Second is the renewal of regional economies through establishing new industries. The second type of regional upgrading could be shallow because new industries can be directly transplanted from elsewhere through the relocation of multi-plant firms and/or TNCs. During such a process, firm may not upgrade at all. This study uses the term of *local upgrading* to refer the upgrading of local firms at either the firm level or the regional level so as to distinguish it from regional upgrading contributed by TNCs.

The process of upgrading involves relational features. The decision and implementation of upgrading is subject to diverse influences from intra-, inter- and extra-firm relations. These relations provide various channels for firms to accumulate necessary resources for upgrading. Meanwhile, when a firm implements an upgrading action, it may receive supports or resistances from other stake holders which can be suppliers, strategic partners, customers or other *in situ* institutional actors (e.g. governments). These relational features are not novel in

contemporary studies. The GVC literature has articulated various inter-firm relations within value chains and how these relations influence upgrading (Gereffi, 1999; Gereffi et al., 2005; Staritz et al., 2011). Development studies have revealed firm-state relations which channel state supports and assistance to domestic firms for upgrading (Beeson, 2004; Cammett, 2007; Evans, 1995; Meyer-Stamer et al., 2004). Geographers have also revealed various inter-organizational relations that construct regional innovation and learning networks (MacKinnon et al., 2002; Morgan, 1997; Trippl et al., 2009). These relations, linkages or external connects are important because these channels not only circulate resources for firms to upgrading, but also serve as a platform where power relations and interactions affect the outcomes of upgrading.

3.3 An analytical framework for understanding strategic coupling and industrial upgrading

The aim of this section is to operationalize the relational perspective in the investigation of industrial upgrading. Anchored in the GPN approach, the analytical framework of this study is to examine the network relationships of both firms and non-firms actors and more importantly, the mechanisms of industrial upgrading enact within these relationships. Situated in the context of globalizing regional development, the concept of strategic coupling is applied and further conceptualized as the key variable to explain upgrading in latecomer regions. By tracing these casual mechanisms rather than network structure per se, this study avoids the problem of network privilege pointed out by Sunley (2008). It also attempts to resonate with Yeung (2005) by unpacking power dynamics within the process of coupling

which produces spatial changes.

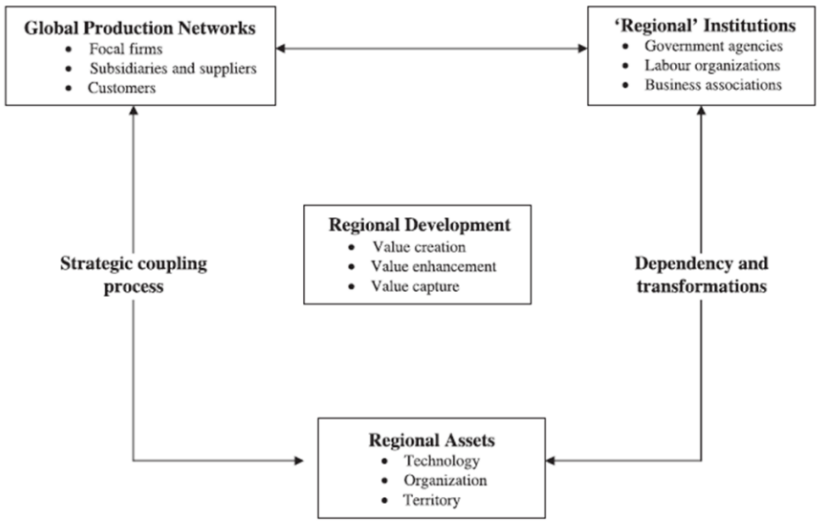
3.3.1 Global production networks and strategic coupling

A global production network is defined as a globally organized nexus of interconnected functions and operations by firms and non-firm institutions through which goods and services are produced and distributed (Coe et al., 2004; Henderson et al., 2002). The framework of GPN "aims to reveal the multi-actor and multi-scalar characteristics of transnational production systems through intersecting notions of power, value and embeddedness" (Coe et al., 2008a:267). The GPN approach moves beyond the GVC approach in three ways. First, it is more realistic in its analytical commitment to the network form, not linear structure. Second, the GPN analysis involves non-firm actors, institutional arrangements and environment. It is not limited to cost-based transactions, while open to other non-cost-based interactions, such as untraded interdependency, dedicated commitment, complementarity or the social mechanisms of network governance (Jones et al., 1997; Storper, 1997b; Yeung, 2005). Third, the GVC approach tends to assume a pre-determined asymmetrical power relation that lead firms have dominant power over local firms. In contrast, the GPN framework has a more flexible understanding of power which treats power in as a relational effect. The practices of power are not pre-determined, but subject to the specific relationality and the contexts of actors (Henderson et al., 2002; Hess, 2008; Hess and Yeung, 2006; Yeung, 2005). Although lead firms are powerful in their owned value chains, local firms may find a way to leverage their power by utilizing resources resting in their institutional and spatial contexts.

Since the 1970s, we have witnessed an intensified articulation of latecomer economies in

the Asia–Pacific region into GPNs in various industries, such as the dramatic rise of Japan, the rapid industrialization of the four East Asian "tigers" economies and the recent ascendance of an emerging giant, China (Cho et al., 1998; Clark and Kim, 1995; Dicken, 2007; Gereffi, 1994; Hoskisson and Johnson, 1992; Ozawa, 2005; Sit and Yang, 1997). This integration is mainly associated with a process conceptualized as *strategic coupling*, as showed by Figure 3.1. In the context of regional development, strategic coupling refers to "the dynamic processes through which actors in regions coordinate, mediate, and arbitrage strategic interests between local actors and their counterparts in the global economy" (Yeung, 2009a: 232). TNCs reap value from various means by utilizing regional assets provided by regional institutions and local firms. The power of complementarity derives from both inherent regional advantages and the industrial structure of global industries (Coe and Hess, 2011). Regional institutional actors, such as policy makers, play as a critical mediator in optimizing regional assets to seek for a better connection with GPNs so that local firms may take up a more promising position.

Figure 3.1 Strategic coupling in globalizing regional development



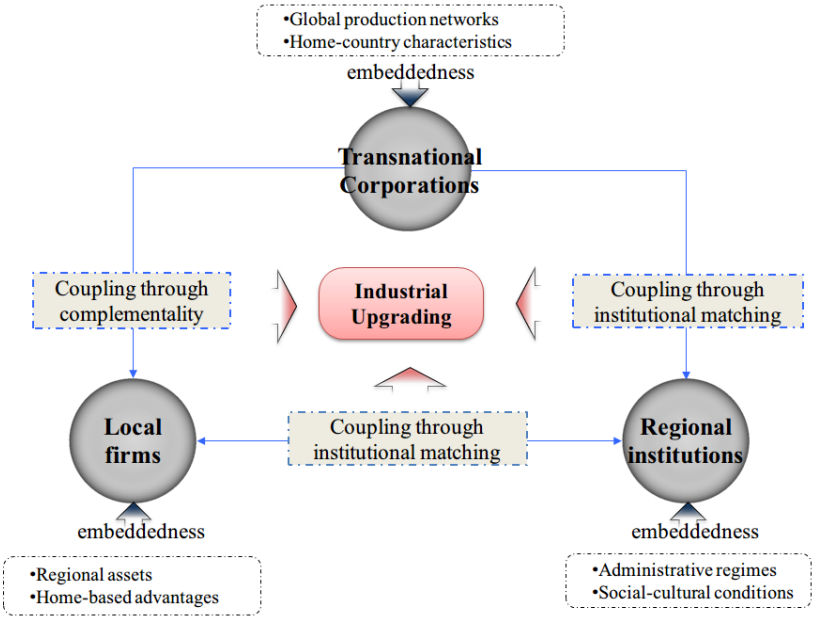
Source: Figure 1 in Coe et al. (2004:470).

The process of strategic coupling has three distinctive features. First, it involves active intervention and intentional action of the part of participants which is strategizing through carry out new combinations of resources to disturb the existing static equilibrium of an economy for arbitraging different opportunities (Mathews, 2002; Schumpeter, 1934). Secondly, it is a time-space contingent process, while not static. Strategic decoupling and recoupling may also happen due to changing capabilities of interests of participants or changing institutional-spatial contexts. Thirdly, the convergence process of coupling is multi-scalar that transcends different territorial boundaries and geographical scales (Yeung, 2009).

3.3.2 Actors, knowledge gaps and tension

As shown in Figure 3.1, the process of strategic coupling constitutes relations and power among key actors which subsequently determines the ways of value creation, enhancement and capture. Based on Figure 3.1, this study develops a specific framework for understanding better globalizing regional development and the dynamics of industrial upgrading (see Figure 3.2). In Figure 3.2, industrial upgrading takes place in a latecomer region based on strategic coupling between TNCs in GPNs and local firms in the region through which the advantages of regions interact with the strategic needs of the TNCs. Meanwhile, both TNCs and local firms indirectly couple with regional institutions through the process of institutional matching. Three key actors are identified in this relational framework: transnational corporations, local firms and regional institutions.

Figure 3.2 An analytical framework of industrial upgrading in globalizing regions



Source: compiled by author.

Transnational corporations (TNCs) refer to firms that have the power to coordinate and control operations in more than one country, even if they do not own them (Dicken, 2007). During the process of globalization, TNCs are primary players orchestrating their GPNs at a global scale. Some of them are global lead firms (branded-name firms presenting in end markets) which rest in the core positions of GPNs with superior technological and market power. Some of them grow into key suppliers or contract manufacturers for lead firms, following lead firms' steps during global industrial relocation (Humphrey, 2003). Some of them pursue industrial specialization and become platform developers or specialized-product providers (Sturgeon, 2002). TNCs will be attracted to locate at different regions due to their interests to take advantages of geographical differences in production or distribution factors. The advantages can be ownership, locational or internationalization advantages in Dunning's account (Dunning, 1979, 1988, 1995, 2000); the capabilities in the supply-base (Gereffi et al., 2005); special natural resources, lower labor wages, or specific state policies in terms of fiscal

incentives, industrial policies, trade barriers and subsidies and so on.

Local firms (the same as latecomer firms in this thesis) are the firms originating within a region. Conceptually, they are similar to local suppliers in the terminology of the GVC literature. Except for earning a profit, the initiative of local firms is to catch up with TNCs to prevent being discarded or marginalized by them. To reap time-cost efficiency during the process of catching up, most of the local firms would like to develop external linkages for sourcing knowledge and seeking additional assistance in territories, networks and society where they are embedded (Hess, 2004). This is the fundamental incentive for local firms to develop strategic coupling with TNCs and regional institutions.

Regional institutions in Figure 3.2 are represented by regional formal organizations, regionally specific institutions, local arms of national/supranational bodies and extra-local institutions that affect activities within regions without co-present necessity (Coe et al., 2004). Governmental agencies are the most important representatives that exert power based on a political-administrative system of governance dominated by national/regional/local states. Associational economies exist as networked forms of industrial organizations which mean for fostering inter-organizational cooperation and communication, the alleged 'collective social order'(Cooke and Morgan, 1998). Regional institutions serve as a critical mediator in optimizing regional assets and providing business-friendly and supportive institutional environment. In doing so, regional benefits from attracting good-performance TNCs to locate in and generate a knowledge-spillover effect among *in situ* firms through various means (Trippl et al., 2009).

When strategic coupling happens in a latecomer region, three key actors engage each

other and form different power relations. The opportunities of industrial upgrading result from knowledge diffusion and reproduction among the coupled actors. There are basically two main obstacles for local firms to catch up with TNCs: dislocation from the main international sources of technology and from the main international markets they seek to enter (Hobday, 1995). Schmitz (2007) reinterpreted these obstacles as technology and market gaps. Extending their ideas, I term these gaps as knowledge gaps shaped by the specific knowledge structures and prior knowledge of respective actors. Table 3.1 lists the main features of technology and market gaps that vary among different industries and market conditions.

Table 3.1 Knowledge gaps between latecomers firms and TNCs

Industrial and market configuration	**Technology gap**	**Market gap**
Matured industries: standard technologies with slow change	Low	High
New industries: specific technologies with rapid change;	High	Moderate
Foreign market: high demanding of design and quality, highly competitive;	High	High
Domestic market: matured products with lower technological requirement and price competition;	Low	Non-existent

Sources: adapted from Figure 2 in Hobday (1995) and Schmitz (2007:422).

To latecomer firms in GPNs, technology gap is a result of isolation from original sources of technologies, such as R&D centers, or the feedback loop between users and producers that spurs innovation; the difficulty of accessing proprietary technology; and weak indigenous innovation capability. Market gap originates from the difficulty for them to understand and respond to rapidly changing consumer demands when it is disconnected from the final market. Core market knowledge can be seasonal and heterogeneous market demands as well as tastes or fashion trends, skills of marketing, branding and distribution, and the expertise of supply

chain management and so on (Barney, 1991; Schmitz, 2004; Van den Bulte and Moenaert, 1998).

When strategic coupling is developed, the central concern of key actors is how to develop a better relationship that can meet partners' demands and fulfill their own business goals simultaneously as well. However, the partnership of coupling is not always full of harmonious corporation and synergy. Tensions may be generated in relation to knowledge sharing and competition which may raise serious challenges to local upgrading. Tension refers a situation that there are mismatched needs or interests of actor in a relation in which difficulties are caused. Within strategic coupling, there are fundamental tensions existing at three different levels which may impede, constrain or discourage local upgrading.

At the inter-firm level, tension is inherent between latecomer firms and TNCs. Latecomer firms would try various means to bridge knowledge gaps with TNCs, improve their in-house capabilities, and even create their own lead. But TNCs prefer to maintain these gaps at a moderate distance. They define the content of knowledge diffusion from their sides to local suppliers so that local suppliers can produce qualified products and will not grow up to become a new competitor towards TNCs themselves. In doing so, TNCs can reinforce their leading positions in GPNs as an industrial 'gate keeper' (Humphrey and Schmitz, 2002b; Schmitz, 2004; Schmitz, 2007).

At the extra-firm level, between regional institutions and firms, tension is derived from institutional mismatching. In many occasions, regional industrial policies would like to maximize knowledge spillover and sharing within the regions so as to foster better collective learning and innovation. But firms naturally prefer knowledge isolation to maintain their

competitiveness, particular to the knowledge related to their core competence. Meanwhile, regional policies are meant to satisfy the demands of local and foreign firms. But these policies do not necessarily produce benefits for all participants in a regional economy. In some occasions, regional polices may even pose challenges to firms' own interests (Coe and Hess, 2011; Schmitz, 2007).

At the intra-firm level, tension emerges when firms try to upgrade, such as renewing production lines, adopting a new production system or just making some organizational changes. Suck cost is a key factor that discourages firms to upgrade their production and organizational systems due to high transaction costs and asset specificity (Clark, 1994; Clark and Wrigley, 1997). Labor may resist upgrading actions because they may suffer from learning new processing skills, adopting more demanding technologies or even being laid off after the installation of new production systems, such as the replacement from Fordism production to 'flexible' production (Gertler, 1995; see more details in section 2.2.2).

Due to the existence of tension, actors in strategic coupling encounter dilemmas in the pursuit of industrial upgrading. TNCs would like to assist local upgrading, but they have to pay attention to the content of knowledge diffusion so that local suppliers would not catch up too easily. Latecomer firms also encounter a dilemma. The quicker latecomer firms would like to catch up, the more they need to be dependent on TNC so as to maximize learning opportunities. But this dependency may produce heavy sunk costs and cause technological and organizational lock-in. Latecomer firms therefore lose more bargaining power due to a high degree of asset specificity. Within firm-state relationships, regional actors are facing more complicated dilemmas because regional institutions are not profit-seeking actors and

may have many other value orientations, such as social welfare or political objectives. The dilemmas in promoting upgrading are summarized in four paradoxes (Cammett, 2007; Meyer-Stamer et al., 2004):

(1) Upgrading-life-cycle paradox: pursuing active local policy is crucial in the early stage of upgrading but effective local policy networks is likely to be available at a late stage;

(2) Integrationist paradox: local policy networks which seek to achieve close relationships between local producers and global producers will be marginalized if they have successfully upgraded;

(3) Location paradox: firms are increasingly demanding when it comes to locational quality but show a decreasing propensity to invest in local policy network;

(4) Cost-efficiency paradox: assisting upgrading of local firms is an ultimate way of improving regional competiveness, but it is more time-consuming and costly in comparing with attracting the location of TNCs.

3.3.3. Power dynamics and the strategies of local firms

The existence of tension and dilemmas imply that power relations within strategic coupling can never be static and pre-determined. In contrast, the interactions are contingent on the changing mutual interests of each party which tries to increase their power strength by strategizing possessed resources or arbitraging opportunities (Mathews, 2002). *Power* in this thesis refers to the relational effects of a capacity to influence and the exercise of this capacity through actor-specific practices (Allen, 2003; Hess, 2008; Yeung, 2005). It is anchored in institutional space, positional and also practical through social actions. It becomes emergent when it is practiced, while power is not inherently possessed, and is not everywhere.

According to Henderson et al. (2002), there are three types of power in GPNs including corporate power from the capacities of firms, institutional power from the capacities of organizations and collective power from the actions of collective agents. The ways of power exercise are significantly influence value enhancement and capture in GPNs.

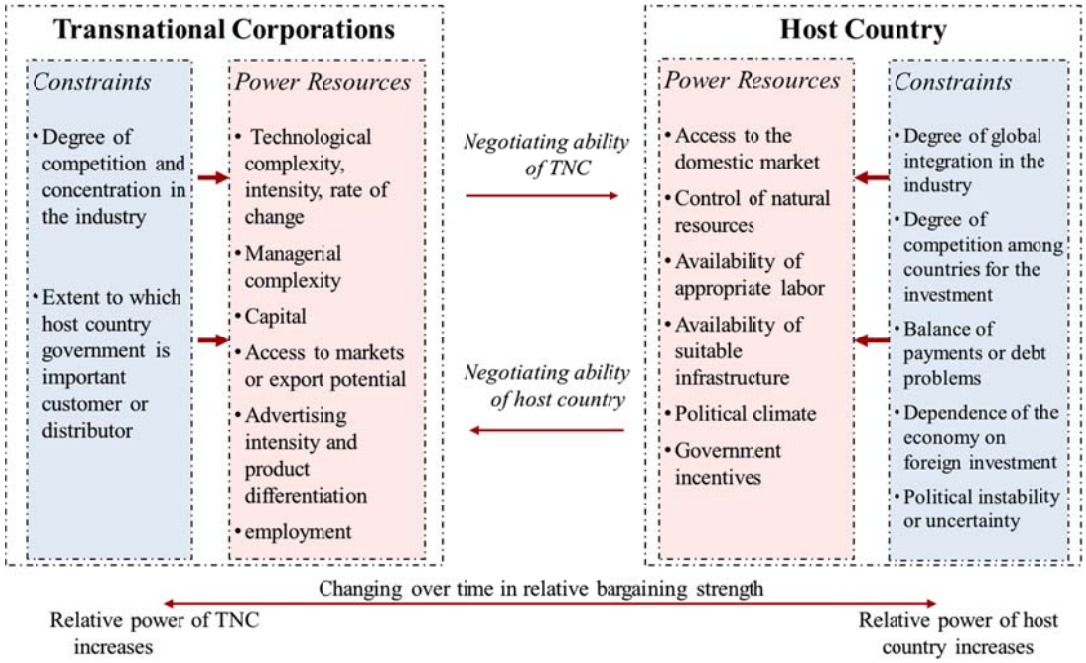
To TNCs, their power is derived from two specificities: 1) their capabilities to orchestrate GPNs so that they can take advantages of geographical differences in the distribution of factors of production; 2) their capability in setting parameters and standards in industries (Gereffi, 2001a; Gereffi et al., 2005; Gibbon, 2001; Hess and Coe, 2006; Sturgeon et al., 2009). This power of domination is organizationally embedded in GPNs and geographically embedded in their home countries/regions which serve as the sources of R&D activities, innovation and primary strategic decisions (Coe et al., 2008a, b). TNCs control the developmental pace of their branch plants, subcontractors and other low-tier suppliers. Meanwhile, they also bargain with regional institutions for lower production costs, better fiscal incentives, and more supportive institutional environment.

To local firms, their power comes from their technological capabilities and other competitive advantages, such as producing products and other home-based advantages. Normally, local firms are less powerful because they are substitutable, unless they possess a unique resource or develop certain technological edges, or find out a specific niche market.

To regional institutions, their power is the state-legitimated administrative power that refers to the capacity of a state to regulate behaviors and enforce order within its territory. In globalization, this power is highly localized and represented by the control of market entry and regulatory regime designed for accommodating firms. As Dicken (2007) has summarized,

there are a great deal of resources and components that can shape a bargaining relationship between TNCs and host countries (see Figure 3.3).

Figure 3.3 Components of the bargaining relationship between TNCs and host countries



Source: Adapted from Figure 8.5 in Dicken (2007:241).

Why are the power relations dynamic rather than predetermined within strategic coupling? This is because the relative bargaining power of actors largely depends on the extent to which one party possesses assets sought by the other party; and the extent to which either party can control that access (Appleyard, 1996; Lecraw, 1984; Liu and Dicken, 2006). In this sense, capability in controlling access to specific assets is a major source of bargaining strength. Where such assets are available in a number of location or organization, the power strength will be lower; or even nonexistent when the asset is universal. But where a particular asset is highly localized (either geographically or organizationally), the actor who controls access to that asset will have the greatest bargaining power.

Situating power in such an analytical context, there are many alternatives for latecomer

firms to reshape power relations with TNCs. Local firms may increase bargaining power if they possess certain scarce resources or receive additional supports from state institutions. Local firms also can bypass the governance power if they identify alternative sources of knowledge, such as multi-tasking by inserting various value chains within the same GPN. Furthermore, local firms can directly lower tension and develop new synergy, when they identify more mutual interests with TNCs. Recognizing these alternatives, there are three important institutional-spatial conditions that underpin local firms to leverage power relations with TNCs.

The first condition is the *diversity of knowledge channels* that emphasizes the available networks of knowledge diffusion rather than one-way diffusion from TNCs to local firms. Trippl et al (2009) has provided a sound summary of these linkages (see Table 2.2). By plugging into a GPN, firms would have many potential ways of knowledge accumulation, such as formal transactions, informal communication, technology transfer, organizational succession, learning by doing, learning by interaction, benchmarking and collective learning. These channels help local firms to reduce dependence on TNCs.

The second condition is *the availability of regional assets* which are more at regional (national) scale. The concept refers to the 'holy trinity' of technology - organization - territories defined by Storper (1997b). Regional assets can be supportive industrial policies set by pro-active states; associational economies including industrial associations, chamber of commerce and other business organizations; home-based advantages like cluster economies, localized supply networks and social-ethic communities; or large domestic markets (see section 2.2 in Chapter 2). Embedded in these regional assets, local firms may give TNCs more

incentives to share or co-develop knowledge with them. Because regional assets are territorially bounded, transaction costs increase for non-local actors to get access. Local firms have certain advantages based on social-cultural familiarity, though these assets are not entirely exclusive to non-local actors.

The third condition refers to *the complexity of competitive dynamics* in GPNs that is more relevant at a global scale. It points to competition between TNCs at the top hierarchy of their value chains. This condition has a strong impact on TNCs' decisions to cooperate with other partners due to competitive pressures within GPNs. To local firms, the more complicated that competitive dynamics is, the more upgrading opportunities they may identify. There are three basic types of competitive dynamics, *cost, flexibility*, and *speed (time to market)*, which are pushing global lead firms to deepen cooperation with their local partners so that they can further sharpen their competitive cutting edges (Lüthje, 2002; Yeung, 2009a). Meanwhile, competitions between global lead firms and platform developers also provides new opportunities for contract manufacturers and suppliers to implement functional upgrading (Feenstra and Hamilton, 2006; Galvin and Morkel, 2001; Lüthje, 2002; Lüthje, 2004; Sturgeon and Kawakami, 2011). For instance, they can purchase and internalize turn-key technologies from platform developers within the same GPN, thus directly upgrading into owned-brand manufacturers to compete with lead firms. In this case, lead firms have not power to block this upgrading because lead firms can only exert control upon their value chains but not the whole GPN.

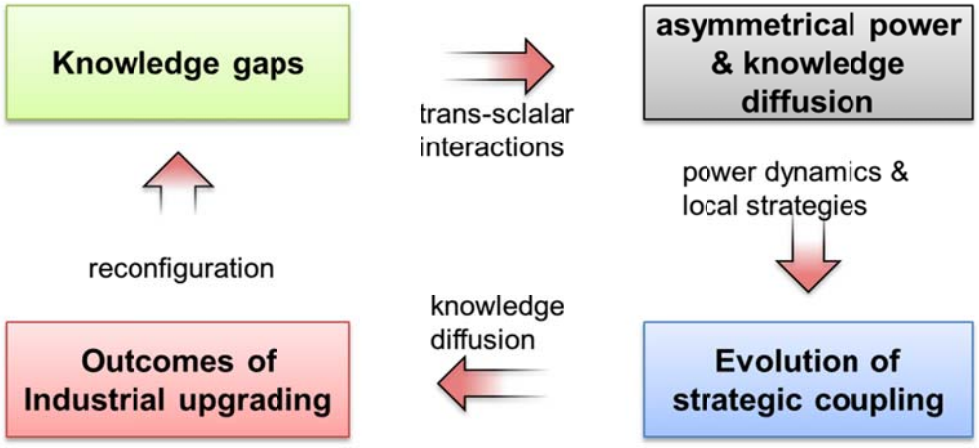
In sum, by recognizing these institutional-spatial conditions, latecomer firms are able to taking advantages from these conditions so as to leverage the governance power of TNCs

without challenging them. Interactions among key actors thus present vivid scenarios configured by different incentives, strategies and dynamic power relations. How does local upgrading vary in different scenarios? The next section attempts to answer this question by theorizing the evolutionary nature and typology of strategic coupling that in turn leads to different upgrading outcomes.

3.4 Strategic coupling and the dynamics of industrial upgrading

The above section has elaborated on the analytical framework in relation to key actors, knowledge gaps and power dynamics within strategic coupling. This section attempts to reveal casual relations between the variety of strategic coupling and the dynamic outcomes of upgrading. The general process of industrial upgrading is reinterpreted as shown in Figure 3.3. Coupled actors in latecomer regions try various means to reduce or overcome knowledge gaps. Power relations are shaped and reshaped by actors' strategies of upgrading. These efforts lead to the changing patterns of strategic coupling and thus produce correspondent outcomes of upgrading. When firms get upgraded, they will face new knowledge gaps.

Figure 3.4 General mechanisms of industrial upgrading



Source: compiled by author.

3.4.1 Variety of strategic coupling

Based on collective endeavor from a journal special issue in *Regional Studies* in 2009, Yeung (2009) summarized three basic types of strategic coupling based on the development trajectories of six globalizing regions in East Asia. They are:

(1) *International partnership* where lead firms from outside the region forge direct linkages with local firms as key nodes within global networks

(2) *Indigenous innovation* where local firms develop greater technological capacities so as to occupy a better position when engaging with lead firms in GPNs

(3) *Production platforms* where local firms strengthen capacities of systematic integration and specialize in manufacturing works for serving global lead firms.

Although this category of coupling has shed light on the pattern of integration between latecomer regions and GPNs, the current conceptualization is insufficient for explaining industrial upgrading. It is summarized through different strategies that latecomer regions have deployed. Hence it is not a theoretically consistent topology for further analyses. The first type refers to a type of relationship; and the second type refers to a strategy of local firm; while the third refers to a type of position in GPNs. In contrast to this ontological ambiguity, Schmitz (2007) has offered an relevant account about latecomer strategies for global integration (see Table 3.2).

Schmitz's (2007) category is logically coherent because it is built on a four-fold configuration, according to the extent of technology and market gaps. But this policy-oriented category is too pragmatic to capture the ongoing dynamics of global integration. Basically, the strategies are overlapping with each other. For instance, strategies of attracting FDI and

technological licensing actually are virtually the same as the strategies of inserting into global value chains. When firms pursue original design manufacturing, they may also develop joint venture with other firms for absorbing some cutting-edge technologies from the partners. Another pitfall is that this category overlooks the influences of institutional-spatial contexts (see section 3.3.3 in this chapter). Technology and market assets are not necessarily bounded within firms, but can be provided by other non-firm actors. Overall, Schmitz's (2007) account provides some solutions for latecomer regions, but fails to showcase the pattern of their integration into the global economy. Apart from these critiques, this category of latecomer strategies is insightful, because it implies the relationship between power asymmetry and knowledge gaps.

Table 3.2 Four strategies for integrating in the global economy

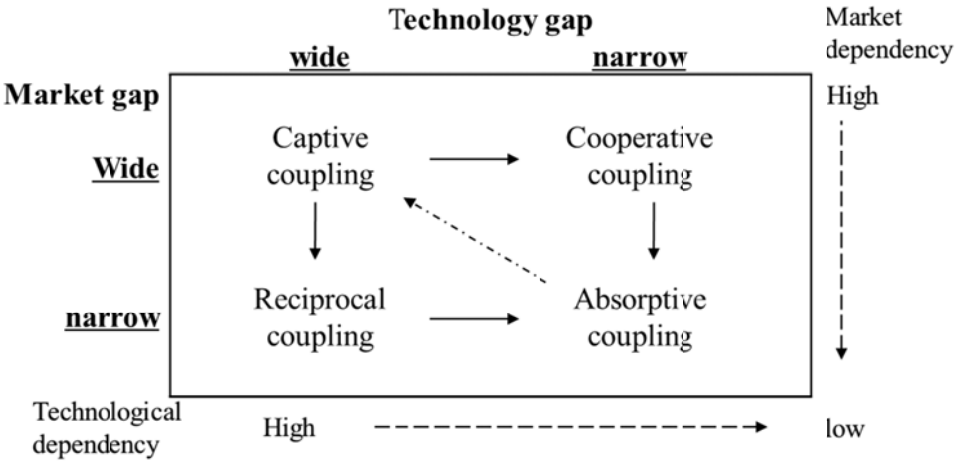
Market gap	**Technological gap**	
	large	small
Large	1. Access to technology and market is a severe problem for local firms. Foreign direct investment is a preferred strategy.	2. Key challenge is not technology, but marketing. Integrating into value chains coordinated by global buyers seems best.
Small	3. Challenge is not in marketing, but technology. Acquiring technology through licensing or joint ventures seems the best option.	4. Technology and marketing gaps are narrow. Local firms can export own-designed complete products directly.

Source: Adapted from Figure 2 in Schmitz (2007: 422).

This study synthesizes both Yeung (2009) and Schmitz (2007) and reinterprets the typology of strategic coupling as shown in Figure 3.5. In a broader sense, the typology represents different relationships between latecomer regions and GPNs; in a narrow sense, the typology represents relationships between local firms and TNCs. This typology is regarded as

an explanatory variable towards the dynamic outcomes of industrial upgrading.

Figure 3.5 Typology of strategic coupling



Source: compiled by author.

Captive coupling

Captive coupling refers to a situation in which late comers are highly dependent on foreign firms within GPNs in terms of technology and market resources. Due to the existing of huge knowledge gaps, latecomer regions must possess some assets to meet the demands of TNCs, such as lower production cost, preferential business environment, better fiscal incentives or specific natural resources. If there are no such assets, coupling would not happen no matter how much effort by latecomer regions.

In this pattern, local firms are at a marginal position within GPNs. TNCs have dominant power in product definition, supply chain management and price setting, whereas local firms play a subordinated role. Local firms and regional institutions have less bargaining power because the assets they provide are substitutable by other latecomer regions. This pattern is similar to captive governance in the GVC literature (Gereffi et al., 2005). Local firms are willing to depend on TNCs, as TNCs also like to lock in suppliers in order to maintain

production stability. Local firms need TNCs' help to bridge the knowledge gaps so as to catch up quickly instead of relying on their own efforts.

Cooperative coupling

When technology gap is narrow, but market gap is wide, *cooperative coupling* tends to prevail. It refers to a situation that local firms in a latecomer region develop a complementary relationship with foreign firms within GPNs. The power of complementarity is built on mutual interests in terms of competitive advantages in labor division or co-development. Latecomer firms do not have to possess equivalent power as foreign firms. But at least they must have qualified technological capabilities or identify certain competitive advantages so that they can have autonomy in selecting strategic partners and their upgrading strategies. TNCs have incentives to treat local firms as strategic suppliers so as to reduce transaction costs.

This pattern is similar to the relational governance in Gereffi's (et al., 2005) account which is based on non-cost transactions that are governed by social mechanisms, such as mutual trusts, reputation, or family/ethnic ties. The difference is that cooperative coupling has a broader definition which also includes cost-based transactions. Cooperative coupling also looks like coupling through being production platforms in Yeung's (2009) account. But it has a nuance meaning in that TNCs have also developed certain dependence on these production platforms. Otherwise they are hard to keep cost competitive, comparing with the others which have developed cooperative coupling with latecomer firms. In this pattern, power relations are still asymmetrical, but in a moderate mode. Local firms and TNCs would mutually influence on the basis of various cooperative agreements, either formal or informal, in terms of

production, transaction, marketing and R&D activities. Overall TNCs cannot exert overwhelming control to local firms. This mutual dependency can be regulated through trust-based cooperation, contract-based commitment, or other social mechanisms. Within these relations, local firms and TNCs both impose costs on maintaining the stability of cooperation.

Reciprocal coupling

When technology gap is large, but market gap is small, reciprocal coupling tends to occur. It reflects a situation in which actors develop coupling relationships for exchanging technology and market resources possessed exclusively by each actor. To latecomer upgrading, it specifically refers to a situation that TNCs comply with specific criteria from states and local firms, so as to get access to localized assets, such as local market. The state criteria often require them to provide additional assistance to local firms, or provide other benefits for the local economy. Power relations in this pattern are highly regulated by the intervention of state actors. The reciprocity of resource exchange is the key mechanism for developing such coupling. Forms of coupling can be technological licensing/cooperative agreements, joint ventures (either based on capital or technology), strategic alliances, or other forms of cooperation.

This pattern is similar to the situation of 'obligated embeddedness' theorized by Liu and Dicken (2006). The difference is that Liu and Dicken (2006) only referred to the situation in which market access was utilized by states as critical assets to increase their bargaining power. In this study, reciprocal coupling can be built on other potential assets, such as national/regional business systems, monopoly industries, domestic logistic systems, natural

resources, institutional arrangements, or social/ethnic ties (Cooke and Morgan, 1998; Qiu, 2005; Storper, 1997a, b; Whitley, 2000; Zhou and Tong, 2003). In the GVC literature, this type of coupling is absent as state actor is not explicitly incorporated into their conceptual framework.

Absorptive coupling

When technology and market gaps are both small, absorptive coupling tends to take place. It refers to a circumstance that local firms are capable of serving directly both domestic and global markets with their indigenous capabilities. Meanwhile they still would like to couple with TNCs for absorbing state-of-art knowledge. Overall, TNCs are still occupying a leading position in their own value chains. But local firms are actively plugged into GPNs and manage to channel knowledge and identify various industrial opportunities.

This is a more matured and ideal level of global integration and it is also the most difficult stage for latecomer firms and regions to achieve. Power in absorptive coupling is more or less balanced in which local firms have sufficient independence in selecting partners, partnerships and market niches. Local firms have greater bargaining power for require more knowledge diffusion from TNCs, but local firms do not override TNCs' power. Again, this pattern of coupling is absent in the GVC literature, because the GVC literature believes that local firms cannot possibly build up such balanced power relation with global lead firms, unless local firms quit the value chain and construct their own chains.

3.4.2 Producing industrial upgrading: How does strategic coupling matter?

The formation of strategic coupling is driven by the power of complementarity where the constituents of relationships benefit from each other's co-presence and engagement. Generally,

when the power of complementarity in strategic coupling is greater, it will be more possible for upgrading to be produced based on higher synergy and lower tension. Four propositions are developed to elaborate on this mechanism in relation to the variety of coupling.

Proposition 1: In captive coupling whereby TNCs dominate knowledge diffusion, the deeper local firms become captive to TNCs, the faster will upgrading be facilitated. But the upgrading is limited and tends to be restricted in process and product upgrading.

In *captive coupling*, TNCs exert strict governance on local firms by defining the content of local upgrading such as setting production parameters and allocating manufacturing tasks. The content of knowledge is more related to production and processing technologies, while not technologies in product development/design. Knowledge spillover from TNCs is limited in the sense that only standard and simple technologies will be diffused through formal traded relations. Market knowledge is rarely diffused from TNCs since there is no incentive to share it. In order to improve the supply capability of local firms, TNCs would like to assist local firms to upgrade more quickly. For instance, TNCs may import advanced machines for local firms or provide basic labor training. To achieve these helps, local firms are required to give up certain rights of control of their own corporate functions, such as management of production systems.

In order to receive more technological assistances from foreign partners, local firms should focus on developing technological capabilities that meet TNCs' demands, particularly in some technologies with asset specificity. TNCs may encourage these local efforts because

their bargaining power may increase once local firms are technologically locked into them. Hence, the deeper local firms are dependent on TNCs, the more technological assistance local firms may be received. Functional upgrading is almost impossible because local firms are kept out of design technologies and marketing skills. There is no incentive or return for TNCs to share the knowledge. Indigenous efforts of functional upgrading will also create tension to the coupling relation.

Regional institutions in captive coupling often encounter a dilemma (see section 3.3.2). They need to decide whether to put the strategic needs of local firms or foreign firms as their top priority. To help local firms, regional policy makers can provide much preferential assistance and invest intensively in constructing a regional learning system, but this process is time-consuming and costly. Local firms may also leave the region after successful upgrading. To give preference to foreign firms, regional policy makers can simply provide substantial fiscal incentives and give more priority to the needs of foreign firms. This strategy may serve as a critical shortcut for 'upgrading' regional economies. But this kind of regional upgrading would be shallow if local firms are further marginalized or discriminated, such as the formation of technological enclaves in developing regions (Wang and Lin, 2008; Wang and Lee, 2007). The region may also become vulnerable due to over-dependence on TNCs (Chapman, 2005). My detailed empirical investigation in Chapter 6 points to this process and outcome in the PRD's electronics industry.

Proposition 2: In cooperative coupling, the more developed are complementarity and mutual interests between foreign and local firms, the higher is the potential for local upgrading.

Ways of knowledge diffusion are rich within cooperative coupling. Since local firms can provide qualified technological services, TNCs are interested in developing various cooperation partnerships with local firms. Once TNCs treat local firms as strategic suppliers or partners, they tend to provide substantial helps to local firms so that the latter can conform to the former's demands, such as special training in developing OEM/ODM business. Meanwhile, TNCs may provide market feedbacks and may even share some knowledge in design to suppliers so as to meet rapid changing market demands. Therefore, the more TNCs are interested in cooperative with local firms, the more possible upgrading will be achieved. Product upgrading would be more prosper than other types of upgrading because it satisfies TNC's need of rapid product change for competing in the global market (Lüthje, 2004; Staritz et al., 2011). But functional upgrading remains unwelcomed by TNCs, because local firms may grow up as a new competitor. However, once the mutual interest is built on exploiting new markets rather than challenging the original market shares of TNCs, functional upgrading would be possible. In other words, the more mutual interests are developed, the more upgrading possibilities can be realized in local firms.

Based on upgrading initiatives, local firms may invest a lot in familiarizing with the rules of the global market and in seeking global business opportunities. However, this effort not only requires intensive investment in capital, but also brings them into direct competition with a number of TNCs that have established world-wide brands, global distribution networks and

tremendous retail terminals. Given time and cost constrains, local firms would prefer to stay as contract manufacturers for global lead firms and improve their competitiveness by developing cutting-edge production technologies. Chapter 7 illustrates this proposition based on local upgrading in the apparel industry in the PRD.

Proposition 3: In reciprocal coupling, the more balanced are power relations, the more synergy is there for upgrading.

In reciprocal coupling, the extent and content of exchanged resources determines the ways of knowledge diffusion and power relations between local firms and TNCs. The power for regional institutions comes from their legitimized administrative rights on their territories. Local firms do not have this administrative power, but they have bargaining power because they are familiar with territorialized assets which are rooted in national bureaucratic systems and social-cultural networks. The outcomes of upgrading are quite diverse because all types of knowledge may diffuse according to specific criteria proposed by the local party.

TNCs are not passive to the local demands of knowledge transfer, but will try various efforts to defend their leading positions in GPNs. For instance, they may enforce a modular pattern of production organization so as to internalize their competent technologies within modularized components. TNCs may only transfer know-*how*, but may continue to block the transfer of know-*why*. They also may increase the complexity of knowledge sharing by enforcing exclusive industrial standards or setting specialized production parameters. Hence local firms may also be technologically locked into them due to high asset specificity.

The niche of maintaining reciprocal coupling is a balanced power relation in which each party does not override the other. If local party request substantial knowledge sharing while does not provide corresponding benefits, TNCs may take a short-term strategy in the coupling without any intent of upgrading. If TNCs' power overrides s the local party, they may be replaced unless they have technological monopoly in the global industry. In Chapter 8, this thesis exemplifies this proposition in the PRD's automotive industry.

Proposition 4: In absorptive coupling, the more capable are local firms in multi-tasking within GPNs, the more upgrading will occur.

Absorptive coupling is an ultimate stage of latecomer upgrading. It is also the most difficult stage of development for local firms to achieve. Although TNCs still have greater power in terms of technological advance and market control, local firms already have certain independence in selecting partners to couple with. In this case, TNCs have to prepare for the potential challenges derived from further local upgrading. TNCs may resist sharing their original newly advanced technologies or even enforce specific agreements in the coupling to hinder local upgrading. They may also raise industrial entry barriers (e.g. new industrial standards) to impede local firms' entry into the global market (Nadvi, 2008; Nadvi and Wältring, 2004; Tewari, 2008).

A fundamental way for local firms to achieve this stage is to improve their absorptive capacities which refer to the ability of acquire, assimilate, transforms and exploit knowledge and apply it to commercial ends (Cohen and Levinthal, 1990). There are generally two ways

of improving absorptive capacities that are (1) constantly investing in R&D (either internal or external); and (2) diversifying knowledge structures by training and recruiting more skilled labor and talents (Kim, 1998; Vind, 2008; Yang and Lin, 2012; Zahra and George, 2002). The improvement of absorptive capacities enable firms to speed up the learning process of absorbing knowledge from their TNCs counterparts, become more able to absorb knowledge from other channels, and eventually reduce dependency on TNCs.

Apart from improving absorptive capacities, the GVC literature has suggested local firms to insert into multiple value chains rather than highly depend on one single chain (Schmitz, 2004). I rephrase this strategy as *multi-tasking* in GPNs through which local firms develop various partnerships with different types of TNCs which can be global buyers, branded lead firms, platform developers or intermediate traders. By serving multiple functions, such as conducting OEM/ODM/OBM business or developing different market niches simultaneously, local firms can diversify knowledge channels and identify more competitive dynamics within GPNs (see section 3.3.3). These efforts help local firms maximize upgrading opportunities by synthesizing resources at different localities or positions within GPNs. Empirical investigations of this study find that none of the industries, cities or clusters in the PRD has yet developed such absorptive coupling. However, the potential of absorptive coupling is emerging at some cases which is discussed in Chapter 9.

3.4.3 Dark sides of strategic coupling and the potential of decoupling

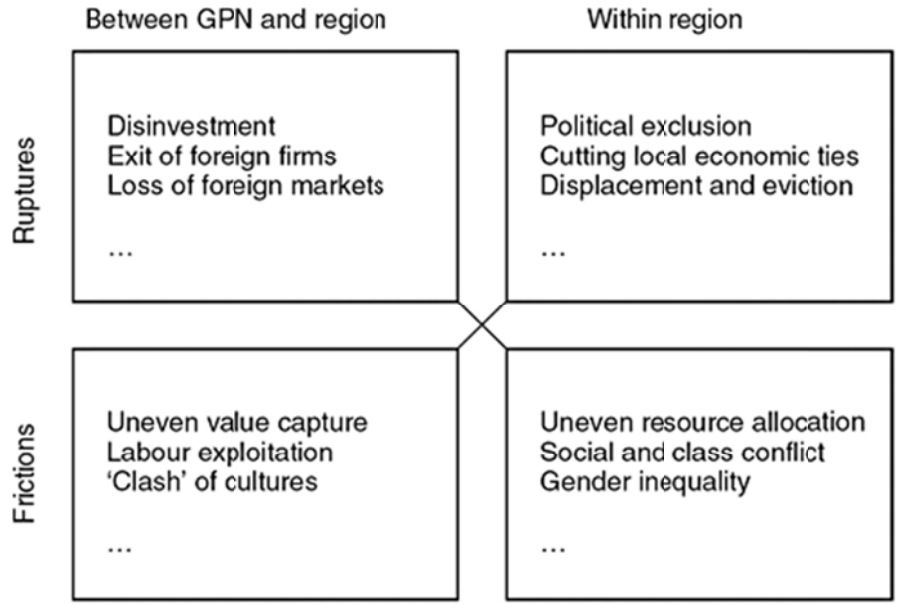
The above sections have shown the variety of strategic coupling and its dynamic process of evolution. However, this thesis tries to avoid an essential view towards the causality between strategic coupling and upgrading. Section 3.3.3 has implied that the process of

strategic coupling does not always benefit all regional actors, but contains certain dark sides. Power relations among coupled actors are not naturally harmonious, whereas are interwoven with various tensions.

During the formation of coupling, regional actors have to be aware of the possibility of *institutional capture*, whereby the engagement between local institutions and external firms leads to the direct and indirect subsidization of the activities of inward investors through prioritizing the needs of such firms at the expense of indigenous firms (Phelps, 2000). Due to asymmetrical power relations between regional institutions and TNCs in GPNs, TNCs are more able to influence regional growth agenda in favor of their interests, such as industrial policies concerning commercialization, innovation and other research funds; regulations of labor markets in terms of skills, wage and working conditions; and more basically, fiscal incentives in taxations and infrastructures (Christopherson and Clark, 2007).

Within strategic coupling, numerous studies have shown that the embeddedness of GPNs into regional economies does not guarantee to bring positive outcomes (Lowe, 2009; Phelps and Raines, 2003). Some of the local actors (e.g. firms and labor) may be marginalized in the process of value capture, though they may contribute substantially in value creation and enhancement. Meanwhile, the opportunities and livelihoods of people and households raise serious questions towards the issue of social upgrading when industrial upgrading is fulfilled. Coe and Hess (2010) have provided a detail account of negative consequences resulted from strategic coupling in which ruptures and frictions are created due to the conflict of interests between the coupled actors (see Figure 3.6). Tensions are trans-scalar in the sense that the conflict and contest emerges among intra-, inter- and extra-regional actors (Hudson, 2007) .

Figure 3.6 Potential of disembedding global production networks



Source: Adapted from Figure 11.2 in Coe and Hess (2010:135)

When coupling is developed and persistent over time, regional economies may suffer from the problem of path dependency and lock-in (Giuliani et al., 2005; Grabher, 1993; Viotti, 2003). In this situation, regional institutions are unable to respond quickly to the rapidly changing demands of GPNs and also have difficulties in innovation due to over dependency on external sources of knowledge. As a result, regions either become disconnected from the network or trapped in a form of strategic coupling that does not best utilize the region's assets. As pointed out in section 3.3.2, high sunk costs and asset specificity would be developed to further discourage any radical change of the pattern of coupling.

There are many ways for regions to escape from lock-in. Regions can recouple with GPNs, either recoupling with new collaborators or developing new partnerships; or may even decouple with GPNs to pursuit industrial upgrading on their own efforts. To achieve this goal, on the one hand, regional institutions and firms need to remobilize regional assets to attract new interests of TNCs whereby regional assets will reshuffle through the process of layering,

convention and recombination (MacKinnon, 2012; MacKinnon et al., 2009; Martin and Sunley, 2006). On the other hand, intra-regional firms have to improve their absorptive capacities so as to reduce dependency on TNCs and move to a more beneficial position within GPNs (see section 3.4.2).

3.5 Conclusion

This chapter has conceptualized the dynamics of local upgrading according to different types of strategic coupling. This effort bridges the theoretical gaps between geographical and non-geographical studies by embracing key influential factors (industrial governance, embeddedness and state intervention) and linking multi-scalar forces within a coherent analytical framework (see Figure 3.2). It thus contributes to the literature on industrial upgrading by offering a more realistic account of the mechanism of local upgrading. In contrast to the regionalism literature, my framework recognizes both endogenous and exogenous forces in a more balanced way. Comparing with the GVC literature, my framework provides a useful lens for appreciating the influences of various non-firm (non-profit) actors on the process of upgrading. More importantly, it reveals the influence of institutional-spatial contexts on value chain governance in which power relations may be reconfigured. Without privileging any specific scale or actors, this framework examines how the interactions of key actors within strategic coupling lead to various outcomes of upgrading. My analyses show that the driving forces of local upgrading are not as rigid as the GVC literature and development studies have predicted (see Chapter 2). This is basic contribution of this thesis.

The most critical contribution comes from my conceptualization of the typology of strategic coupling. Critically revisiting the concept of strategic coupling, this chapter further conceptualizes the concept in relation to different configurations of knowledge gaps and power relations. The fourfold typology serves as a key variable for explaining the dynamics of upgrading. This effort links together the regionalism literature and the GPN studies and helps readers understand the geography of upgrading in the context of globalization. Without any rigid and pre-determined trajectory, the process of local upgrading is dynamic and contingent to the interactions among key actors. Power relations and responsive strategies are critical factors that shape ways of knowledge diffusions. The interpretation of this typology illustrates the importance of political economy within GPNs in which the power relations of key actors and their bargaining processes are embedded in specific institutional-spatial contexts. While the content of knowledge diffusion is highly influenced by inter-firm governance pattern, synergy can be fostered to nurture more local upgrading. Within strategic coupling, besides the power of complementarity, there are also mutual interests and the reciprocity of resource exchange that produces synergy.

Another effort made by this chapter is related to the discussion of power dynamics within strategic coupling. It is pointed out that local actors can utilize resources embedded at different scales to leverage the governance power of foreign firms. This effort opens out many other possibilities for local firms to increase bargaining power or bypass the control of TNCs. Particularly, upgrading opportunities would emerge when local actors manage to synthesize different resources. This interpretation complements to development studies by offering more alternative of local upgrading strategies. The problem is whether local firms are capable of

identifying these opportunities. The overall efforts of this chapter verify my central argument that local upgrading is subject to interactions among key actors, rather than the dominant power of global lead firms or state strategies alone. Four propositions are developed based on each type of strategic coupling. The rest of this thesis devotes four empirical chapters to exemplify the propositions, including one general chapter about strategic coupling in the PRD and three industry-specific chapters demonstrating different scenarios.

Chapter 4 Methodology

> Achieving a methodological approach which is consonant with one's own values and concerns typically involves the longest struggle in research work and the deepest kinds of engagement (Salmon, 1992:77).

4.1 Introduction

The primary aim of my methodological approach is to investigate and measure how different types of strategic coupling are formed and affect the process of local upgrading in the PRD. The entire data collection process is guided by four key issues: (1) the extent to which the PRD has achieved industrial upgrading; (2) the key drivers of upgrading in respective historical moments and industries; (3) the types and evolution of strategic coupling developed during the processes of upgrading and (4) strategies that local firms have deployed in upgrading and the response of their foreign partners.

This chapter is organized into six sections. The second section reflexively discusses a methodological commitment in the choice of a relational perspective. The third section provides a contextual overview about doing fieldwork in China and the strategies adopted for ensuring the accessibility and credibility of sought data. This section embodies how I have negotiated with and invested in the field based on my social-cultural advantages. The fourth section reviews earlier methods applied in the studies of industrial upgrading and details the selected methods. This effort shows how the applied methods link my research objectives to my theoretical pursue. This chapter also provides a critical assessment on my awareness and

enforcement of research ethics in the fifth section and ends with a summary.

4.2 Methodological commitment

While the relational perspective in economic geography receives scholars' attentions increasingly, many of the discussions are concentrated in ontological and epistemological levels that argue for an alternative for understanding the intentions and strategies of economic actors, the patterns of relations, and how they behave upon the relations (Bathelt and Glückler, 2003, 2011; Yeung, 2005). At a methodological level, this perspective does not privilege either a quantitative or a qualitative approach. The merit of this methodological openness provides a wide space for students of economic geography to apply various analytical tools from previous studies. But there is a methodological challenge for this perspective.

As I have discussed in Chapter 3, there is a risk in adopting a relational perspective. It may become immune to empirical evaluation once the analytical framework becomes too loose and broad to include everything (Sunley, 2008). It also may over privilege a network-centric view and over emphasize the influence of non-territorialized relations such that geographical ingredients are losing relevance. This methodological risk becomes the most critical challenge throughout this study. In order to overcome this challenge, adopting multiple and complementary methodology practices becomes necessary for exploring the micro-foundation of economic actions and also generate theoretical insights based on a multi-scalar dimension. This effort overcomes the weakness of individual stand-alone methods and the fallibility of single method for representing complicated social-economic phenomena. In doing so, this study can go beyond making 'stylized facts' like the mainstream

economists prefer, or delivering ‘close dialogues’ that just reinterprets the same geography without new theoretical contributions (Clark, 1998; Yeung, 2003). This is a critical realist’s approach to the studies of upgrading. In critical realism, the behaviour and experiences of an individual is not just determined by their indigenous characteristics but by their positions in social structures, together with their associated resources, constraints and rules. The underlining mechanisms of a phenomenon do not just arise from the causality of a series of events, but also derive from the social structures of objects, and the locality they take place within geo-historical contexts (Sayer, 1997, 2000). Guiding by this view, my methodological objective is not only to explain the mechanisms of industrial upgrading, but to find the geo-historical contexts that may facilitate or hinder the working of mechanisms.

In order to accomplish my research objectives, multiple methods are deployed that incorporate an interpretive approach (intensive) and a deductive orientation (extensive) approach, including using secondary data, *in situ* research, in-depth interviews, questionnaire surveys and participation observation. The infusion of both intensive and extensive approaches helps me reveal the complex motivations, opinions and experiences of an individual; and also identify regularities, patterns and distinguishing features of a population (Bryman, 2001; Hay, 2010; Kong, 1998). These methods are reflexively applied in all selected industries, localities and cases throughout this study. They are not novel in economic geography, while the synthesis of these methods would be a nuance. When absorbing useful methodological insights from earlier works, I also ground them in the context of doing fieldwork in China. The next section addresses fieldwork context in terms of constraints, limitations, personal home-based advantages and responsive strategies.

4.3 Contextualizing methods in the field

Fieldwork context is very important to formulating a valid methodology for a social-science study. Proper understanding of the fieldwork contexts will guide researchers to select the most appropriate and effective methods for pursuing the right data (Patton, 2002). To all fieldwork researchers, there is always a fear that the validity of entire research may be jeopardized when they are forced to adjust or even revise the chosen methods in the field, thus becoming deviated from ideal methodological designs (Salmon, 1992). The central concern of understanding fieldwork contexts is to minimize the risk of getting 'surprises' or even failure in data collection during the planned main period of fieldwork (Crang and Cook, 2007). This section discusses specific problems of doing fieldwork in China as well as in the PRD; and my advantages and strategies of overcoming these problems.

4.3.1 Doing fieldwork in China

From the early 1990s, with the further opening reform of China, fieldwork opportunities in China became more and more available for oversea scholars. But the huge size, political specificity, and the diversity of geographical, social and cultural differences are posing many challenges towards scholars. As Heimer and Thøgersen (2006:1) noted, "doing fieldwork inside the PRC [People Republic of China] is an eye-opening but sometimes also deeply frustrating experience". Normally, conducing fieldwork in such a developing country often encounters many common problems as in other developing countries, such as a low level of data accessibility but a high level of red tape, bureaucratic inefficiency, bribery/corruption, high sensitivity to outsiders or the approval of a research visa and so on (Heimer and

Thøgersen, 2006; Lowe, 2009; Udry, 2003; Wei, 2000; Yeung, 2001). Specifically in China's contexts, there are three major issues challenging both domestic and foreign researchers.

First of all, probably the biggest challenge is the dominant presence of the Communist party-state in the form of direct political-ideological control and the intangible influence of party discourse. The strict political censorship creates a barrier of ambiguous climate towards both domestic and overseas fieldworkers: what sort of information is open to the public is not clearly defined, but subject to the decision of local authorities and party cadres. When ambiguity emerges, the result is often information blockage, particularly to overseas researchers. Moreover, without an authorized and official source, foreign requests of access would be easily denied by governmental agencies or individual due to distrust and the intent of keep away from troubles.

The difficulty of data access was the second methodological challenge. During the Mao period and even through to the 1980s, field researchers were under close surveillance with very limited access to the field and data collection. Today, this constraint has been greatly reduced. Many domestic universities, research institutes and even governmental agencies increasingly welcome overseas academics for short-term visits or joint research. While the restriction of access is loosening, the difficulty of field access is transferred to the level of a local contact. Currently, getting a research visa or finding a collaborator is no longer sufficient. A capable local contact becomes a necessary prerequisite for completing fieldworks. Many economic geographers have also pointed out this importance of capable local contacts for data collection in their China studies (Qiu, 2005; Wei et al., 2007; Yang, 2009). The quality of *Guanxi* (relation) among fieldworkers, local contacts and informants become a crucial key for

success. This feature is deeply rooted in Chinese traditional culture of trust building upon personal relations, gift economy, courtesy in networking and the preference of face-saving (Dunning and Kim, 2007; Hsu and Saxenian, 2000; Tsui, 1997). Without understanding these subtle rules or social norms, fieldworkers may not be able to reach the sought data in China.

The third challenge, more specific to the PRD, is the anti-survey attitude among enterprises and organizations. More and more domestic and overseas researchers treat China as a precious empirical 'lab'. Abundant research projects, planning programs and surveys have been implemented either officially or informally in the past decades. This trend has turned the PRD (as well as the Yangzi River Delta) into an over-studied place in which firms become tired of arranging for interviews and filling in questionnaires. They are sometimes frustrated by some badly designed studies disguised in the name of local authorities. One of my informants was involved in a compulsory national survey in which he was given a very thick questionnaire through the mail with a tight submission deadline. As he complained, "I did open the mail and took a look at the file. It was a book, not a questionnaire! I then threw it away. I am a businessman, not a student for exam".

4.3.2 Negotiation within the field

As a native Chinese, I have been educated to comply with Chinese social norms, cultures and political ideology and did not meet great difficulties in infusing myself into the field. Having stayed there for eight years, I also know the study field well, such as its development history, geographical characteristics, economic and institutional conditions, local dialects and culture. However, I still needed to adjust my fieldwork plan to comply with the fieldwork contexts.

Benefiting from the fortune of timing, my research topic of industrial upgrading was resonating well with many ongoing policy research projects and governmental planning schemes during the fieldwork (see Chapter 1). This institutional context indirectly increased the credit of this study which was considered as a coherent and well-timed research project according to the prevailing political climate in the PRD. However, this advantage was still insufficient to sustain my access into the field. Without a formal and trustable local reference, I would still be regarded as an outsider.

Specific efforts were devoted for finding sound local contacts. I invited a collaborator from my former graduate school at Sun Yat-sen University. Established in 1924, this university currently is one of the top ten universities of China located mainly in Guangzhou, the geographical center of the PRD. Serving as a significant education and research center, it has developed strong economic-social networks within the PRD based on thousands of promising alumni every year, various government-university research projects and laboratories, and a large number of public educational courses offering for the society. My collaborator is an experienced economic geographer. He has good reputation and intensive social networks in the PRD through his years of works as a prominent professor and research consultant. During my fieldwork period, he was conducting a national research project about industrial transformation and relocation in the PRD. Since I was invited to join in his project, my fieldwork was thus reframed as an international joint project. A specific agreement was made that I can autonomously conduct fieldwork under this project without necessity to share collected data with my research collaborator.

But joint-research project merely served as one of my stepping stones to the field. I

intensively deployed my social networks to approach the potential informants. I sought helps from my classmates, alumni, collaborators in my earlier research projects and other personal friends. They rest in different domains in the PRD, particularly in Guangzhou city and the urban planning industry. For instance, Ms Z was my classmate who worked in the Urban Planning Office of Xintang township government. Since January 2010, she has been in charge of a local urban renewal project involving the renewal of the land-use property rights among many local firms in the apparel industry. With her great help, I managed to approach many prominent local entrepreneurs in Xintang, as well as the vice party deputy of the town. The fieldwork in Xintang eventually constitutes an important part of Chapter 7. In another example, I was introduced to a director in Flextronics[1] (Zhuhai) through my friend who worked in Flextronics (Singapore). A 'snowball' effect happened after a successful interview. The director decided to recommend me to meet a vice president of Guangzhou Automotive Corporations. The vice president subsequently became a vital gatekeeper for me to access the automotive industry where I collected substantial data to complete my Chapter 8.

Apart from the problem of access, I also met some difficulties in collecting quantitative data. Due to the problem of the anti-survey attitude in the PRD, I changed the original design of my questionnaire survey, based on suggestions from my collaborator and my pilot test (see section 4.4.2). In short, my fieldwork was a process of constant negotiation between the ideal methodological design and the availability of data and local contacts. Five key methods were eventually deployed in fieldwork, which is addressed in the next section.

[1] The second largest global lead firm in electronics service manufacturing industry.

4.4 Methods and Data collection

To a fieldworker, sources of data are infinite and one should always find a balance between the focus of addressing research objectives and the creativity of identifying empirical evidences. As Yeung (2003) and Clark (1998) pointed out, one of the merits of practicing economic geographies is the openness of using various methods beyond stylised facts and modelling to approximate the real world. This thesis has no intent of inventing or proposing a new method, but tries to engage in best practices in previous studies. This section interprets the reasons and implementation of method selection in relation to the types of sought data.

4.4.1 Methods in early studies

In prior studies of upgrading, economic geographers have shown the effectiveness of qualitative methods, mainly through case studies and on site research. These works have illuminated the strategies, performance, behavioural characteristics of firms in learning/upgrading, as well as the spatial restructuring of production networks (Coe et al., 2004; Tokatli, 2003, 2007; Tokatli and Kizilgun, 2004; Vind, 2008; Yang, 2009; Yeung, 2007). Participation observation was applied for tracing the learning process and trajectory of regional upgrading (Lowe, 2009; Yang, 2009). Based on a questionnaire survey, Scott (2008) examined the interrelation between customer's demands and upgrading in the furniture industry in Thailand. In Pavlinek and Zenka's (2010) study of the automotive industry, the number of employee turnover was used for measuring process/product upgrading; wage improvement was applied to measure aggregate upgrading; R&D intensity (share of R&D expenditures in industrial value-added) was measured for reflecting the extent of functional

upgrading. These methods are all useful and have been integrated into this study.

In other disciplines, such as industrial economics, economic sociology and development studies, scholars frequently apply quantitative indicators to measure upgrading, such as firm size, export/import, industrial gross output, industrial value added, the number of labour, profit, and capital investment and so on (Gereffi, 1999; Kaplinsky and Farooki, 2011; Ozawa, 2005; Rabellotti, 2004; Schmitz, 2004). Other indicators like expenditure in R&D activities, value of new products, number of technicians and patents are applied, particularly in the innovation studies (see a detail review in Polenske, 2007). One of the most influential works comes from Giuliani et al (2005) who investigated casual relations between collective efficiencies and industrial upgrading based on a statistical model of Likert scale. But the mechanism of it was rather ambiguous because the causality was determined based on a simple correlation analysis without any detail elaboration and explanation.

4.4.2 Methods employed in this study

The difficulty of measuring empirically industrial upgrading comes from its multiple features. It has quantitative nature, like improvement in productivity and efficiency in relation to product and process upgrading. It also involves qualitative change, such as functional and inter-sectoral upgrading (see definition in Chapter 3). This study applies quantitative and qualitative methods that are associated with each other and infused in analyses. The types of sought information and the selected methods are summarized in Table 4.1.

Table 4.1 Research objectives, information requirements and methods

Objectives	Information requirements	Applied methods
Formation and evolution of strategic coupling	· Historical development of the PRD · Incentives and strategies of actors from global, regional, and local scales, institutional and geographical contexts in the 1980s · Relationality and the pattern of integration	· Literature in Chinese, archives, government publication and reports · Interviews with officials and researchers · In-depth interviews with local entrepreneurs · Mapping: geographical characteristics of the PRD
Unpack the mechanisms of upgrading within coupling	· Power relations and synergy within the coupling; · Investment, technology transfer, labour training, various learning and innovation activities · Key drivers of these activities · Extent and content of upgrading	· In-depth interviews with local and foreign entrepreneurs · government publication and reports · Statistical yearbooks at both national, provincial and urban levels; · Informal discussions · Mapping: demographic distribution of industrial clusters · Participation observation: training, learning and innovation activities · Questionnaire survey: informants' evaluation of upgrading
evolutionary coupling and dynamics of upgrading	· Changing institutional environment · Emerging regional assets · New industrial opportunities · what new resources are deployed by firms; · Changing power relations; · Strategies of upgrading	· Archives, publication, media news, official reports about new industrial policies and governmental imperatives · In-depth Interviews with officials and researchers · In-depth interviews with officials, local and foreign entrepreneurs · Questionnaire survey: informants' evaluation to various assets / resources

Source: author's fieldwork.

Secondary data

Apart from reviewing Chinese literature, statistical yearbooks and reports in the PRD are important sources of secondary data. The collected statistical reports included three sets:

(1) General statistical yearbooks in multiple years at national, provincial and urban levels from 1990 to 2010 and some statistical reports about data before 1990s.

(2) Specific statistical yearbooks: industrial statistic yearbooks and scientific statistic yearbooks in 2009, 2005 and 2000.

(3) Guangdong Economic Census in 2004 and 2008. There are currently most precisely firm-level survey data in China. The 2004 census was provided by my collaborator, while a brief version of 2008 census was purchased from a local database company.

Building on insights in the previous studies, I used various indicators to measure industrial upgrading at a regional level on the basis of industrial value added. Industrial value added equals the difference between an industry's gross output (consisting of sales or receipts and other operating income, commodity taxes, and inventory change) and the cost of its intermediate inputs (including energy, raw materials, semi-finished goods, and services that are purchased from all sources). This indicator reflects the extent of value creation and capture more precisely than total industrial outputs. It has been increasingly applied in the GVC studies (Cattaneo et al., 2010; Gereffi, 2008; Sturgeon and Gereffi, 2009).

Besides statistical reports, various urban planning reports were also collected (see Table 4.2). According to China's industrial regulations in the urban planning industry, information in urban planning and design reports are only allowed to be publicly disclosed one year after the approval of the plans. Hence I only used information from the approved planning reports before 2011. These reports provide many firm-level economic data in different cities, towns and industrial clusters, which support my elaborations on the pattern of strategic coupling throughout four empirical chapters. They also show the regional strategies and policies relevant to upgrading. Many representative firms presented in these reports were my top priority for research interviews and visits.

Table 4.2 Referenced urban planning reports

In English	In Chinese
· DRCGP, 2009, "Research Report of the High-Tech Renewal of Traditional Industries in Guangdong Province", (Development and Reform Commission of Guangdong Province, Guangzhou)	· 《广东省传统产业高新技术改造研究》，2009，广东省发改委编制
· DRCGP, 2009, "Research on the Development of High-Tech Industries in Guangdong Province in a New Era", (Development and Reform Commission of Guangdong Province and Sun Yet-sen University, Guangzhou)	《新时期广东省高科技产业发展研究》，2009，广东省发改委、中山大学编制
· NDRC, 2003, "Planning of the Coordination and Development of Megalopolis in Pearl River Delta", (National Development and Reform Commission, Guangzhou)	· 《珠三角城镇群协调发展规划》，2003，国务院发改委编制
· NDRC, 2008, "The Outline of the Plan for the Reform and Development of the Pearl River Delta 2008-2020", (The National Development and Reform Commission)	· 《珠三角改革规划发展纲要2008-2020》，2008，国务院发改委编制
· DRBBDGS, 2005, "Research of Lessons from Industrial Upgrading from Taiwan, Hong Kong and Singapore (in Chinese)", (Development and Reform Bureau of Baoan District Government of Shenzhen)	· 《台湾香港新加坡产业升级经验借鉴研究》，2005，深圳市宝安区发改局编制
· CDPRC, 2007, "Industrial Planning Section in Urban Master Plan of Shenzhen 2006-2020 (in Chinese)", (Shenzhen Division of China Development and Planning Research Center, Tsinghua University)	· 《深圳市总体规划 2006-2020（产业规划专题）》，2007，清华大学中国城市发展规划研究中心深圳分院编制
· GDDRC, 2004, "Development Planning of Nine Key Industries in Guangdong Province 2005-2010 (in Chinese)", (Guangdong Development and Reform Commission, Guangzhou)	《广东省九大产业发展规划2005-2010》，2004，广东省发改委编制
· GDEIC, 2010, "Development of the Strategic New Industries of the Guangdong Twelve Five-Year Plan", (Guangdong Economic and Informatization Commission)	· 《广东省战略新兴产业“十二五”规划》，2010，广东省经济与信息化委员会编制

Source: author’s fieldwork.

In-depth interviews

Since the post-quantitative cultural turns, economic geographers have recognized the merit and beauty of ‘talking to people’ as a considerable method for practicing human geography (Cloke et al., 2004). In-depth interview has become one of the fundamental

methods for geographers to get closer to the reality, thus transcending the explanatory limit of neoclassical economics (Dunn, 2010). This method can fill a gap in knowledge that other methods (e.g. census data) are unable to bridge efficaciously. It can investigate the complex behaviors, motivations and opinions of informants. By giving informants some causes to reflect on their experiences, in-depth interview can help researchers to find out more about the research objects than if they are simply observed or complete a questionnaire (Minichiello et al., 1995; Valentine, 1997).

While census data present the general characteristics of industrial upgrading, this study deploys in-depth interviews for identifying the mechanism of local upgrading and more critically, for linking different empirical findings together in order to explain the evolution of strategic coupling and the outcomes of upgrading. These interviews not only provide direct evidence, but also point to many clues for understanding the phenomena of upgrading.

More specifically, I conducted a pilot fieldwork with several interviews in June 2009. Two revisions were made based on feedbacks from the pilot test. First, I decided not to proceed to interviewees directly by myself, but to rely on local contacts to play an intermediate role. This worked well in trust building. Second, I only conducted face-to-face interviews, because Chinese informants regarded interviews via telephone or email as a distrustful and impolite manner. Three key industries (the automotive, electronics and apparel industries) were selected to represent a variety of industrial specificity in term of industrial governance and production organization (see Table 4.3). These three industries have been playing a representative role in the transformation and upgrading of regional industrial structures (see section 4.1 in Chapter 1). But they went through different trajectories of

industrial upgrading respectively.

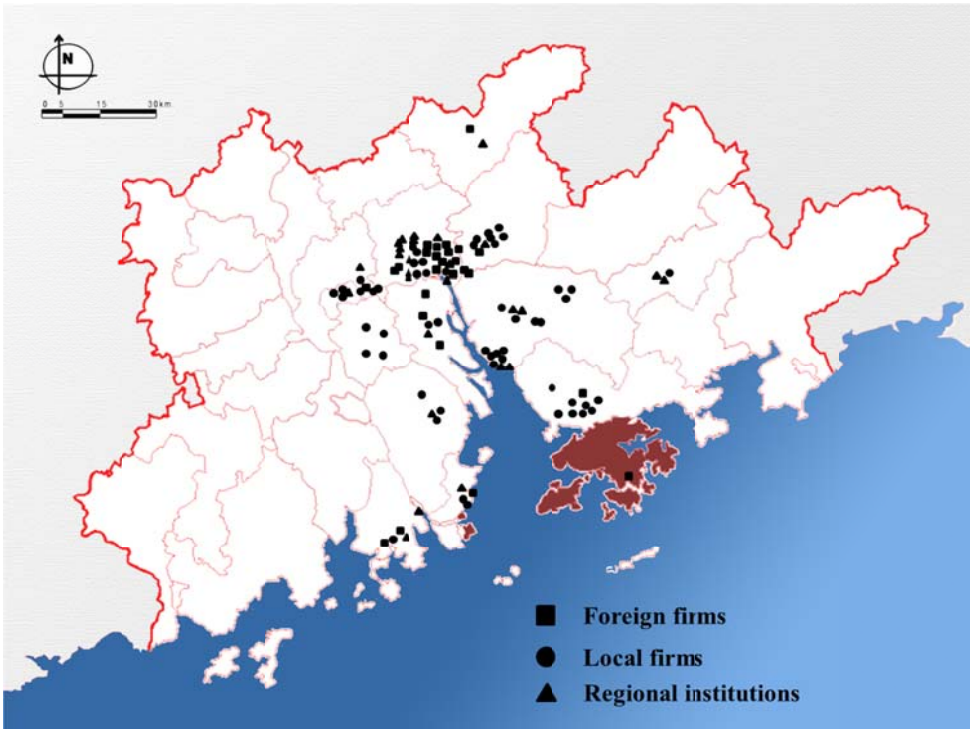
Table 4.3 Industrial specificity in the PRD

	Apparel	**Automotive**	**Electronics**
Types	· Traditional	· Complex products	· Specialized products
Product	· Simple products	· Complex products	· Specialized products
Production networks	· Simple · Short · globalized	· Complex · Sophisticated · Regionalized	· Sophisticated · globalized
Governance	· Buyer-driven	· Producer-driven	· Modularization
In PRD	· Traditional · Less important	· Newly · More important	· Traditionally strong · Remaining important
Dominant firms	· Local firms	· State owned firms	· Foreign firms
Governmental supports	· Weak	· Strong	· Moderate

Sources: author's fieldwork, Dicken (2007), Gereffi et al. (2005), Schmitz (2004).

In-depth interviews constituted the main part of the fieldwork. They were conducted from February to September in 2010 during which site research and participation observation were accompanied. Informants were selected based on a non-probability sampling with two principles: (1) the sample enterprises were involved in upgrading activities or events no matter they failed or succeeded; (2) the sample enterprises were representative and not reflecting an *ad hoc* case. Ultimately, 110 interviews were accomplished in the field. Most of the informants are concentrated on five major cities in the PRD, including Shenzhen, Dongguan, Guangzhou, Foshan and Zhuhai (see Figure 4.1). Corporate informants made up the majority and senior-level informants accounted for a major share. About one third of all informants came from governmental agencies and associations (see Table 4.4).

Figure 4.1 Spatial distribution of interview informants



Source: compiled by author.

Table 4.4 Types of informants and positions

Types of informants	**Number**	**Percentage in total**
Corporate	83	75%
Owner	9	8%
Chairman	3	3%
General manager	10	9%
president	1	1%
Vice president	14	13%
Director	18	16%
Manager	14	13%
Section manager	11	10%
Officer	3	3%
Organization	27	25%
Chairman	1	1%
Chief Party Deputy	2	2%
Vice mayor	1	1%
Division Deputy	3	3%
Director	8	7%
Officer	12	11%
Total	**110**	**100%**

Source: author's fieldwork.

Table 4.5 shows the profile of informants from another angle. 77 of the corporate informants are manufactures and 6 of them are from professional service providers and traders. The majority of manufactures are composed by three targeted industries. The informants are representative according to their positions. Table 4.6 shows the economic profile of corporate informants. Among 83 interviewed companies, ten of them are top 50 companies in Guangdong Province in 2009 in terms of total industrial output. About 20% companies had a value of industrial output over 500 million *yuan* in 2009. The total industrial output of four largest interviewed companies was 363 billion *yuan* which accounted for 6% of the PRD's output value in 2009.

Table 4.5 Industrial structure of informants

Types of informants	**Number**	**Percentage in total**
Manufacturing	77	70%
Apparel	21	19%
Electronics	34	31%
Automotive	16	15%
Chemical	2	2%
Ceramics	2	2%
Steel	2	2%
Other	33	30%
industrial association	11	10%
gov. agency	10	9%
Research Institute	6	5%
Service company	4	4%
Trader	2	2%
Total	**110**	**100%**

Source: author's fieldwork.

Table 4.6 Economic profile of corporate informants

Items	Number of enterprises	Percentage in total
Decade established		
1980s	39	47%
1990s	27	33%
2000s	17	20%
Start-up Investment (million *yuan*)		
< 1	10	12%
1 - 5	27	33%
5 - 10	23	28%
> 10	23	28%
Revenue Scale (in 2009, million *yuan*)		
< 5	5	6%
5 - 50	22	27%
50 - 500	40	48%
500 - 50,000	12	14%
> 50,000	4	5%
Employment in 2010 (person)		
< 100	10	12%
100 - 1000	28	34%
1,000 - 5,000	24	29%
5,000 - 10,000	12	14%
> 10,000	9	11%
Ownership types		
SOE	5	6%
FIE	24	29%
PE	54	65%
Total	**83**	**100%**

Source: author's fieldwork.

Questionnaire survey

Questionnaires are useful for collecting information about informants' behaviour, experiences, social interactions, attitudes, opinions and awareness of events. There are some limitations to the depth and extent of qualitative data that a questionnaire is capable of gathering. But this method have several strengths that can effectively complement qualitative research (MacLafferty, 2003; Parfitt, 2005). It can provide a framework for in-depth interviews, allowing key concepts, values and meanings to be teased out and measured. It also

gives informant the privacy and time to consider the developer their responses to sensitive questions (McGuirk and O'Neill, 2010).

During my preliminary fieldwork in 2009, some of my local contacts suggested to me that I should not conduct a questionnaire survey because local entrepreneurs might hold an anti-survey attitude (see section 4.3). Yang (2009) also reported this problem in the PRD in which she eventually changed the planned survey. But when re-entering the filed in 2010, I figured out that the problem rested in the way of survey delivery, not in the survey *itself*. In many of the previous surveys, questionnaires were delivered by mails, express delivery, or undergraduate students who were temporarily hired as research assistants. These questionnaires tended to be negatively resisted. However, this problem could be eliminated by better trust building and courtesy, such as face-to-face communication between principle investigators and informants.

Recognizing the nature of the anti-survey attitude, I insisted on conducting a survey by delivering the questionnaire at the end of the interview. Informants were free to complete it on spot or mail it back to me later. In order to lower informants' resistance, I also deployed some networking skills which were rooted in the culture of gift economy in China. I only asked my local contacts to introduce informants whoever my local contacts had a strong tie. Therefore, most of my informants were willing help and, in doing so, giving/returning a favour to my local contacts. Meanwhile, I prepared a set of research materials about industrial upgrading for sharing with informants. This initiative made the interview a mutual learning process. Additionally, a coaster printed with NUS's logo was given as a token of appreciation.

Only manufacturers were involved in the survey. The informants were asked to evaluate

the progress of various types of upgrading of their companies and some influential factors during the process of upgrading. The questionnaire was not asking the same question as in the interview. For instance, during the interview, I asked the informant to talk about how a new production line was installed and why they wanted to purchase that machine. In the questionnaire, the informant only evaluated the extent of process upgrading based on a given value. A pilot test was conducted with eight corporate informants and three professional researchers in March 2010. My thesis committee also gave me substantial feedbacks on the questionnaire design. Two revisions were made accordingly: (1) the number of questions was reduced from 50 to 30; (2) the scale of value was reduced from 0 ~ 5 to 0 ~ 3 (see the translated version of questionnaire in Appendix A).

The overall outcome of questionnaire survey was satisfactory. 77 sets of questionnaires were accepted by informants. About one third of them were completed on the spot and the rest returned questionnaires through express delivery, fax or email.[2] All returned questionnaires were checked to see whether informants had completed them and whether the answers were consistent with the interviews. Incomplete or unclear questionnaires were followed up accordingly. When the informants became unavailable, the questionnaires were deemed as unqualified samples. This effort ensured an effective returned rate (89%) of which 69 questionnaires were qualified eventually for my empirical analysis (see table 4.7).

[2] Many of them asked me to email the questionnaire to them later on instead of completing it on the spot.

Table 4.7 Sample profile of questionnaire survey

Industries	Number	Percentage in total
Electronics	31	45%
Apparel	20	29%
Automotive	14	22%
Steel	2	3%
Ceramics	1	1%
Chemical	1	1%
Total	**69**	**100%**

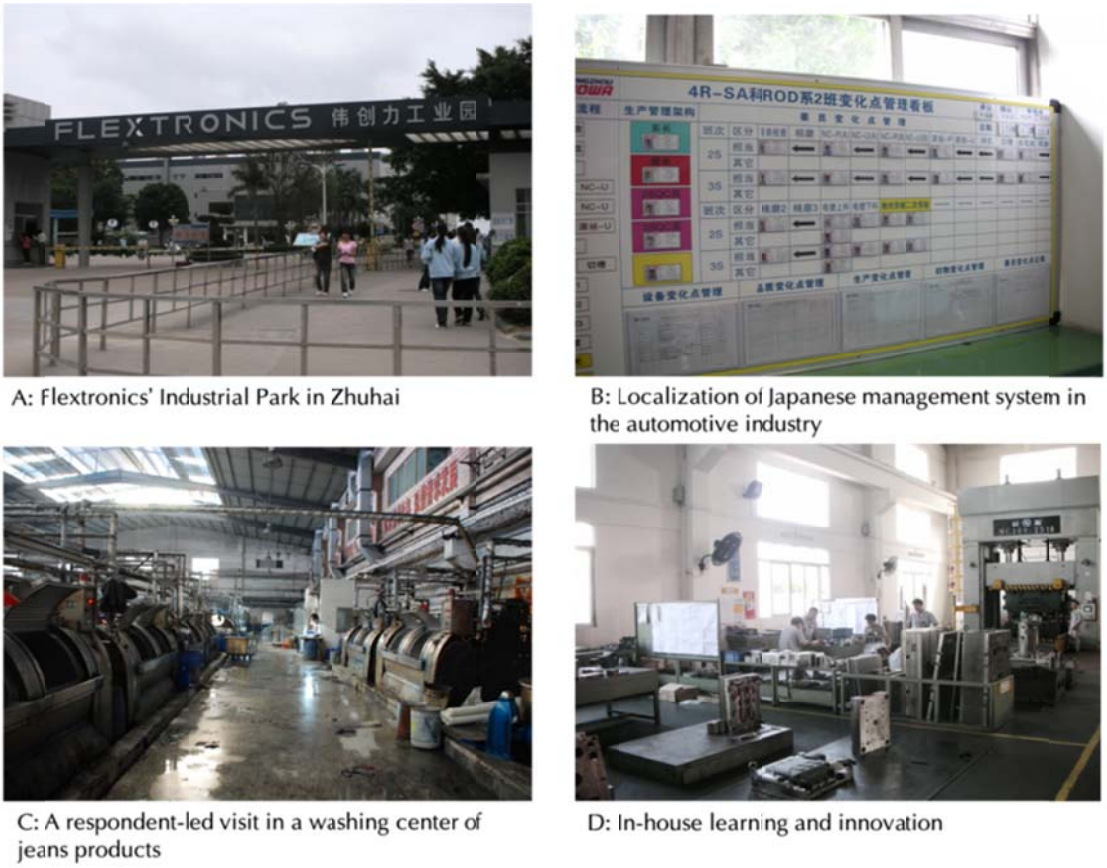
Source: author's fieldwork.

In-site and participation observation

In-site and participation observation yielded data on knowledge diffusion during the process of local upgrading in the PRD. The observation allowed me to move beyond taking information from interviews as a matter of fact, and more significantly, developed a ground-level feeling of the on-going mechanisms and outcomes. I mainly engaged in three types of observation.

First of all, throughout the whole fieldwork, I travelled extensively through different cities, towns and industrial districts in order to conduct interviews. Observation along the way was thus conducted. I observed in an impressionistic manner the outcomes of regional upgrading. During the interviews, many corporate informants also offered me a site visit to their factories, R&D centres, and production lines (see Figure 4.2). I cognitively perceived the flow of knowledge diffusion from receiving orders to delivering goods. Particularly, I was able to observe some in-house training sections and workshops for understanding better product and process upgrading. In some special occasions, the informant personally showed me around their factories and showcased their achievements of various kinds of upgrading.

Figure 4.2 Site visits



A: Flextronics' Industrial Park in Zhuhai

B: Localization of Japanese management system in the automotive industry

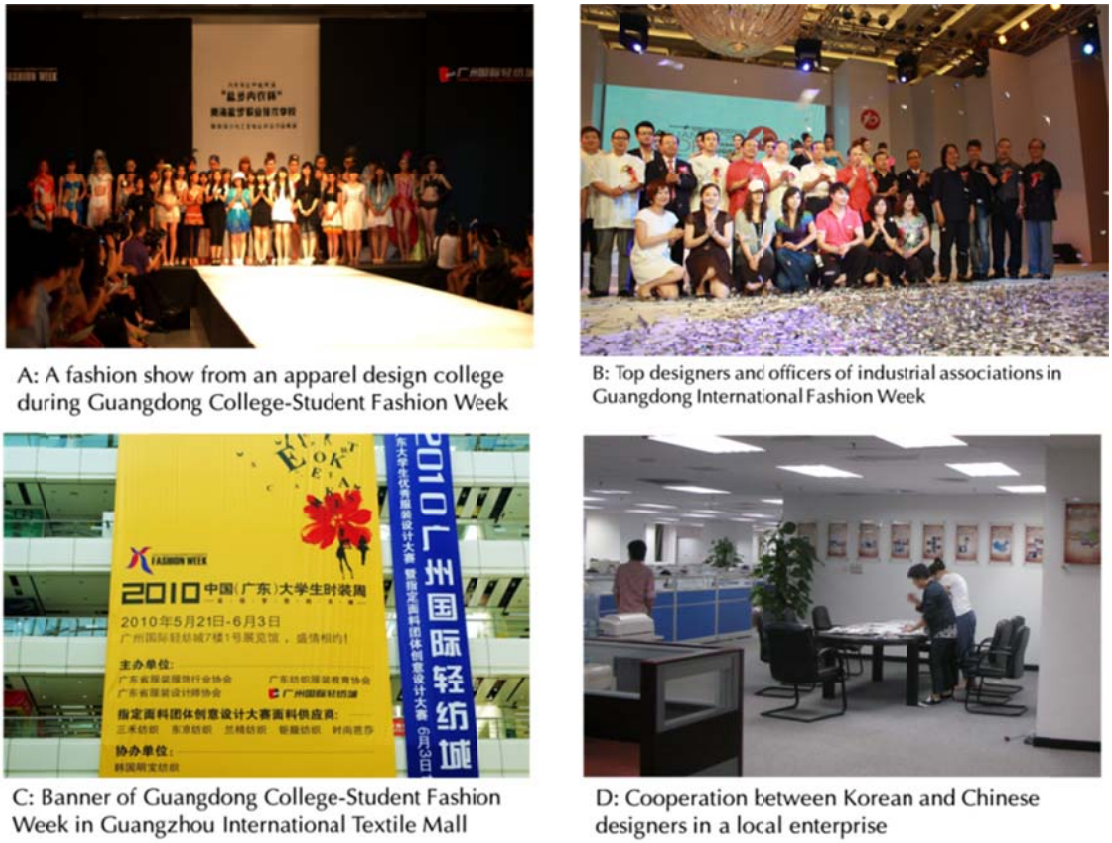
C: A respondent-led visit in a washing center of jeans products

D: In-house learning and innovation

Source: pictures were taken by author during fieldwork.

Second, I managed to participate in various events to appreciate the process of collective learning and knowledge sharing. Since 2000, Guangdong Apparel Industrial Association (GAIA) has hosted various fashion festivals, trade fairs and design competitions within the PRD annually. Invited by the vice chairman of GAIA, I participated in two events as a special guest in 2010: (1) Guangdong College-Student Fashion Week in June; (2) Guangdong International Fashion Week in September. Within these events, I got to understand the alleged 'collective learning platform' in the PRD's apparel industry. The platform is composed of these fashion events and has been hosting designers, entrepreneurs and buyers from domestic and global markets (see Figure 4.3).

Figure 4.3 Participating in site events



A: A fashion show from an apparel design college during Guangdong College-Student Fashion Week

B: Top designers and officers of industrial associations in Guangdong International Fashion Week

C: Banner of Guangdong College-Student Fashion Week in Guangzhou International Textile Mall

D: Cooperation between Korean and Chinese designers in a local enterprise

Source: pictures were taken by author during fieldwork.

Third, through participating in several planning projects, I observed focus group discussions and policy-making processes pertinent to upgrading. For instance, I was invited as a research consultant to participate in the project of urban system and industrial park planning in Qingyuan City. This project gave me a chance to observe the regional imperatives of upgrading, firm-state tension in restructuring regional industries, as well as local responses to new industrial policies. By observing how local firms bargained with governments for fiscal incentives, I understood better the 'picking the winner' approach of local authorities in offering fiscal supports. In Qingyuan, most of the funds for helping upgrading were actually granted to the firms which had already been upgraded, not those most in need for such funds! In s, plenty of tacit knowledge was accumulated during my site visits and participant

observation. This perceived knowledge is fully deployed in my explanations and interpretations throughout this thesis.

4.5 Research ethics

Research ethics is the values that regulate and govern the ethical behaviours of scholars during research, as well as the ways of scholars in reinterpreting collected information and attempting to elaborate the perspective and norms of the profession (Dowling, 2010; Hay, 1998; Valentine, 2005). Key issues include positionality, honesty, ethical standards, confidential protocol and authorship. This section elaborates my positionality in fieldwork and how I averted inappropriate ethics behaviours.

4.5.1 Positionality

I consider research positionality as the most critical issue which requires a researcher to be continuously reflexive towards scientific beliefs, values and approaches. This effort is to ensure internal consistency of my study from theorization to empirical verification. The problem of positionality can be dated back to the crisis of representation in social science that 'the problem of description becomes the problem of representation' (Hay, 2010; Marcus and Fischer, 1986). This situation happens when a researcher fails to appropriate and synthesize shifting paradigms adopted in his/her research. Hence the researcher encountered with a problem of explaining the reality with a storyline mixed up by different value judgements and standards, irrespective of his/her awareness of this problem. Internal contradictions in interpretations are thus generated.

Being aware of this problem, I adopted critical realism as my philosophical paradigm for

perceiving and theorizing reality. Whilst empiricism and positivism tends to locate causal relationships at the level of events generally, critical realism locates the causality at the level of a generative mechanism. It argues that causal relationships are irreducible to ‘empirical constant conjunctions’ in terms of David Hume's doctrine, or ‘empirical contexts' in Andrew Sayer's account (Archer et al., 1998; Bhaskar, 1975; Collier, 1994; Sayer, 1994, 1997). In other words, a constant conjunctive relationship between events is neither sufficient nor even necessary to establish a causal relationship.

The relational perspective in economic geography is partly rooted in critical realism (Bathelt and Glückler, 2003, 2005; Boggs and Rantisi, 2003; Yeung, 1997b, 2005). It explains the spatiality of economic actor’s activities by (1) highlighting the relationality and power that produces conjunctive relations between events; and (2) identifying the contexts when the events happen in a single or multiple localities (see section 3.2 in Chapter 3). As such, upgrading is neither a necessary outcome of learning or innovation, nor pre-determined by stylized governance patterns (as in the GVC literature). Instead, it should be grounded in both causal relations and spatial contexts where industrial upgrading takes place. This is the fundamental way of interpretation in this thesis.

4.5.2 Ethics and its implementation

When entering the field, I did not encounter difficulties in understanding industrial landscapes and everyday life in the field. Being a native Chinese, it is also possible for me to avoid a predisposed Western-centric cultural perspective to China’s issues. I critically remind myself to avoid being a China centralist who exaggerates the achievements of China’s economic growth and becomes blind to the dark sides of these achievements. I keep reflexive

of the power dynamics among local contacts, informant and me. To informants, they were doing a favour for friends (friend-like organizations). In the view of local contacts, they were both doing a favour for me and for academic research.

From design to implementation, my fieldwork followed strictly established procedures, protocols and other ethical norms I had committed with the approval of the Institutional Reviewing Board (IRB) of NUS. This IRB work was completed in March 2009.

Informed consent was received on the spot of interview as a confirmation of informant's acknowledge upon the procedure of interview (e.g. duration or approval for recording), privacy protection, confidentiality, and other rights of participants (e.g. levels of data disclosure and anonymity). Several informants refused to sign the forms for personal issues, though they agreed to let me use information collected during the interviews. About one third of the corporate informants requested to be anonymous. Most of the governmental informants disallowed me to quote any exact figures they had mentioned during the interviews in my thesis or further publications, except if those statistical data were publicly available.

An interview guideline was given to informants in advance and interview language was chosen by informants to ensure the comfort and accuracy of expression (see a sample of guideline in Appendix B). Most of the localities of interviews were in informants' own offices or workplaces where they had a sense of authority. Questions asked were not supposed to cause any trouble to informants. If informants disagreed with audio recording, hand-writing was used as a replacement. Informants were allowed to interrupt the interview without necessity to explain, but I did not encounter this situation. At the end of each interview, informants were requested to check the scripted interview data in order to convince them that

all data were accurately recorded. Whenever data are extracted and represented in thesis, I strictly assure that the informant' identity is confidential. Their anonymity is guaranteed by using titles or pseudonyms if a direct quotation is extracted from the interview data. Before publication, all extracted data (cases and quotations) will be sent back to the informants for double checking accuracy and the consent of publication. In sum, every attempt is made to ensure the rights and privacy of my informant, as well as the honesty and objectivity of my research.

4.6 Conclusion

The methodology of this study is premised on the multi-methods approach to empirical research. My methodological framework was designed to explore the content and extent of upgrading at the firm and the regional level, the formation of strategic coupling, and most importantly, to explain the interrelations between coupling and upgrading. This methodology was not idealistic, but was grounded upon rounds of negotiation within the field contexts. The selected methods were strictly guided by a scientific belief of critical realism. Data collected include statistical reports in multiple years, a pool of in-depth interviews, a set of questionnaire survey, and observations in the field. The outcomes are satisfactory: 110 interviews were conducted and 69 questionnaires were collected with a high return rate. These efforts have demonstrated the effectiveness, representativeness and validity of my fieldwork. Having detailed the methodology of this study, I now turn to the next four chapters that systematically present my empirical findings and their theoretical implications on local upgrading in the PRD.

Chapter 5 Industrial upgrading and evolutionary strategic coupling in the Pearl River Delta

5.1 Introduction

Since the 'open-door' reform in 1979, China has been transformed from an isolated country into one of the world's leading producers, traders and destinations for FDI. In the first half year of 2010, China overtook Japan and became the second largest economy in the world with the GDP of $2.6 trillion.[1] However, this remarkable economic growth has been questioned. There is an ongoing debate about whether the performance of China's economic is driven mainly by productivity growth or by factor accumulation (Wang and Meng, 2001; Wang and Yao, 2003). It is unclear whether FDI or human capital is more influential. The role of FDI in domestic knowledge spillover and national exports is also controversial (Cheung and Lin, 2004; Xu and Lu, 2009).

Specific to industrial upgrading, when the performance of the Chinese economy has been improved, whether Chinese local (domestic) firms have achieved corresponding upgrading is still in question (Huang, 2008; Sun, 2007; Young and Lan, 1997). There are two different strands of thoughts. In a pessimist view, Steinfeld (2004:1971) argues that "Chinese enterprises have become extensively linked with the global economy, yet in a shallow manner. They remain stuck in commodity manufacturing, undifferentiated activities for which

[1] Source: National Bureau of Statistics, http://www.stats.gov.cn/tjsj/jdsj/t20100716_402657756.htm

innovation is absent". Huang (2008) believes that SOEs have made a major contribution to the growth of domestic economies. But the contribution is at the expense of a huge amount of state investments utilized in a very inefficient way. Steinfeld (2010) also critiques that Chinese firms will not be the threat to the West, due to their lagging-behind speed in technological innovation in comparison with Western TNCs.

In contrast to these critiques, other studies embody an optimistic view to the achievement of upgrading in China, such as the formations of industrial districts and the changing patterns of regional development (Marco and Marco, 2005; Sun, 2007; Wei et al., 2007; Wei et al., 2009b); the improving capabilities of innovation in domestic firms (Ernst, 2007; Fan, 2007; Lazonick, 2004; Zhou, 2008a; Zhou and Tong, 2003); the enhancement of institutional environment (Lin, 2009a; Zheng et al., 2009) and so on. These studies consider export-oriented industrialization and indigenous absorptive capabilities as the key to achieve innovation and industrial upgrading (Zhou and Wei, 2011). Scholars in the literature of developmental state hold a similar view. They argue for export-driven forces as the primary and superior impetus for industrial growth and technological upgrading to latecomer economies (Amsden, 1989; Beeson, 2004; Hobday, 1995; Lall and Urata, 2003; White, 1988).

Situating in such a debate, this thesis does not attempt to offer an exhaustive account of the progress of industrial upgrading or to argue whether foreign firms or China's states are the key driver of domestic industrial growth. Drawing upon the case of the PRD, it focuses on an issue that these China studies have not yet clearly articulated: how does the interplay among foreign firms, domestic firms and state institutions affect local upgrading?

Chapter 3 has theorized the causal mechanism between strategic coupling and the dynamics of latecomer upgrading. From this chapter through to Chapter 8, I will operationalize the relational framework and exemplify the upgrading mechanism based on the case of the PRD over three decades of development. As the first empirical chapter, this chapter focuses on three topics: what types of strategic coupling have been developed in the past decades; the extent to which the PRD has achieved upgrading and the key drivers of this upgrading; the features of changing pattern of coupling. It is organized into five sections.

The next section provides an overview of the regional trajectory of industrial development and the characteristics of upgrading in the PRD. Key analyses are laid out in the third and fourth sections. Drawing upon the relational framework, the third section elaborates on the formation of strategic coupling and the limited outcomes of upgrading produced in strategic coupling. The fourth section articulates the evolutionary tendency of strategic coupling in the PRD in three dimensions: the changing profiles of foreign trade, the diverse performance of firms and changing institutional-spatial conditions. The final section discusses how the trajectory of the PRD exemplifies the casual relation between strategic coupling and local upgrading. A preface of subsequent chapters is provided.

5.2 Growth dynamics in the Pearl River Delta: beyond a world factory

Chapter 1 has introduced the changing role of the PRD in China's national economy through its shifting from a less-favored region into an experimental field of marketization. This section summarizes three key development stages of the PRD over three decades in

relation to changing regional institutional environment. The progress of industrial upgrading is measured in various ways.

5.2.1 Development stages of the Pearl River Delta

The post-reform development of the PRD can be reinterpreted as three stages in relation to institutional reforms historically. From 1978 to 1992, the PRD was in a period of restricted policy experiment. Strategic coupling was developed in which the central government mediated this region to meet the demands of industrial relocation of Hong Kong and other East Asian NIEs such as Japan. This period was meant for exploring institutional reforms and learning the manipulation of capitalism (Lu, 2001; Xu, 1988). Before 1986, all reform policies were only available within two special economic zones in the PRD (Shenzhen and Zhuhai). Township and village enterprises (TVEs) were encouraged by local states within rural areas in the rest of the PRD. Foreign investors, mainly from Hong Kong, were allowed to establish export-processing enterprises (EPEs) in the PRD. The preliminary success of industrialization encouraged China's central government to remove the restriction after 1986. Industrialization was speeded up. From 1986 to 1992, the total industrial output of the PRD increased by 32% annually; and land used for urban and industrial development expanded by 60,000 hectares.

During the 1990s, strategic coupling was reinforced in which the PRD experienced very rapid industrialization with further market liberalization. The initial success and the Southern inspection tour of Deng Xiaoping (in 1992) served as catalysts that brought more institutional supports to the PRD (Fang and Luo, 1999; Gan and Gan, 1994; Li, 1997; Tang and Tian, 2002). In 1994, the PRD was officially established as an independent economic zone with

more autonomy for attracting foreign investments and leveraging institutional reforms (Wu, 2005). Meanwhile, the implementation of new fiscal law stimulated prefecture governments as the key actors of industrial development, because they became heavily dependent on land transfer fees as revenues (Li, 2002; Lin, 2009b; Wu, 2007). From 1990 to 1993, the amount of utilized FDI in the PRD reached $14 billion, which was twice of the total amount in the 1980s. From 1993 to 1997, the PRD underwent rounds of economic booms in stock market and real estate market (commercial and industrial). Billions of domestic capitals and millions of migrant workers flowed in this region. However, this rapid development was slowed down by the 1997 Asian financial crisis during which Hong Kong experienced a very serious recession and significant negative impacts on the PRD occurred (Jao, 2001; Lin and Chen, 2003).

After 2000, China's accession into WTO made the PRD more open to international competition in which local firms enjoyed less export rebates, import subsidies and tax reduction as before (Chen and Wang, 2010; Sit, 2001; Yeung, 2002a). During this period, strategic coupling was enhanced in two ways.

First, Hong Kong was further integrated with the PRD under the Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA). This arrangement was an economic cooperative framework launched in 2004, including tax-free policies, market opening in service industries and investment facilitation[2]. The mission of CEPA was partly meant for upgrading the PRD's economy by attracting more producer-service industries from Hong Kong (Yang, 2005).

[2] Since 2004, about 300 products have been treated as tax-free products for manufacturing, covering industries like electronics, apparel, medical and chemical. Four main industrial markets in the PRD were open for Hong Kong firms to participate in and hundreds of manufacturing components were treated as free-tax goods. Macao was included in the agreement later on.

Second, the PRD's regional authorities have implemented various new industrial policies to stimulate industrial upgrading and improve absorptive capacities. As introduced in Chapter 1, the PRD has adopted the dual-transformation policy since 2008 which was meant for replacing lower value-added industries with the higher ones. When this policy was implemented, tension emerged between local and regional authorities in defining the usage of industrial land (Yang, 2012; also see Chapter 7). Meanwhile, apart from increasing research funds for endogenous firms, regional authorities implemented a new policy - Guangdong Technology Correspondent Project which was straightly meant for improving regional absorptive capacities. The project tried to build up regional innovation networks by establishing connections between universities/institutes and local firms. Selected technicians were allocated to local firms for at least one year and were required to participate in at least one project pertinent to upgrading or innovation, such as process improvement, new product development or equipment redevelopment. By 2010, about 1,000 technicians were allocated to 932 firms. About 80% of the firms located in the PRD and more than 50% were electronics enterprises[3]. During this period, the PRD has also been challenged by its economic sustainability, such as the exhausting land resources, raising labor wages, environmental degradation and increasing raw material costs and so on (Huang and Chen, 2009). All these problems pointed to industrial upgrading as an ultimate solution (Yu and Zhang, 2009).

5.2.2 Characteristics of industrial upgrading

Throughout three decades of export-oriented industrialization, the PRD has achieved upgrading to a significant degree. The region has been transformed from an agricultural

[3] http://cxy.gdstc.gov.cn/HTML/tzgg/127673876686665523469706315775 45.html

backwater into one of the world's leading manufacturing hubs. From 1978 to 2010, GDP in the PRD grew by 15-17% annually (GDSY, 2010). By 2009, the PRD took up 3% of the world exports with a value of $234 billion. Within China, the PRD has become a national economic vanguard. Since 1990, the PRD has accounted for more than 28% of export value in the country's total. Since 2000s, the annual GDP of the PRD has consistently exceeded 8.5% of the national total. This rapid industrial growth was accompanied by the improvement of performance at the firm level. A measurement based on industrial value added (IVA) illustrates this tendency.

As shown in Table 5.1, the total IVA of the region increased from 6.1 billion *yuan* in 1980 to 1,529 billion *yuan* in 2009. This significant growth resulted from improved efficiency of firms. From 1980 to 2009, IVA per enterprise continuously grew from 0.4 million *yuan* to 37 million *yuan*. The IVA per capita also achieved a remarkable growth of 23.5 times. During the same period, the number of firms only increased by 2.5 times and the number of workers grew with 10 times. These growth rates were much slower than the ones in IVA per enterprise and per capita.

By comparing the ratios of labor intensity and technology intensity, a watershed of the regional trajectory can be seen. Around 2000, the figure of labor intensity reached a peak level and then dropped slowly. In contrast, the ratio of technology intensity kept increasing continuously. This trend implies that firms in the PRD were less dependent on utilizing massive labor as before. Instead, significant investments were devoted to improving the technological capabilities of firms. It should be noticed that the figure of technology intensity here only refers to expenditures on new facilities and equipment renewal. Overall, the profit

ratio of the PRD's firms was enhanced from 3.5% in 1990 to 6.1% in 2009.

Table 5.1 Industrial development and upgrading in the Pearl River Delta

Category	**Unit**	**1980**	**1990**	**1995**	**2000**	**2005**	**2009**
GDP	*billions*	12	101	408	842	1828	3218
# PRD / Nation	*%*	2.6	5.4	6.7	8.5	9.9	9.4
IVA	*billion*	6.1	29	120	263	815	1529
No. Enterprises	*thousand*	16.3	25.1	19.5	15.7	28.2	41.6
No. Employees	*million*	3.3	6.1	15.1	25.8	28.2	32.6
IVA per enterprise	*millions*	0.4	1.2	6.2	18.1	28.9	36.7
IVA per capita	*thousand*	1.9	5.4	8.0	15.3	28.9	46.9
ELI	*unit*	193	232	776	1352	999	783
ETI	*million*	0.1	0.6	2.5	5.4	6.4	7.2
Profit ratio	*%*	N.A.	3.5	3.1	3.5	4.8	6.1

Notes: expect for figure in GDP, all data refer to enterprises above designated size that an annual turnover more than 5 million *yuan*. These enterprises accounted for the majority of total industrial output in the PRD which was more than 85% before 2000 and about 95% by 2009. IVA= industrial value-added; ELI, enterprise labor intensity = employment per enterprise; ETI, enterprise technology intensity = annual net value of equipment and instrument per enterprise; Profit ratio = gross profit / total turnover.

Sources: Guangdong Statistic Yearbook, 1990-2010; Pearl River Delta and Yangzi River Delta Statistic Yearbook, 2000, 2006, 2010; Guangdong Industrial Census 2004.

The revealed competitive advantages (RCA) index is applied to reflect the changing competiveness of the PRD in the 2000s. The RCA index is widely used in international economics for calculating the relative advantage or disadvantage of a certain country/region in a certain class of goods or services as evidenced by trade flows (see Balassa, 1979; Li et al., 2012). Results in Table 5.2 show that the region has been upgrading its competitiveness in the past decade with an increasing RCA index from 0.11 to 0.17, in spite of negative impacts from the global financial crisis in 2008.[4] The most competitive industries were textile, apparel (including footwear, headgear and so on), stone products, miscellaneous manufacture, and workers of art collectors. The competitiveness of machinery and electronics products also

[4] The massive drop of the RCA index in 2004 mainly resulted from the huge increase of imports in plant products, medical instruments and equipment, clocks and watches, musical instruments and so on. These export amount of these products originally exceeded import before 2000.

achieved moderate extent of growth from 0.15 to 0.23. But the international competitiveness of the automotive sector was reducing (see products of Vehicles and Aircraft vessels).

Table 5.2 RCA index of foreign merchandise trade in Guangdong Province

Years	**1998**	**2004**	**2009**
Total	***0.11***	***0.07***	***0.17***
live animal	0.33	0.25	0.02
Vegetable products	0.09	-0.49	-0.63
Animal or vegetable fats	-0.36	-0.90	-0.86
Prepared foodstuff	0.44	0.37	0.31
Mineral products	-0.24	-0.77	-0.56
Chemical products	-0.37	-0.52	-0.33
Plastics &amp	-0.36	-0.42	-0.35
Wood &amp products	-0.27	-0.08	0.14
Wood pulp &amp	-0.44	-0.30	0.07
Textile &amp	0.35	0.36	0.63
Footwear, Headgear, Umbrellas, Feather & amp	0.96	0.97	0.97
Stone products	0.42	0.47	0.67
Jewelry, Coins	0.07	0.27	0.15
Base metal &amp	-0.31	-0.24	-0.2
Machinery, Electric product &amp	0.15	0.12	0.23
Vehicles Aircraft vessel	0.32	0.15	0.08
Instruments, Medical/optical Instruments &amp	0.34	-0.20	-0.16
Miscellaneous Manufacture	0.94	0.93	0.93
Works of Art Collectors	0.98	0.95	0.93
Special Trading Goods	0.18	-0.89	-0.8

Notes: the RCA of net exports as a percentage of gross exports plus imports, given by

$$RCA_{xat}^{X-M} \ ^{*} = \frac{X_{xat} - M_{xat}^{*}}{X_{xat} + M_{xat}^{*}}$$

Where

X_{xat} is the region x's export value of commodity at time t;

$\mathrm{M_{xat}}$ is the region x's import value of commodity at time t;

Ceteris paribus the closer the index is to +1.0; the more competitive an industry is in the global economy, and vice versa: that is, RCA $\geq$ 0 implies comparative advantage while RCA $\leq$ 0 implies a competitive disadvantage.

Sources: export and import data of main merchandise in Guangdong Statistic Yearbook in multiple years. Data specific for the PRD are unavailable. Provincial data are deployed and regarded as representative because The PRD's foreign trading accounted for more than 90% of the entire province in the 2000s.

Besides the upgrading of firm performance, functional upgrading was also achieved at the regional level in the sense that the PRD has upgraded from a processing base into one of a local economic power house with horizontally agglomerated industries, vertically integrated production networks and a growing body of R&D and innovation activities (Enright et al., 2005; Enright et al., 2003; Yang and Liao, 2009; Yu and Zhang, 2009). Dozens of industrial clusters, national/provincial industrial parks and development zones were developed in various sectors, such as electronics, home appliances, telecommunication equipment, toys, automobile vehicles, watches and clocks, garments, footwear, plastics products, and ceramics and so on.

As I have shown in Chapter 1, the industrial structure of the PRD is moving towards and concentrating in higher value added sectors (see Figure 1.3). The dominant role of the electronics industry, including electronics product, ICT and electronic machinery, has been reinforced. In contrast, the influence of the textile and apparel industries is declining over time. As a newly emerging industry with higher value added, the transport equipment industry stands as the industry with most significant growth.

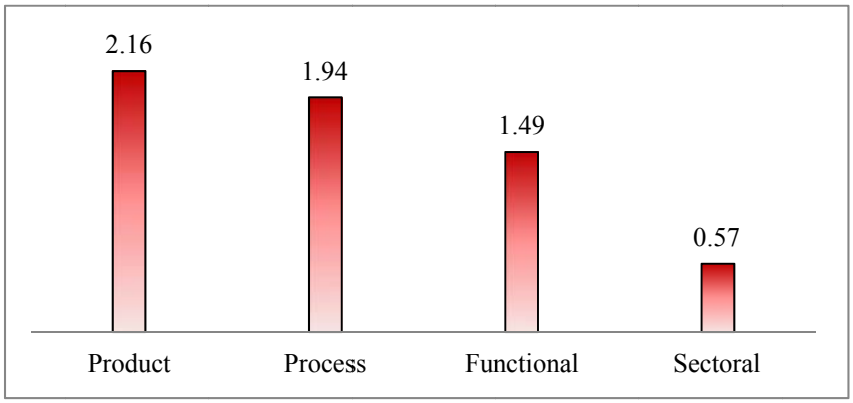
Along with the transformation of industrial structure, the positions of these industries in GPNs are also improved. Currently, the PRD's electronics industry is not made up by low value-added processors in a marginal position. Instead, the PRD has taken up a much more central role in the electronics' GPNs. This industry comprises manufacturing plants of many global lead firms in consumer electronics such as Sony, Kyocera, Toshiba, Samsung, LG, Nokia and Motorola; key electronics manufacturing service (EMS) providers like Foxconn, Flextronics, Quanta, Compal, Wistron, Inventec and Delta; and promising local or domestic

Chinese firms like Huawei and ZTE (telecommunication), Media and TCL (home appliance), and Lenovo (computer) and so on. Integrated with thousands of suppliers, these leading electronics firms agglomerate within dozens of industrial clusters/parks in the PRD, particularly in Shenzhen, Dongguan and Zhuhai (see details in Chapter 6).

In the apparel industry, thousands of competent local firms agglomerate in clusters and product-specific specialized towns. They are manufacturing countless products for most of the global branded retailers ranging from Louis Vuitton, Prada and Armani in Europe; to Levis, LEE and A&F in the United States. Although the importance of the apparel industry in the PRD has been shrinking, this industry still accounted for 5% in total world export in 2009. This portion led ahead many developing countries such as Turkey, India, Vietnam and Indonesia (see details in Chapter 7). In the automotive industry, the PRD have been upgraded into a key automotive industrial base supplying to the large domestic market of China. The key change in this industry occurred in the three joint ventures between SOEs and leading Japanese auto assemblers (Toyota, Honda and Nissan). A vertically integrated production network was constructed by these joint ventures, their origin suppliers and new local Chinese suppliers (see details in Chapter 8).

According to my empirical survey of 69 interviewed firms in 2010, product upgrading was the most significant type of upgrading with a value of 2.16 (see Figure 5.1). Process upgrading stood second and was followed by functional upgrading. Sectoral upgrading was less significant with only a score of 0.57 within a scale of zero to 3. The overall tendency shows that the surveyed firms have achieved significant upgrading within the same sector.

Figure 5.1 Industrial upgrading in the surveyed firms



Notes: informants were requested to evaluate the extent of upgrading in four types. A value ranged from absent (0) to very high (3) was attributed. The result is averaged.

Source: author's survey on 69 firms in the PRD in 2010.

5.3 Captive coupling, knowledge diffusion and upgrading

The above section has shown the development stages and characteristics of upgrading in the PRD. The analytical foci of this section are the formation of captive coupling and how it led to a limited outcome of upgrading.

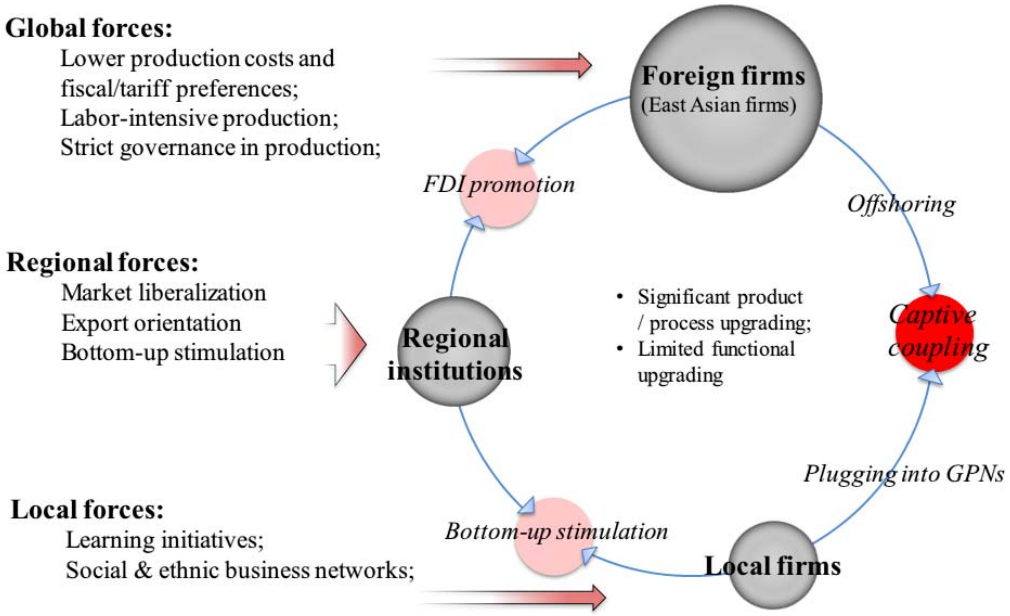
5.3.1 Formation of captive coupling

In the case of the PRD, the initial pattern of coupling belonged to *captive coupling*, referring to a state in which local firms were highly dependent on foreign invested firms (FIEs, either TNCs or foreign investors) in terms of capital, technology and market. The formation of captive coupling resulted from multi-scalar forces as shown by Figure 5.2.

At the global scale, the PRD faced extremely huge technology and market gaps with the global economy because of its lack of industrial base (see Chapter 1). The PRD could only satisfy the basic profit-seeking imperative of TNCs which tended to relocate labor-intensive segments to localities with lower production costs. At the beginning of the 1980s, the average

wage in manufacturing SOEs in the PRD was about $5 per month (Yu, 2008). Before the Asian financial crisis in 1997, monthly wages in manufacturing were merely increased to $100 in the PRD (Gu and Yang, 1999). This cost-based complementarity was attractive to TNCs.

Figure 5.2 Captive coupling in the PRD



Source: compiled by author.

At the regional scale, with a liberal policy framework, regional governments in the PRD managed to facilitate the formation of captive coupling. This institutional leeway satisfied both the interests of local entrepreneurs and global capitalists. They both preferred a more flexible administrative environment so that they could practice capitalism without violating relevant laws and directives (e.g. public ownership) in China (Chen and Pu, 1999; Enright et al., 2003; Ning, 1998; Xu, 1988). Hong Kong firms played a critical intermediate role during this process. This point can be illustrated by the view of an owner of a Hong Kong-based OEM company in the apparel industry:

> My big boss [investor] was actually from the US. When he decided to outsource jeans to China in 1982, he chose the PRD for its cheap labor costs and liberalizing environment. He set up a company in Hong Kong first for coordinating his business. This was because this big boss was skeptical of opening directly a factory in China since he had heard a lot of negative comments about the unstable politics and arbitrary local cadres of China. He also did not fully understand how to do business in China. That was why I was chosen to be a partner (Interview 100325, on 25 March 2010 in Guangzhou).

At the local scale, captive coupling was reinforced by a bottom-up approach of FDI promotion. In the beginning of the 1980s, Guangdong Province had little financial capital in its regional banking systems. Without additional capital investments from the central government, Guangdong provincial government had little capability to launch large scale construction projects or to nurture competent SOEs. Hence the provincial government further decentralized power and promoted foreign investments at the local scale such as counties, towns and villages, which led to a scattered form of FDI distribution in the PRD (Cui, 1999; Xu, 1988; Yang and Sit, 1995). Local governments were highly incentivized because they could retain the bulk of the revenue generated under a specific arrangement of 'fiscal contract' (财政包干 Cai Zheng Bao Gan). As Table 5.3 shows, the category of 'others', including small cities, counties, towns and villages, accounted for most of the FDI with the highest growth rate between 1980 and 1993. These local governments served as flexible and pro-active actors to satisfy the needs of foreign investors. The former chief planner in Guangzhou Urban Planning and Design Institute has conceptualized this phenomenon as the 'small dog economy' which contributed to the formation of captive coupling considerably:

> Dongguang is a typical city that is highly dependent on FDI. At that time, all 33 towns were mobilized to attract foreign investments at the same time, like a local tournament. The municipal governments almost had no restriction on them or industrial plan for them, expect setting an unwritten but fixed annual criteria of FDI attraction to be achieved. I called it as 'small dog economy' in which all the dogs [towns] were running round and competed with each other for food [FDI]. It was quite flexible and efficient for development in the beginning, but it was a rough way of resource utilization in terms of lands and environment (Interview, 100417, on 17 Apr 2010 in Guangzhou)

Table 5.3 Distribution of actual utilized foreign capital in the PRD (1980 – 1983)

Urban scale (population)	**1980**	**1993**	**1980-1993**	**Annual growth rate**
	%	%	%	%
Mega city (> 1 million)	28.1	13.2	14.2	43
big city (0.5~1 million)	26.3	22.3	29.5	52
middle city (100~500 thousand)	22.0	18.1	21.2	51
Others (< 100 thousand)	23.6	46.5	34.7	55
Total amount (million, $)	101.2	6428	20094	

Note: Others include small cities, counties, towns and villages.

Sources: Guangdong Statistics on Regional Economic Development, 1980-1993.

Social and ethnic business networks in the PRD also played a positive role in facilitating captive coupling. These connections enabled the region to enjoy good accessibility to information about the global market, state-of-art technologies and modern managerial skills. They either introduced the PRD to wider audiences or directly shaped the relocation decisions of TNCs based on personal networking or preferences, particularly when the decision makers or brokers were ethnic Chinese (Hsing, 1996; Olds and Yeung, 1999; Qiu, 2005; Yeung, 1997a). For example, many of the apparel industrial clusters in the PRD benefited from the overseas relatives of local entrepreneurs (see details in Chapter 7). Zhuhai City attracted many Japanese firms by constructing a specific social network. In the mid-1980s, Zhuhai governments hired several Chinese returnees from Japan as senior officers in the Zhuhai Bureau of Foreign Economy and Trade. These returnees actively organized several official

business trips to Japan for promoting FDI. Meanwhile, the returnees mobilized their social connections in Japan to get in touch with Japanese lead firms in the electronics industry. As a result, Zhuhai successfully brokered a large amount of Japanese electronics companies to offshore their manufacturing segments to Zhuhai, such as Canon (1990, camera and printer), Mitsum (1991, transformers and magnetic head) and Panasonic (1993, motor and battery). By 2000, Zhuhai had hosted about 240 Japanese electronics companies and continuously attracted more Japanese firms based on this agglomeration effect. Within a single year in 2006, 100 Japanese electronics firms established branch plants in Zhuhai with a total investment over US$ 10 million.[5] Apart from providing fiscal incentives for these Japanese firms, Zhuhai governments also actively built up several industrial parks to accommodate them and even provided help in recruiting workers, technicians and engineers.

5.3.2 Limited upgrading in captive coupling

Due to large knowledge gaps, liberalizing regional environment and local initiatives, the integration pattern of the PRD formed as captive coupling. Local economies were captive to foreign firms which provided capitals and technologies by establishing a large number of FIEs. This captive coupling led to rapid industrialization in the PRD in which product and process upgrading was significantly realized based on the synergy between local entrepreneurs and foreign investors. However, the upgrading was limited. The limited upgrading was embodied by the prevalence of export-processing enterprises (EPEs) and Hong Kong firms in the PRD.

[5] Source: author's interviews in Zhuhai in June, 2010, with four interviewees: two directors and a senior officer of three industrial parks, and a vice-director of the Foreign Economy and Trading Bureau of Zhuhai.

EPEs were called the *San Lai Yi Bu* (三来一补) enterprises in China, which is also termed as process and assemble firms (Yeung.G, 2001). These enterprises refer to three forms of processing works[6] and compensation trade. These enterprises have no domestic sale quota and all finished goods must be exported. It should be noticed that investments in EPEs are excluded from the conventional definition of FDI and are regarded as 'other forms of foreign investments' in Chinese statistical terms. EPEs are similar to the *maquiladora* in Mexico which emerged in the 1960s and became prevalent after the establishment of NAFTA in 1994 (Kamel and Hoffman, 1999). The difference is that EPEs have greater flexibility in material procurement. They do not necessarily process materials designated or provided by foreign partners, while enjoy certain autonomy in sourcing in global markets (Gan and Gan, 1994; Song et al., 1989; Xu, 1988).

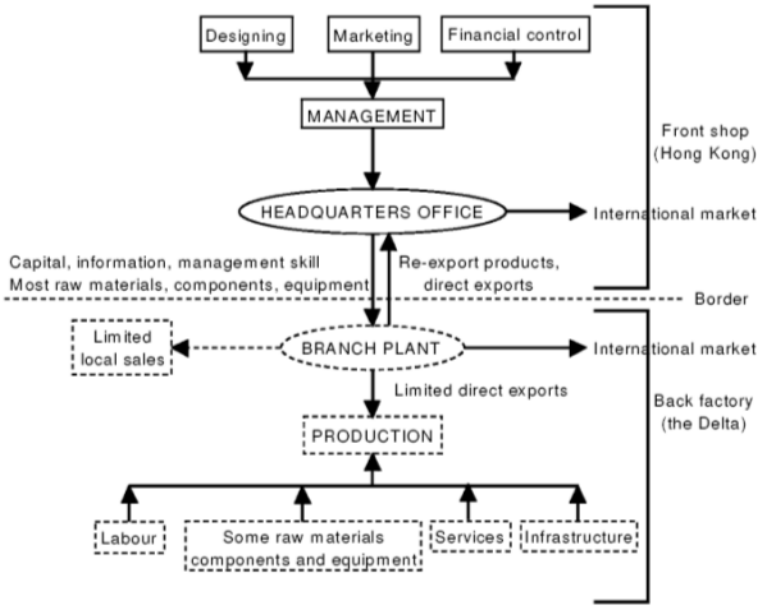
EPEs have been prevalent in the PRD for three decades which means that the region has highly depended on this type of enterprises in which local firms are captive to foreign investors. In 1980, investments in EPEs accounted for 61% of total utilized foreign capital in the PRD. Though the portion was decreasing, it still took up a share of 48% in 1990 (GDSY, 2001). Data from the custom regime shows the significant role of EPEs in the foreign trading of the PRD. In 1990, EPEs accounted for 82% of total export value and 80% of total import value in the PRD. A decade later, the portion was reduced a little bit with 78 % in export and 70% in import. By 2009, EPE still played a major role in foreign trading, accounting for 57 % of export value and 54% of import value in the PRD.[7]

[6] (1) manufacturing with designated designs and templates from foreign partners; (2) manufacturing with provided raw materials from foreign partners; (3) manufacturing with imported materials from foreign partners.

[7] Guangdong Statistic Yearbook in multiple years, 1995 – 2010.

Due to geographical proximity, social-cultural networks and deliberated national strategies, Hong Kong firms became the primary players in establishing EPEs in the PRD. Taiwanese firms followed after the mid-1980s (Leung, 1993; Tuan and Ng, 2004; Yu, 2008). By 1985, Hong Kong-origin investments ($670 million) accounted for 90% of total utilized foreign capital in the PRD.[8] Most of them were concentrated on the apparel and electronics industries (Chui et al., 1997). The prevalence of Hong Kong firms formed a regional production pattern between the PRD and Hong Kong, termed as the 'front shops-back factories' (FSBF, 前店后厂) pattern.

Figure 5.3 Front shops-back factories pattern of production in the PRD



Source: Figure 3 in Sit and Yang (1997:657).

Shown as by Figure 5.3, Hong Kong played a dominate role as the front store which received orders from global markets and completed manufacturing works by thousands of EPEs in the PRD (Sit and Yang, 1997; Sit, 1998). The FSBF pattern largely boosted the competitiveness of Hong Kong firms by offshoring and outsourcing labor-intensive segments

[8] Guangdong Statistics Yearbook in multiple years, 1991 - 2010.

to the PRD hinterland. Many Hong Kong-based FIEs participated in this pattern later on by subcontracting orders to local manufacturers rather than establishing EPEs.

There was synergy for nurturing upgrading within EPEs. In terms of labor division, foreign investors were in charge of investing in facilities (including machines, plants and basic equipment), importing parts of raw materials, providing designs and managerial assistance, and exporting final products to global markets. With very low entry barriers, local firms provided all other resources such as land, workshops and low-waged workers, except capital and technologies. In terms of profit sharing, local firms earned a fixed amount of processing fees and tax reimbursements, while foreign firms appropriated all other profits. Therefore, foreign investors had incentives to improve production efficiency by upgrading product ranges and processing technologies in EPEs. Local partners were willing to follow the governance of foreign investors as this was the best learning opportunity for them, when their indigenous capabilities were rather weak. Knowledge diffusion took place through the efforts of foreign investors in three general steps: providing product definitions and designs, constructing production lines (equipment, facilities and even factories) and labor training. For instance, during the 1980s, there were about $3 billion machines imported into the PRD by foreign investors. A comment from the owner of Changjiang Textile and Apparel Company interprets knowledge diffusion within EPEs:

> We knew nothing at all at that time [the 1980s]. We would be better off by just following the instructions set by foreign businessmen. We did what they told us to do. They taught us how to set up a factory, organize a production and management system, although sometimes we did not know why we should do it that ways. Our business boomed quickly. Many workers from states owned enterprise hopped to my factories, because in my factory, they could earn more and learn more (Interview 100427, on 27 April 2010 in Guangzhou).

Though there was synergy, functional upgrading was limited within EPEs. By defining production and organization, foreign investors had overwhelming power towards local partners from production to delivery. Local firms served as affiliated processors at a truncated and marginal position within EPEs. This position was disconnected from information about market demand, marketing, procurement, logistics, the management skills of production system and supply chain. Foreign investors had no incentive to transfer any of these types of knowledge to local firms which hindered local upgrading to a certain degree.

Without strong endogenous technological capabilities, the corporate power of local firms was too weak to help them escape from such a disadvantage position or bargain for more learning opportunities. Institutional power was also weak in the sense that regional assets, such as liberalizing institutional environment, pro-active developmental states and overseas social-cultural networks could only facilitate the process of industrialization, whereas could not support local firms to reshape power relations with foreign investors (Cui, 1999; Li, 2002). Without associational economies, collective power was also hard to be developed among local firms in the PRD. The weak power of local governments and firms was described by the director of Guangdong Development Research Institute as below:

> At that time [the 1980s], policy was our only treasure for development. We kept persuading foreign firms to invest in the PRD, while at that time, we could not ask for too much. It was good enough once those business-men were willing to invest in. Therefore, local governments rushed to attract FDI by lowering production costs. As I remembered, many towns and counties even waived land rents. At the same time, all industries came in, unselectively, such as low end and processing industries, or highly polluted or highly energy-consuming industries (Interview 100518, on 18 May 2010 in Guangzhou).

Institutional inertia was also developed within EPEs that further hindered local functional upgrading. Comparing with FIEs, foreign investors in EPEs only have to pay processing fees. Operating in the forms of EPEs had lower managerial costs and earned more marginal profits. Moreover, workers in EPEs were employed under short-term labor contracts without any coverage of pension or social insurance (Gu and Yang, 1999). Therefore, foreign investors hardly had interests in upgrading EPEs into FIEs, unless they wanted to develop the domestic market. To local authorities in townships and villages, they also preferred to stay with EPEs for earning administrative and processing fees. Once EPEs were upgraded into normal enterprises, local authorities could only reap profits from land leasing. This was why local authorities resisted the new regional-upgrading policy in 2008 which aimed for relocating EPEs in the PRD.[9]

To sum up this section, the economic take-off of the PRD resulted from the formation of captive coupling based on multi-scalar forces: the global imperative of industrial relocation, regional liberalizing tendency and local initiatives. Synergy within captive coupling nurtured rapid industrial growth as well as limited product and process upgrading in the region. Functional upgrading was impeded organizationally and institutionally. Nevertheless, the PRD was not dominated by this captive coupling throughout three decades of development. Strategic coupling has been evolving since the 1990s. Next section addresses this dynamics.

[9] An online media report about the bargaining between local and regional authorities about restructuring EPEs, at: http://finance.ifeng.com/city/cskx/20091101/1414570.shtml

5.4 Impetus of change: evolutionary strategic coupling

The formation of captive coupling occurred between the 1980s and the early 1990s. Beginning in the mid-1980s, FIEs started to increase their influence in the region through establishing joint exploration of resources and three types of FIEs (ventures): equity joint venture, contractual joint venture and wholly foreign-owned venture. Different from EPEs, these FIEs not only benefited the regional economy through the effects of knowledge spillover, and also nurtured local firms as their suppliers. Since the 1990s, FIEs became much more influential and replaced EPEs as the key driving force. Meanwhile, local firms were also catching up with FIEs and managed to develop more comprehensive partnerships with foreign investors by utilizing various new regional assets. This section illustrates the evolutionary tendency of strategic coupling in three dimensions: (1) the changing regional profiles of foreign trade which reflect the evolving pattern of integration; (2) the divergent performance of firms which present the reconfiguration of driving forces to local upgrading; (3) local upgrading strategies which are embedded in various spatial-institutional conditions. I argue that these changes provide new opportunities for local firms to leverage the governance power of foreign firms in their pursuit of local upgrading.

5.4.1 Changing patterns of foreign trades: moving away from captive coupling

By examining the changing profiles of foreign trade data in the PRD, this study identifies two distinctive features related to the evolution. First, as shown in Table 5.4, the PRD has been directly articulated into the global economy, rather than depended heavily on the intermediate role of Hong Kong. From 1990 to 2009, the dominant role of Hong Kong was

overtaken by firms from the United States, Japan, Taiwan and other EU members. Although Hong Kong was still the most important partner in the export market, its share declined from 81% to 32%. In the import market, there was evidence of Hong Kong's shrinking share from 80% in 1995 to 7% in 2000 and to 2.4% in 2005. Moreover, Hong Kong was excluded from the top five importers in 2009. In the export market from 1990 to 2009, the United States overtook Hong Kong's role with an increase from 4% to 19%. During the same period in the import market, Hong Kong was replaced by Japan, Taiwan and South Korea. Particularly, Japan became the third important trade partner of the PRD. This tendency implies that the PRD is moving from a marginal node into a more central position within GPNs. The region has articulated into global markets by building up trade relationships with many of the most important developed and developing countries.

Table 5.4 Main trading partners of Guangdong Province (1990 – 2009)

Rank	**Export**				
	1990	1995	2000	2005	2009
1	Hong Kong(81)	HK(87)	HK(34.3)	HK (39)	HK (32)
2	US (3.8)	US (3.1)	US (28)	US (25)	US (19)
3	Japan(2.7)	Japan (2)	Japan (8.4)	Japan (6.2)	Japan (4.9)
4	Macao(1.6)	Taiwan(2)	German(3.5)	Netherland (3)	German(3)
5	Singapore(1.3)	Macao (0.8)	UK(2.87)	German(2.5)	Singapore (2.7)
Rank	**Import**				
	1990	1995	2000	2005	2009
1	HK (66)	HK (80)	Taiwan(19)	Taiwan(18)	Japan(14)
2	France(8)	Taiwan(11)	Japan(18)	Japan(17)	Taiwan(13)
3	Macao (6.4)	Japan(3)	South Korea(9)	South Korea(9)	South Korea(9)
4	Japan (4.4)	US (1.2)	US (6.8)	US (4.2)	US (4.8)
5	UK(4.0)	Sweden(1)	HK (6.7)	HK (2.4)	Malaysia (4.7)

Sources: Guangdong Statistics Yearbook, 1991-2010, Unit: %.

Second, as shown in Table 5.5, the PRD was reducing dependence on EPEs in its international trade markets. In export trade, the share of EPEs declined from 82% in 1990 to

57% in 2009. In import trade, it was reduced from 80% in 1990 to 54% in 2009. Correspondently, ordinary trade kept growing and exceeded the share of EPEs. The articulation into global markets and the fading influence of EPEs implies that the PRD has been moving away from captive coupling. Both foreign and local firms in the PRD increasingly export more sophisticated products than EPEs.

Table 5.5 Changing patterns of foreign trades in the PRD (1990 – 2009)

Year	Total	Ordinary trade	EPE Trade	Others
Export				
1990	22.2	18%	82%	0.6%
1995	56.6	19%	80%	0.4%
2000	91.9	22%	78%	0.3%
2005	238.2	35%	65%	0.0%
2009	359.0	42%	57%	0.9%
Import				
1990	19.7	18%	80%	2.0%
1995	47.4	16%	83%	0.7%
2000	78.2	30%	70%	0.8%
2005	189.8	38%	61%	0.6%
2009	252.2	46%	54%	0.3%

Notes: EPE trade refers to trades based on export-process firms. Others include trades based on bonded warehouse, donations and so on.

Sources: Guangdong Statistic Yearbook 1992-2010, Currency: US$, billion.

5.4.2 Divergent performance of key actors: who are the drivers?

While the pattern of captive coupling is evolving, who are the key drivers of this change? By investigating into the performance of different firms, this study finds that the driving forces of the PRD have been reconfigured constantly in the last two decades. By and large, SOEs have the best performance but least influence in the PRD. The region is still led by FIEs. But local private firms are quickly catching up with FIEs (see table 5.6).

Table 5.6 Enterprise Performance in the PRD (1991 – 2009)

Year	SOE	COE	PE	#FIE	FIE(HTM)	Others
Industrial value added (billion)						
*1991	25	15	1.2	5	12	N.A.
1999	33	21	30	41	97	29
2005	38	11	197	255	290	55
2009	83	12	530	429	407	68
Number of enterprises (unit)						
*1991	7172	20499	N.A.	N.A.	N.A.	N.A.
1999	1304	2801	1914	1261	5776	N.A.
2005	1047	974	8909	3931	9810	N.A.
2009	294	612	14727	5364	11720	N.A.
IVA per enterprise (million)						
*1991	3.5	0.7	N.A.	N.A.	N.A.	N.A.
1999	25.2	7.5	14.2	32.5	16.8	N.A.
2005	87.3	11.3	22.1	64.9	29.5	N.A.
2009	281.4	19.6	36.0	79.9	34.7	N.A.
IVA per capita (thousand)						
*1991	14	7	N.A.	N.A.	N.A.	N.A.
1999	84	29	73	82	45	N.A.
2005	290	39	101	123	75	N.A.
2009	469	43	154	148	87	N.A.

Notes: SOE refers to state owned enterprise; COE refers to collective owned enterprises; PE refers to private invested enterprise; FIE (HTM) refer to FIEs originated from Hong Kong, Taiwan and Macao; Others refer to all firms with annual revenue lower than 5 million *yuan* plus EPEs.

*: Data in 1991 refer to the whole Guangdong province. Currency: *yuan*.

#: FIEs refers to foreign invested enterprise excluding the ones from Hong Kong, Taiwan and Macao.

Sources: Guangdong Statistic Yearbook 1996-2010; the PRD and the YRD Statistic Yearbook, 2005-2010; Guangdong Economic Census 2004 and 2008.

During the 1980s, SOEs were playing a dominant role in the regional economy. By 1992, more than 7,000 SOEs produced the majority of output with 25 billion *yuan* IVA. Collective owned enterprises (COEs) were the second largest forces accordingly. From then on, SOEs and COEs have lost their influence. The number of SOEs and COEs shrank incredibly. In 2009, there were only 294 SOEs and 612 COEs. Meanwhile, their contribution to IVA in the PRD became very insignificant. In 2009, SOEs contributed only 83 billion *yuan* IVA which was 10% of the FIEs' total, while the COEs' outputs were much less. However, the SOEs

turned out to be highly efficient in terms of their growing figures of IVA per enterprise and IVA per capita which were ranked top among all firms in the last decade.

This distinctive trajectory of the SOEs/COEs largely resulted from the radical national reform during the 1990s (Wu, 2005). Due to the unsatisfactory outcome of the SOEs reform in the 1980s, China implemented two radical policies in implementing managerial and structural reform among SOEs which were termed as 'Zhua Da Fang Xiao' (抓大放小, grasping the big and let go the small) and 'You Jin You Tui' (有进有退, selective industrial development). These policies significantly consolidated the number of SOEs through intra- and inter-regional mergence and acquisition, massive employment layoff and privatization (Huang, 2002; Steinfeld, 1998, 2004). In doing so, SOEs became giant corporate groups and possessed a huge amount of fixed assets and dominated in monopolistic industries, such as petroleum, power supply, railway and telecommunication (Wang, 2011). By 1998, the number of SOEs in China was reduced to about 60,000 and then further to 20,000 in 2009, while most of them were highly profitable due to monopoly.[10]

Since 1990, EPEs have been losing their importance in the regional economy. In Guangdong Province, while EPEs accounted for 60% of foreign investments 1980s, the portion significantly declined to about 25% in around 1995 and shrank further to 12% in 2005 and to 4% in 2009 (GDSY, 2001). When EPEs, SOEs and COEs became less influential, FIEs emerged as the key driver of the regional economy. As shown in Table 5.6, FIEs had accounted for the largest share of IVA and the numbers of firms since 1999. Among private firms, FIEs and FIEs-HTM (firms from Hong Kong, Taiwan and Macao), FIEs had the best

[10] In 2009, with a profit of $20 billion, China Mobile Communications Corporation was evaluated as the most profitable corporation in the world; the total profit of all SOEs was $ 137 billion while top six monopolistic SOEs accounted for 63%.

performance and FIEs-HTM became the least efficient recently in terms of IVA per enterprises and per capita.

The dominance of FIEs resulted from the further market liberalization in the PRD during the 1990s and the 2000s (see also section 5.2.1). As Steinfeld (2004:1979) described, "the reformers [in this period] pursued arguably the most liberal FDI policy of any Asian developing country". Incentivized by the new taxation law since 1994, urban authorities became a very pro-active force in mobilizing large-scale development projects in the PRD. Because land conveyance became one of the most important sources of revenue, regional governments tended to increase their income by 'selling' land for industrial and urban development (Lin, 2009b). By 2006, 30 development zones and industrial parks were established in the PRD, covering an area of 28,266 hectares. These industrial districts were used for attracting the relocation of TNCs, particularly those in high- and new-technology industries (DRCGP, 2009; Wong and Tang, 2005).

In order to improve local supply stability and international competitiveness, FIEs did not merely relocate non-core processing segments to the PRD, but progressively transplanted their suppliers to the region. Within respective production networks, incumbent and new technologies were diffused from their R&D centers and headquarters to the production sites in the PRD. This mechanism of FDI-driven development has been discussed in many previous studies (Enright et al., 2003; Lin, 1997; Sit and Yang, 1997; Yang, 2005; Yang, 2009; Yang and Liao, 2009). My interpretation of captive coupling in section 5.3 is generally consistent with their explanations.

While FIEs are leading the regional economy, private firms have achieved the most significant growth. As shown in Table 5.6 above, private firms were quite insignificant in 1991, contributing to less than 3% of the regional IVA. But they have made remarkable progress within two decades. In 2009, they contributed 1/3 of the regional total. In 1999, the performance of private firms was lower than most of the other firms in terms of IVA per enterprise. But in the last decade, the number of private firms increased dramatically from about 2,000 to 15,000. Meanwhile, they managed to upgrade their production capabilities by substantially improving efficiency: the figures of IVA per enterprise and IVA per capital more than doubled. These figures showed higher efficiency than FIE-HTM. It also should be noted that data in Table 5.6 only refer to firms with a minimal annual turnover of 5 million *yuan*. As this study's estimation is based on multiple sources of statistical yearbooks, there were about 140,000 enterprises in the PRD lower this minimal annual turnover in 2009, contributing to merely 5% of the regional total IVA. These smaller firms employed millions of workers and were struggling for their survival.

5.4.3 Strategies of local upgrading

The above elaboration has demonstrated that the PRD is moving away from captive coupling to a certain extent. The regional economy is no longer dependent on EPEs to stimulate rapid industrialization. Firms in the PRD are moving from a highly truncated mode to a more central position within GPNs. Meanwhile, the PRD is no longer fully dependent on FIEs in driving regional growth. Local firms have caught up with FIEs and become another key driving force in shaping regional upgrading. What are the trajectories of local upgrading? What are the key strategies adopted by local firms? Is there anything new beyond previous

studies that emphasize the importance of indigenous innovation? The rest of this chapter attempts to answer these questions on the basis of the empirical investigation of this study.

To account for the remarkable industrial growth and upgrading in China, previous studies have pointed to a key answer in relation to the contributions of knowledge spillover from TNCs, strong state investments and intensive endogenous innovation, such as in the cases of Lenovo and Huawei (Ernst, 2007; Fan, 2007; Fan, 2011; Fan, 2006; Lazonick, 2004; Li, 2009; Lin and Wang, 2009; Yang, 2009). However, my empirical investigation shows that the majority of local firms in the PRD do not conform to this catching-up trajectory.

By examining the performance of high-tech industries in the PRD, this study finds that the absorptive capacities of the PRD has been improved, but strong innovative capability has yet to be developed in the region. Innovation here refers to the use of new technologies, methods or ideas.[11]

As shown by Table 5.7 below, from 1998 to 2008, high-tech enterprises achieved significant growth and accounted for 31% of the regional industrial output. Within the output value of high-tech products, the share of the value of new products progressively grew from 13% to 17% during the same period. Meanwhile, the amount of R&D expenditures and employment for R&D all had an impressive growth (more than ten times). The number of issued patterns also grew from 10707 to 62031. These trends indicate that the PRD as a whole is more capable in making new/higher-value-added products and has improved its technological capabilities. However, if we take the increasing number of firms into account, the achievement of innovation at the firm level was not significant and was even a bit

[11] Innovation differs from invention in that innovation refers to the use of a new idea or method, whereas invention refers more directly to the creation of the idea or method itself.

disappoint. From 1998 to 2008, the average R&D expenditure of high-tech firms increased from 6.8 million *yuan* to 9.2 million *yuan*, but the ratio between R&D expenditures and output value decreased by 0.4%. Although the total amount of issued patents increased six fold, the average amount per firm declined from 13.1 to 7.9. In a similar trend, while the PRD's high-tech firms were employing more technicians for conducting R&D activities, the average number of R&D technicians did not experience a corresponding increase. It indeed grew from 26 in 1998 to 47 in 2000. After that, the average number was dropping and it eventually declined to 25 in 2008.

Table 5.7 Performance of the high-tech industries in Guangdong Province

	1998	**2000**	**2002**	**2004**	**2006**	**2008**
General						
· High-tech products in total industrial output (%)	11.2	17.2	21.6	23.5	30.5	30.9
· Value of new products in high-tech products (%)	12.7	13.9	12.9	13.5	13.9	16.7
· Number of high-tech firms	815	1173	1730	3065	4673	7831
R&D and Patent						
· R&D expenditures of high-tech firms (million)	5,600	11,300	16,200	24,100	38,500	71,800
# per enterprise	6.8	9.9	9.4	7.9	8.2	9.2
# in high-tech output (%)	3.6	3.9	3.5	2.8	2.5	3.2
· Issued patents (item)	10707	15799	22760	31446	43516	62031
# per enterprise	13.1	13.9	13.2	10.3	9.3	7.9
· R&D Employment (people)	21,100	53,400	69,400	76,300	127,100	197,500
# per enterprise	26	47	40	25	27	25

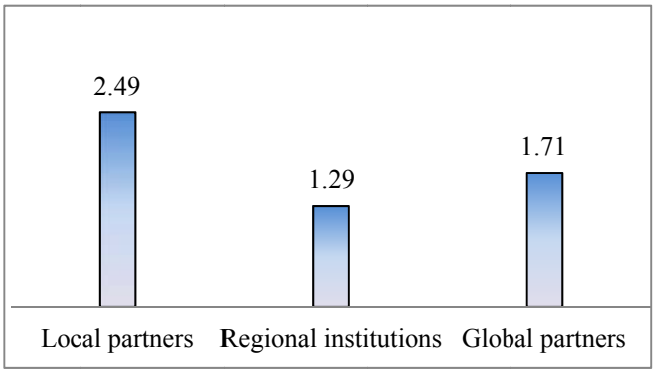
Notes: According to the official category from National Bureau of Statistics of China (2006), high-tech industries include eight key sectors: nuclear fuel processing, chemical-information products, medicine manufacturing, aerospace manufacturing, electronics and communication products, computer and internet equipment, medical equipment and instrument, and public software. See more detail at: http://www.stats.gov.cn/tjbz/t20061123_402369836.htm. Data specific for the PRD are not available. But the PRD accounted for more than 80% of output in high-tech industries in the 2000s. Hence provincial level data are considered as representative.

Sources: Guangdong Scientific Development Yearbook, 1998-2008.

If not innovation, what will be the local strategies of upgrading in the PRD? My empirical investigation has observed different strategies that local firms have frequently deployed in their pursuit of upgrading. These strategies are related to changing institutional conditions at different spatial scales.

At the local scale, while serving as the suppliers or subcontractors of foreign firms, local firms preferred to develop more external cooperation with both firms and institutional actors so as to identify more learning opportunities. The increasing cooperative type of firms was a sign to support this point. From 1995 to 2009, among FIEs in the PRD, the proportion of Chinese-foreign joint ventures had increased from 20% to 29%. Before 1995, the majority of the SOEs were wholly owned by the state. This configuration was reshaped. Among about 1,000 SOEs in 2009, only 300 of them were wholly owned by state. The others were state-holding companies either with private firms or FIEs (GDSY, 2010). The increasing number of cooperative enterprises diversified external linkages that enabled more knowledge diffusion among local firms.

Figure 5.4 Importance of external partners to local upgrading



Notes: informants were requested to evaluate the importance of external collaborators the upgrading of their companies. A value ranged from absent (0) to very high (3) was attributed. The result is averaged.

Source: author's survey on 45 local firms.

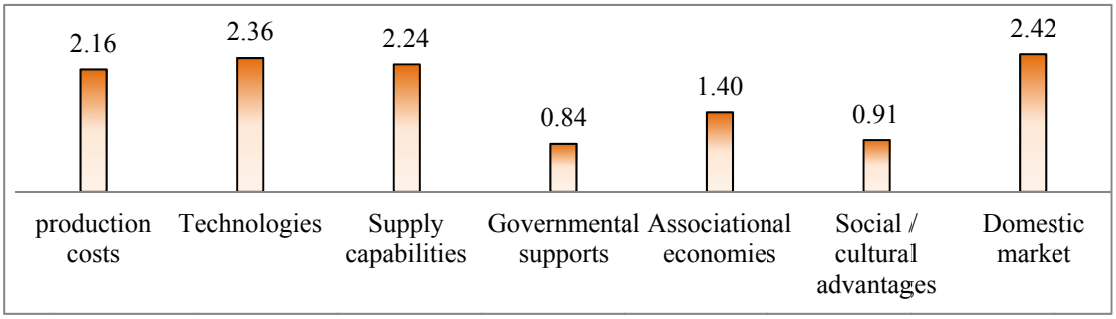
According to my field survey (see Figure 5.4), cooperation with local partners had the most significant influence on the upgrading strategies of local firms. Global partners were the second most important type of collaborators. Regional institutions were less significant with a score of 1.29.

At the regional level, local firms tended to utilize emerging new assets to increase their bargaining power and upgrading opportunities. Apart from the liberalizing environment, there were at least three new assets available for local firms in the PRD. First was the emergence of China's huge domestic markets. This market did not exist in the 1980s to most of firms. It was originally small in size and regionally fragmented due to limited household incomes and the state-controlled pricing system. But currently China's domestic markets have become quite large based on the incredible industrial growth and the increasing purchase power of firms and individuals (Gadiesh et al., 2007; Ma, 2009; Wu, 2005). Second was the growing body of regional supply networks. Different from the condition in the 1980s, the PRD has now developed such a production network based on thousands of TNCs, the transplanted suppliers and the growth of local firms. The third asset was the emergence of regional associational economies (e.g. industrial associations) which served as the channels of knowledge diffusion in the PRD.

Figure 5.5 articulates the influence of these assets on local upgrading among the surveyed firms. Domestic markets served as the most important asset to local firms in upgrading. The availability of technologies in the PRD stood as the second important factor, followed by the factors of regional supply-base capabilities and production-cost advantages. Particularly, 90% of the informants affirmed that their companies had increased local

sourcing content and reduced component importation in the past decade. About 70% of the informants confirmed that they had sourced more than 50% components and materials from local supply networks within the PRD. In comparison with these factors, associational economies and social-cultural advantages mattered less. Governmental support was the least significant. This result reminds us that the role of regional institutions in the PRD should not be overemphasized, even though the pro-active China' state institutions has been well recognized in the literature (Fan, 2007; Huchet, 1997; Ma, 2009).

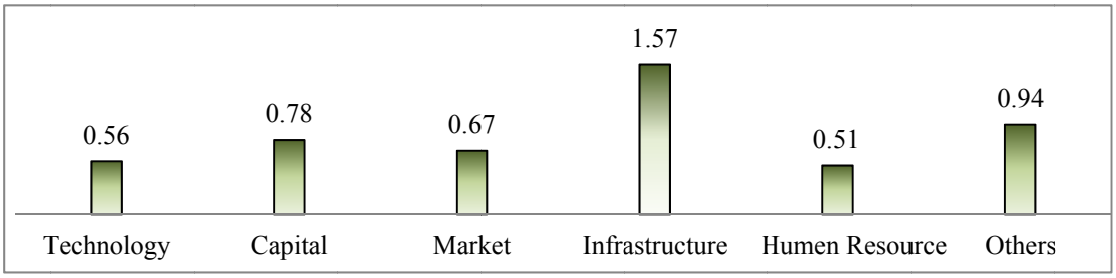
Figure 5.5 Importance of regional assets to local upgrading



Notes: informants were requested to evaluate the degree of importance of regional assets during the upgrading of their companies. A value ranged from absent (0) to very high (3) was attributed to each type of regional assets. The result was averaged.

Source: author's survey on 45 local firms.

Figure 5.6 Importance of supports from governments and institutions



Notes: informants were requested to evaluate the degree of importance of governmental supports during the upgrading of their companies. A value ranged from absent (0) to very high (3) was attributed to each type of supports. The result was averaged.

Source: author's survey on 45 local firms.

Figure 5.6 above shows that governmental support was only effective in constructing infrastructures (with a value of 1.57). All other governmental support such as technologies, capital, market and human resource, was not influential towards local upgrading.

At the global level, local firms tended to look for more upgrading opportunities by taking advantages of competitive dynamics within GPNs. This strategy was implicitly generalized from different viewpoints by my informants. It enabled local firms to bypass the control of foreign firms and cooperate with a wider range of foreign partners. The disintegration of the FSBF pattern (see section 5.3.2) between Hong Kong and the PRD is a good example.

Within the FSBF pattern, Hong Kong firms' governance power was vulnerable. Overtime, the PRD's local firms became familiar with international markets and trading regulations. They went to Hong Kong to establish their own shops and receive orders from global buyers directly. At the same time, when domestic institutional environment became more liberal, global buyers also preferred to bypass Hong Kong traders and to develop their own suppliers in the PRD. This tendency was facilitated by more frequent international trade fairs, business exhibitions or other events hosted in the PRD (Yeh and Xu, 2006). The reunion of Hong Kong and China and the Asian financial crisis also facilitated this process (Jao, 2001; Shen, 2003). Eventually, the governance power of Hong Kong firms was bypassed. Hong Kong no longer served as the 'front shop' of the PRD. It gradually shifted to providing professional sourcing/trading services for global buyers and logistic services for the PRD firms respectively (Tewari, 2006; Yeh and Xu, 2006). This change is reflected in the comment by a senior committee member of the Fashion Designer Association of Hong Kong who is also the CEO of Alter Design Corporation:

> After the reunion, global buyers [lead firms] preferred to cooperate directly with firms from mainland China. Everybody knows that middle man [Hong Kong's firms] must take some money, so why not we just move further to deal with the producer. I must say, that the crisis [in 1997] gave the PRD an opportunity. Because China' well performances within the crisis, those buyers had faith to deal with Chinese firms, and they soon found that that PRD's local firms were not bad actually. So things got changed. A lot of [Hong Kong] bosses needed to find another way to make money, like turning to the logistics and financial industries. Hong Kong sill has certain expertise in these kinds of industries (Interview 100602, on 2 June 2010 in Guangzhou).

By synthesizing assets at different scales, a few firms in the PRD were able to recouple and even decouple with TNCs, thus pursuing industrial upgrading on their own efforts. For instance, after years of accumulation, Huawei had decoupled with its Hong Kong OEM customer in the early 1990s and built up R&D team to develop HAX switch by its own. This decoupling did not suffer Huawei a lot because it has yet to develop technological lock-in to the Hong Kong firm, or institutional lock-in to itself. Witnessing foreign switch makers gained huge profits from the China market, Huawei decided to pursue product upgrading, from developing the small-scale switch system to the large scale switch system, and then move to develop mobile telecommunication facilities (e.g. base stations) and cellphones. By heavily investing in indigenous absorptive capacities, Huawei imitating those most transferable incumbent network technologies and specialized in engineering designs (Fan, 2011; Li, 2011b). Two additional factors sustaining the upgrading of Huawei. First is the mattress culture[12], symbolizing a distinguishing characteristic of Huawei's low-cost and hard-working spirit. The annual average wage of R&D technicians was lower than 40% of the global level, comparing with Cisco and Alcatel in the 2000s. Second is the huge and

[12] During the process of developing the key technology, its engineers usually worked almost 24 hours a day in the laboratory for months; they took naps only when they were very tired, and got up to work again after some rest.

fragmented domestic market which allows Huawei to find its critical mass by selling their less-perfect products in rural and sub urban areas initially.[13]

The above empirical observations have introduced three general strategies of local firms adopted in their pursuit of upgrading. These strategies are not exclusive to each other and can be synthesized. In Chapters 6 to 8, I provide further detailed case studies to demonstrate how local firms deploy these strategies to leverage the governance power of foreign firms. For instance, domestic markets serve as a crucial source of profits in the electronics industry (Chapter 6), while it is utilized by local firms to practice marketing skills in the apparel industry (Chapter 7). In the automobile industry, domestic markets are deployed as an exchange for knowledge diffusion from TNCs (Chapter 8). In reducing knowledge gaps, local firms in the electronics industry mainly learn from their TNCs clients (Chapter 6). But in the apparel industry, they accumulate knowledge through diverse channels (Chapter 7). In the automotive industry, local firms absorb knowledge from their foreign partners (Chapter 8). The overall finding resonates with Viotti's (2003:653) view that innovation tends to be "a phenomenon alien to late industrializing economies". Many local firms in the PRD actually adopt "a strategy of learning that focuses on the mastering and improving of the absorbed technologies of production."

5.5 Conclusion: the changing dynamics of local upgrading

In most of the contemporary China studies, the PRD has been recognized as one of the world's leading manufacturing bases and the vanguard of China's national economy (Cartier,

[13] Data about Huawei in this paragraph came from an interview with a senior manager of Huawei on 16 June 2010 in Shenzhen.

2001; Chen and Li, 2006). Scholars interested in the PRD mainly attribute the success of PRD's development into four factors: (1) export-oriented strategies; (2) knowledge spillover from FIEs (mostly from Hong Kong and Taiwan); (3) economic power decentralized by the central government that allows regional policy makers to construct a business-friendly institutional environment; and (4) local initiatives of coupling facilitated by ethnic-based social networks (Enright et al., 2005; Hsing, 1996; Ng and Tang, 2004; Sit, 1998; Smart and Lin, 2007; Yeh et al., 2006). These studies generally come to an agreement that while the PRD experiences upgrading through learning from and benchmarking against TNCs, it is now becoming less promising due to exhausted land resources, increasing labor costs, and deteriorative environment (Liao and Chan, 2009; Lin, 2009b; Yang, 2009). Some scholars have argued for greater endogenous technological innovation to overcome this diminishing return (Fan, 2011; Zhou and Wei, 2011). Otherwise, industrial development will reach a bottle-neck soon and upgrading is bound to be impeded as Steinfeld (2004, 2008) has predicted.

Although the above assertions are plausible and have been supported with some empirical facts, they mainly hold a static view of the captive coupling pattern of integration. In contrast to them, this chapter offers an alternative interpretation by investigating into the relation between strategic coupling and local upgrading in the PRD.

By reviewing three decades of development in the PRD, this chapter found that the development trajectory of the PRD cannot be accounted for the developmental state literature. A developmental state did not appear in the PRD. Instead, the region underwent a liberalizing process continuously which was mediated by the central government's desire for promoting

export-oriented industrialization. More recently, a regional imperative of upgrading emerged that tended to relocate labor-intensive manufacturing industries within the region. Empirical examination has shown that the PRD managed to achieve upgrading in various dimensions, such as corporate performance, international competitiveness, and structural and functional changes. The region is moving into a world manufacturing hub, rather than a processing and assembling base.

Through the relational framework, this chapter reinterpreted the economic take-off of the PRD in relation to the formation of captive coupling among foreign firms, regional institutions and local firms. The prevalence of EPEs reflected how synergy within captive coupling led to rapid industrial growth as well as the improvement of the processing capabilities of local partners. A historical analysis of the operation of EPEs demonstrated that synergy within captive coupling was not predetermined by value chain governance. In contrast, it was subject to specific institutional arrangements and spatial conditions where EPEs were embedded. The asymmetrical power relation within EPEs hindered the prospect of local upgrading, such as functional upgrading. Local firms had little power to escape from the disadvantaged position. However, my further analyses illustrated that captive coupling was not static but evolutionary and subject to changing knowledge gaps and institutional-spatial conditions.

Section 5.4 has largely articulated the impetus of changes. Since the 1990s, there were many ongoing trends implying that the PRD was moving away from captive coupling, such as the new regional profile of foreign trading and the divergent performance of firms. The new regional trading profile indicated that the PRD was no longer captive to Hong Kong for

participating into the global trading. It became more capable of engaging with trading partners from most of the developed countries in a more comprehensive manner. During this process, the driving forces of the regional economy were reconfigured substantially. EPE, SOEs and COEs, the key players before 1990s, lost their influences significantly. In contrast, FIEs became the most significant economic force, while local private firms caught up quickly. Interestingly, local firms had already performed better than FIEs from Hong Kong, Taiwan and Macao by 2009.

While previous studies have emphasized the importance of indigenous innovation in nurturing local upgrading, the PRD case does not conform to this phenomenon. Drawing on the performance of the high-tech industries, this chapter identified that the influence of innovation was less significant. In contrast, the empirical survey of my study showed that local firms would like to adopt three alternative strategies related to different resources and opportunities rested at different scales.

This chapter so far has revealed the evolutionary tendency of strategic coupling. The unresolved issues are that: what type of coupling is the PRD evolving towards, and what are the subsequent impacts to industrial upgrading? My interpretation of three local strategies remains preliminary at this stage and insufficient to provide conclusive answers. Next three chapters will detail the evolutionary strategic coupling and subsequent upgrading in three different industries: electronics, apparel and automotive. My analyses will articulate the dynamics of local upgrading in the PRD.

Chapter 6 Captive coupling in the electronics industry: relocation, localization and local upgrading

6.1 Introduction

The electronics industry is one the most important sectors in the world because it employs more workers, generates greater revenue, and stimulates innovation across entire economies than any other sector (Mann and Kirkegaard, 2006). In the PRD, the electronics industry is the most influential industry in terms of output and export value throughout three decades of development (see Chapter 1 and 5). This chapter provides an examination of local upgrading in the PRD's electronics industry.

Contemporary studies have articulated the difficulty of latecomer upgrading in the electronics industry due to the strong intensity of technology and capital. In order to overcome this difficulty, the GVC literature suggests latecomer firms to insert into value chains and become the quick followers of global lead firms, so that latecomer firms can catch up through learning by doing, technology sharing and organizational acquisition from global buyers to their suppliers (Gereffi et al., 2005; Schmitz, 2004; Sturgeon and Lester, 2004a). However, these scholars also admit that upgrading opportunities are limited and restricted by industrial gate keepers based on the regular pattern of *modular* governance in this industry.

From a different perspective, scholars suggest that developmental state institutions can directly promote upgrading in the domestic electronics industry by heavily investing in indigenous innovation (Beeson, 2004; Douglass, 1994; Johnson, 1995; White, 1988). More

recent studies of the electronics firms in China similarly argue that strategies like FDI promotion or export-oriented industrialization are not sufficient in fostering industrial upgrading, but have to be accompanied by intensive investments in local innovation in order to improve indigenous capabilities (Fan, 2011; Zhou and Wei, 2011). If we follow the logic of the above studies, local upgrading in the electronics industry in the PRD is bounded to be doomed, since the PRD almost lacks any of the assets listed above. Would local upgrading in the PRD be a less satisfactory story? This chapter conducts a critical investigation to answer this question.

As elaborated in Chapter 5, the PRD's economic take-off was initially led by the pattern of captive coupling. Local firms were positioned in a marginalized node within global GPNs and concentrated in the processing and assembly segments of value chains. However, recent dynamics has called for a re-examination of the pattern of coupling and the corresponding outcomes of upgrading in the electronics industry. At the local scale, the further localization of global lead firms has substantially strengthened the manufacturing capabilities of the PRD that leads to the amazing growth of such companies as Foxconn (see the opening story in Chapter 1). This localization would reduce knowledge gaps between local firms and TNCs because it provides more learning opportunities for local firms. At the national/regional scale, there are emerging new assets such as regional supply networks and domestic markets that may increase the bargaining power of local firms (see section 5.4 in Chapter 5). At the global scale, increasing competition among global lead firms, platform developers and contract manufactures have provided more opportunities for local firms to catch up (Sturgeon and Kawakami, 2011). But these changing institutional-spatial conditions do not guarantee the

success of local upgrading. There are still many tough obstacles for local firms to overcome, such as the prevalence of modular governance and rapid change in technologies and so on. In this sense, learning by doing or reverse engineering would be difficult, because the limited absorptive capabilities of local firms will make their efforts seriously lagging behind the rapid speed of innovation in global lead firms (Steinfeld, 2010). But what if local firms are not merely reliant on reverse engineering or learning by doing? What if global lead firms would like to cooperate with local firms for various interests beyond seeking low-cost suppliers?

Situated in such an industrial context, this chapter focuses on three issues: (1) the formation of captive coupling in the electronics industry and whether it has evolved since the 1990s; (2) the current achievement and limitations of industrial upgrading in the region; (3) upgrading strategies adopted by local firms. The overall attempt of this chapter is to explain the ongoing dynamics of local upgrading in the PRD's electronics industry, rather than to take it for granted as another repeated story of latecomer development which gets stuck in labor-intensive activities.

This chapter starts by interpreting the key features of the global electronics industry and the potential power dynamics in its modular governance. By grounding the electronics industry in the PRD's context, the third section elaborates on why and how the pattern of captive coupling is developed and persistent over the decades and the current outcomes of upgrading. While the limitations of local upgrading are revealed, the fourth section provides a critical account of alternative upgrading strategies. Drawing on case studies, this penultimate section articulates three potential pathways of local upgrading. This chapter finally discusses how the PRD's electronics industry offers a different story beyond previous studies and sheds

light on a geographical interpretation of value chain governance.

6.2 Governance and power dynamics in the global electronics industry

In this thesis, the electronics industry refers to a broad range of industries including semiconductor, information and communication technology (ICT), electronic machinery and equipment, and electronic products (e.g. home appliance, cellphone, liquid crystal display, and computer) and so on. This section probes into global industrial trends and power relations in the modular pattern of its value chain governance. The discussion serves as a critical industrial context for understanding the development of the electronics industry of the PRD.

6.2.1 Global industrial shifts and modular governance

The global shift of the electronics industry generally departs from the global North to the global South in the past decades (Dicken, 2007). From the 1960s to the 1980s, North American firms in the computer industry heavily outsourced low-value added manufacturing segments to Mexico and East Asia that in turn enabled the US firms to upgrade into more design-intensive activities in both electronic devices and platforms, such as the 'horizontal computer industry' in the Silicon Valley (Grove, 1996) and the 'Wintelism' (Borrus and Zysman, 1997). By taking this opportunity, contract manufacturers in East Asian newly industrialized economies (NIEs) built up regional production networks in more complex 'triangle manufacturing' arrangements that brought factories in Japan, South Korea, Singapore, Taiwan, and Hong Kong into an integrated production system (Gereffi, 1999; Lüthje, 2002). During this process, global lead firms served as industrial gate keepers based on their strong technological capacities and governance power. Their higher-tier suppliers,

such as strategic partners in East Asia, also developed certain strong bargaining power due to their capabilities in systematic integration and supply chain management. The lower-tier suppliers and subcontractors had less power due to their substitutable nature.

Due to different firm strategies, national contexts and the competitive dynamics of cost, flexibility, and speed within GPNs, East Asian firms have gradually specialized in certain segments or products and formed an inter-regional division of labor to a certain degree (Lüthje, 2004; Yeung, 2009a; Yusuf et al., 2004). Without radical product shift, Japanese producers mainly stay in consumer electronics and tend to specialize in developing new generations of dynamic random access memory (DRAM), electronic machinery and equipment (e.g. Toshiba). Meanwhile, many of them have upgraded into global lead firms in consumer electronics (e.g. camera, multi-media players, and home appliances). South Korea firms follow the pathway of Japan, but invest heavily in semiconductor, liquid crystal display and mobile device technologies. Some of them also grow up and become global lead firms (e.g. Samsung and LG). In contrast, Taiwanese CMs specialize in the entire production chain of the semiconductor and personal computer by providing electronics manufacturing services (EMS), such as TSMC, Foxconn and Quanta. Singapore firms tend to develop strong expertise in process engineering and wafer fabrication, such as Chartered Semiconductor. Together with Hong Kong, the PRD join in East Asian production networks but is situated in a marginal position for processing and assembling less sophisticated products (e.g. non-core electronics components, casings or plastic parts). Components with sophisticated technologies or higher value added are produced and distributed by global lead firms and CMs outside the PRD (Lüthje, 2002; Yang, 2007; Yeh and Lee, 2002). Apparently, the PRD has limited space

of industrial upgrading in such a position. The region is isolated from core knowledge in terms of production technologies, systematic integration skills, as well as marketing and distribution skills.

6.2.2 The fragility of governance power

The electronics industry has become highly globalized production networks based on the prevalence of modularization and standardization which integrates a customer's need for direct monitoring and control (Principe and Honday, 2003; Sturgeon, 2002). This industrial specificity enhances interoperability in the sense that components and systematic elements can be substituted without redesigning the entire products (Balconi, 2002; Langlois, 2003; Ulrich, 1995). Hence electronics lead firms are able to engage in the twin strategies of outsourcing and offshoring over a long distance without losing their governance power in dealing with their suppliers. Meanwhile, by isolating sophisticated technologies within modularized components, they can reinforce their core competences and enforce parameter setting along with their value chains (Frigant and Layan, 2009; Humphrey and Schmitz, 2004). That is the alleged power of modular governance in favor of lead firms. Upgrading opportunities are offered by global lead firms to their local suppliers through parameter setting and product definition in value chains (Gereffi et al., 2005; Sturgeon, 2002). The imperative of doing so is to reduce asset specificity and to take advantage of specialization.

Under modular governance, local firms in the PRD's electronic industry indeed receive some learning opportunities by serving as suppliers. But the barrier of upgrading is evident, because knowledge diffusion is defined and modularized by global lead firms. These types of knowledge are more related to the skills of know-how (e.g. processing technologies), while

still have a way to reach the knowledge of know-why. When technology sharing goes beyond lead firms' interests, local suppliers would not receive any assistance from lead firms (Gereffi et al., 2005; Humphrey and Schmitz, 2002b; Schmitz, 2004; Sturgeon and Kawakami, 2011). Therefore, local firms tend to be kept at the most labor-intensive and lower value-added segments of value chains, unless they receive substantial state supports, invest heavily in innovation or manage to launch joint actions with other local firms (Fan, 2011; Giuliani et al., 2005; Humphrey and Schmitz, 2002b; Lowe, 2009; Zhou and Wei, 2011). However, the dynamics of local upgrading does not always follow this rigid logic. As articulated in Chapter 3, there are three institutional-spatial conditions that may help latecomer firms to leverage the governance power of electronics lead firms: diversity of knowledge channels, regional assets and competitive dynamics within GPNs. Particularly in the electronic industry, the complex and dynamic power relations within GPNs provide more opportunities for local firms to leapfrog.

Different from the apparel industry, an electronics GPN is not just made up by a simple dichotomy of global buyers and local suppliers in a linear structure, but is made up by at least four groups of key actors: (1) global lead firms (branded-name firms presenting in end markets); (2) platform developers/specialized-product providers; (3) contract manufacturers (e.g. EMS providers); and (4) local suppliers (Dicken, 2007; Gereffi et al., 2005; Lüthje, 2002; Sturgeon and Lester, 2004a; Yeung, 2009a).

Global lead firms premise their bargaining power on financial risks-taken during their ordering and selling products. They invest heavily in product development, marketing and distribution which are the core of their competiveness. Compared with lead firms, contract

manufacturers are less powerful because they are substitutable. Thus they struggle in product and process upgrading to capture a lion share of market in which they have strong manufacturing expertise. Meanwhile, they also increase power by collecting bundles of capabilities so as to provide one-stop shopping for lead firms seeking regional and global supply solutions (Sturgeon and Lester, 2004a). Suppliers, particularly lower-tier suppliers are the least powerful actors due to their highly substitutable nature and vulnerable capacities. However, the rise of platform developers complicates power relations within GPNs by providing turnkey/platform solutions of product manufacturing in the form of software, hardware, or combination, such as the Intel's Atom chipset, Microsoft and Google's Android operating system (Fixson and Park, 2008; Lüthje, 2004; Sturgeon, 2002). Upgrading opportunities are thus diversified.

For contract manufacturers and suppliers, they can purchase and internalize turnkey technologies from platform developers within the same GPN, thus directly upgrading into own-brand manufacturers to compete with lead firms. Latecomer firms do not necessarily upgrade to challenge global lead firms. Instead, they can upgrade into a turnkey product supplier, or even a new platform developer, such as the formation of Global Mobility Bazaar (GMB) alliance of VIA from Taiwan (Feenstra and Hamilton, 2006; Galvin and Morkel, 2001; Lüthje, 2002; Lüthje, 2004). In this case, lead firms have no power to block this upgrading. They can only control their upstream suppliers and downstream customers along the same chain, but cannot control platform developers or specialized service providers in the same GPNs.

In sum, there are many alternative upgrading pathways for latecomer firms. These

strategies do not necessarily challenge the governance power of global lead firms. The critical issue is whether local firms are able to identify the necessary assets and develop more synergy with their foreign partners during the process of local upgrading. This is the analytical focus of the next two sections.

6.3 FIE-led upgrading in captive coupling: synergy and limitations

The PRD has embraced the global economy through market liberalization and export-oriented industrialization after 1978. Based on outsourcing and offshoring strategies, electronics TNCs and their subcontractors took advantage of this opportunity and operated in the PRD in various forms of FIEs. This was the fundamental synergy that led to coupling between the PRD and the electronics GPNs. This section investigates the institutional contexts and synergy within captive coupling and how captive coupling leads to the progress and limitation of industrial upgrading.

6.3.1 Institutional contexts of the electronics industry

Experience from the East Asian electronics industries has shown the important role of developmental states in nurturing domestic upgrading through investing in indigenous innovation and facilitating technological transfer (Cho et al., 1998; Hobday, 1995, 2001; Liu and Dicken, 2006; Wade, 1990). But the PRD did not have this type of developmental state. All state support was allocated to other regions in East and North China (Cao, 2007; CCW, 2004).

Before the opening reform in 1978, China's electronics industries developed through import substitution (Liang, 1999). However, this strategy eventually widened technological

gaps between domestic firms and TNCs (Cao, 2007). From 1982 to 2000, the national strategy for the electronics industry was shifted into export-oriented modernization (CW, 2001). Many cooperative partnerships between SOEs and global lead firms were established in the forms of joint ventures, technological licensing, strategic alliances or cooperative investment (Liang, 1999; Wang, 1996). This strategy significantly accelerated the development of China's semiconductor industry. However, none of the key SOEs was located in the PRD; they were instead concentrated in the Yangzi River Delta and Bohai Rim region (see Table 6.1).

From 2000 onwards, China reinforced export-orientation strategy by liberalizing further the domestic market. In 2000, China's State Council established a remarkable directive known as *Policies for Encouraging the Development of Software and Integrated Circuit Industries* (NDRCSC, 2001; see detail in Table 6.2). By providing fiscal incentives, this directive was meant for stimulating more TNCs to relocate higher value-added segments and R&D activities to China. This directive might appear to work effectively. It facilitated knowledge spillover from TNCs (CCW, 2004). By 2010, the total sale value in China's electronics industry soared to near $1 trillion, while the value of exports accounted for 60% of the country's total (PDO, 2011). There has been increasing localization of foreign firms in China in the forms of new production lines and factories, local management centers and R&D bases, as well as IC design segment (Ding et al., 2010; Fan, 2011; Li, 2008: also see Table 6.1). However, during this process, Chinese SOEs and private firms lost domestic-market share seriously, from 69% in 1999 to 29% in 2009 (MIIT, 2003, 2009, 2010). While the production volume of integrated circuits (ICs) was huge, about 60% of the output came from

packing and testing segments (APCO, 2009). These problems put the policy effect on domestic upgrading in question.

Table 6.1 Key semiconductor enterprises in China

Type of cooperation	**SOEs**	**Partner**	**Years**	**Key technologies**
Technology licensing	Huangjing (Shanghai)	Lucent	1987	6 inch silicon wafer with a minimal feature size of 0.9 m;
		Toshiba	1995	Intel 386sx microprocessor
Joint Ventures	Shanghai Beiling	Indigenous	1988	4 inch wafer with a minimal feature size between 2-3μm
		ISSI	1995	6 inch silicon wafer with a minimal feature size of 0.8 m
	Shanghai Semiconductor	Indigenous	1992	5 inch wafer with a minimal feature size of 2.3 m
		North Tel	1994	6 inch silicon wafer with a minimal feature size of 0.8 μm
	Huayue (Shanghai)	Fujitsu	1998	Bi-CMOS, 5 inch silicon wafer with a minimal feature size of 2 μm
	Shanghai Steel	NEC	1994	DRAM and Micro-programmed Control Unit (MCU), 0.5μm
		NEC	1997	DRAM and MCU, 0.35μm
	Stone (Shanghai)	Mitsubishi	1996	Microprocessor
	SMICS (Chengdu)	UTAC (Singapore)	2005	Wafer fabrication
State owned	SMICS (Shanghai)		2000	silicon wafer with a minimal feature size of 0.35μm– 45nm; Microprocessor
State owned	SMICS (Wu han)		2006	silicon wafer with a minimal feature size of 0.35μm– 45nm; Microprocessor
Foreign Owned Enterprises	・ In Bohai Rim Region: Motorola in Tianjin (1993); ・ In the Yangzi River Delta: Samsung in Suzhou (1996), AMD in Shanghai (1997), Philip in Suzhou (2002), Gracesemi in Shanghai (2003), TSMC in Shanghai (2003), Hynix in Wuxi (2006) and so on ・ In West China: Intel in Chengdu (2003) ・ In North China: Intel in Dalian (2007)			

Sources: Liang (1999), Wang (1996) and authors' survey.

Table 6.2 Policies of encouraging the development of the software and IC industries

Aims	Key items of the state directive in 2001	Key renewed items of the state directive in 2011
Taxation discount	All enterprises with endogenous-developed software products are only imposed by 17% value-added tax, while the amount of actual burden tax over 3% will be refunded to the firm for R&D expenditure (abolished since 2005 due the arbitration from WTO)	Enterprise income tax will be waived in enterprises which are conducing software development, integration and testing, integrated circuit design and testing.
Taxation waiver	Certificated new high-tech enterprises in software or IC industries enjoy a specific tax favor called "two plus three": full waiver of tax for the first two year, and 50% discount in the next three year.	From "two plus three" to "five plus five": free income tax for the first five years and 50% discount in the next five years. Enterprises conducing IC testing and assembly activities are also involved within the preferential policy networks.
Industrial pillar group	Key enterprises involved in national industrial planning are only imposed by 10% of enterprise income tax.	Besides the national planning, inter-provincial emerge of SOEs was also encouraged for cultivating stronger SOEs
Market liberalization	All in situ enterprises in software and IC industries enjoy these polices regardless the ownership types	Electronic service industry is encouraged

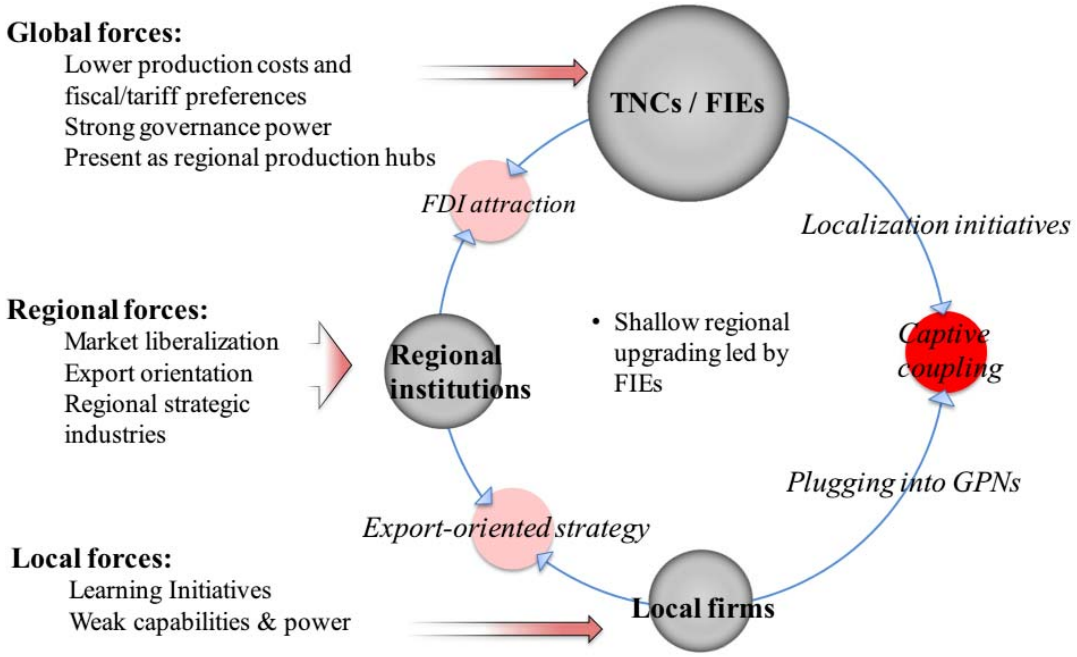
Sources: NDRCSC 2001, 2011.

6.3.2 Captive coupling and synergy

Before the reform in 1978, the PRD was still largely an agricultural-based economy and the electronics industry did not exist except several local SOEs producing lamps and wires (Lin, 1997; Sung et al., 1995). Due to the absence of state support, captive coupling was developed as knowledge gaps (technology and market) were too wide to be bridged (see Figure 6.1). As elaborated in Chapter 5, there were generally four factors that fostered synergy within captive coupling in the electronics industry: the locational advantage of the PRD; the liberalizing institutional environment; pre-existing ethnic-based business networks

and available low-waged labor pool. The synergy gave rise to the boom of EPEs and FIEs.

Figure 6.1 Captive coupling in the electronics industry in the PRD



Source: compiled by author.

The opening reform of China made the PRD the prime hinterland, better than Southeast Asian countries, for accommodating the relocation of Hong Kong's electronics industry (Clark and Kim, 1995; Huchet, 1997; Sung, 1991). Thousands of establishments in this industry constituted a major share of foreign investment in the PRD during the 1980s and 1990s (Chui et al., 1997). Following Hong Kong firms, Taiwanese firms in the computer industry joined this process by the end of the 1980s (Xue, 2009). Currently all key Taiwanese EMS providers, including Foxconn, Quanta, Compal, Wistron, Inventec, ASUS and VIA, have built their production plants in the PRD. Shenzhen and Dongguan have the largest agglomeration of Hong Kong and Taiwanese firms, while Zhuhai attracts many Japanese firms.

Regional and local authorities were pro-active actors in the formation of captive

coupling. They were keen in attracting electronics TNCs, because these firms brought significant growth in GDP, foreign trade and employment. These achievements could prosper regional economy and benefit the political aspiration and promotion of local carders. Since the 1990s, all prefectural governments in nine PRD cities have targeted the electronics industry as their strategic industries with the top priority in investment promotion, preferential fiscal subsidies, and infrastructure construction (NDRC, 2003; Sit and Yang, 1997; Xu, 1988).

6.3.3 Regional upgrading within captive coupling

Captive coupling led to substantial growth of the PRD's electronics industry. After three decades of development, it continues to play a dominant role in the regional economy (see Figure 1.3). In 2009, it contributed to about US$ 25 billion in export value. This amount was about 25% of China's total, about 4% of the world total (GDSYST, 2010). During this process, various types of upgrading were achieved.

In terms of product and process upgrading, the electronics firms and labor are more capable of producing higher value-added products in a more efficient manner. Table 6.3 shows this noticeable progress. In the past two decades, the number of firms and IVA received constant and substantial growth. Meanwhile, the production capabilities of firms and labor were both improved significantly. In 2009, the IVA per enterprise grew by nine times against 1991; and IVA per capita increased by four times during the same period. Compared with them, the number of employee per enterprise presented a different trend that grew relatively slow from 1991 to 2005 and then fell down a little bit after 2005. It means that electronics firms are less reliant on the intensive usage of labor, while achieving substantial improvement in efficiency.

Table 6.3 Upgrading in the electronics industry in the PRD (1991-2009)

Year	No. firms	IVA	IVA-E	IVA-C	NEE
	unit	*billion*	*million*	*thousand*	*person*
1991	969	6.8	7.0	24.5	287
2001	1315	63.3	48.1	86.0	560
2005	2790	191.4	68.6	101.9	673
2009	4368	318.2	72.8	116.9	623

Notes: currency is Chinese *yuan* at constant 2000 price. The electronics industry in the PRD's statistic data includes electrical equipment and products, ICT and computer related products and electronic equipment and products. All data refer to enterprises above designated size that an annual turnover more than 5 million *yuan*. IVA= industrial value-added; IVA-E= industrial value-added per enterprise; IVA-C= industrial value-added per capita; NEE = number of employee per enterprises.
Sources: Guangdong Statistic Yearbook 1992, 1996, 2000, 2006, 2010.

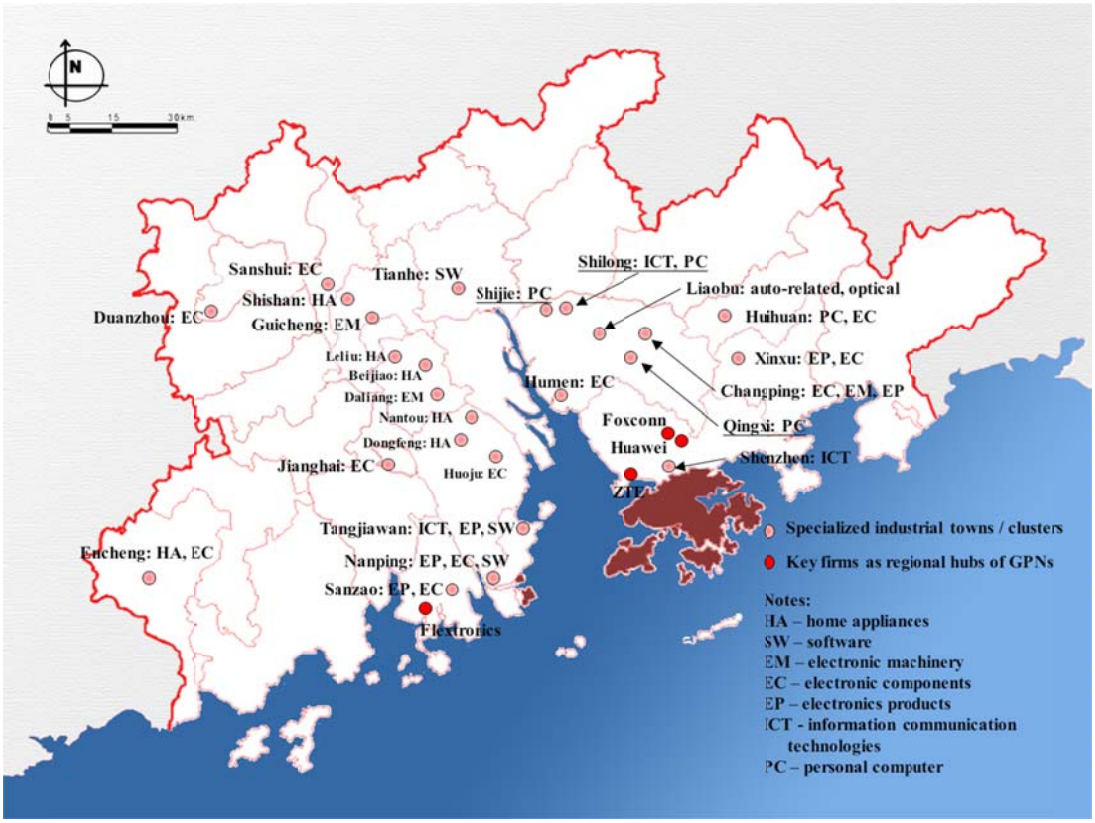
During the upgrading of processing efficiency, the product ranges of the electronics industry have been upgraded. The PRD is no longer processing low value-added and less sophisticated products (e.g. home telephones, cable, wires and non-core components), but are supplying the world with many high value-added and sophisticated electronics products, such as liquid crystal display products, multimedia players, computers, mobile phones, telecommunication equipment, medical/mechanical electronic devices and all kinds of electronics components (Chen and Pu, 1999; GDSY, 2000; GDSYST, 2010). In short, there has been a great deal of product and process upgrading in the forms described in the literature on latecomer upgrading (Humphrey and Schmitz, 2002b, 2004). Consistent with that literature, this study finds that foreign firms have played a very positive role in providing learning opportunities and assistance to their suppliers on the basis of arm-length market relations or subcontracting partnerships. Local firms have benefited from being captive to them. The trajectory of local upgrading is seen in a general manager of Lingyang Electronics in Shunde, as below:

> In the 1980s, Lingyang was just an EPE processing plastic casings and assembled thermoses for Hong Kong clients. After a decade, the clients became our partners. They suggested and trained us to make coffee machines and toasters for global customers. By then we upgraded into a full-package manufacturer. With the help of our Hong Kong partners, we focused on supplying a few global branded buyers. In order to be certificated as their OEM supplier, we worked closely with the Hong Kong partners and technical consultants from our buyers to improve substantially the designs and functions of our products, as well as our workspace and supply-chain management. Now we are not only a qualified OEM supplier, but also conducting OBM business in Middle East and Southeast Asian markets under an appropriate brand. This is functional upgrading in your words (Interview 100415, on 15th April 2010 in Shunde).

During the 1980s, the electronics industry in the PRD was just a processing and assembly base largely composed by thousands of EPEs (Gan and Gan, 1994; Song et al., 1989; Sung et al., 1995). Currently, the PRD has been gradually upgraded into a global manufacturing center comprising about 30 specialized-industrial towns and clusters (see Figure 6.2). Each town or cluster has more or less specialized in certain products or segments. 23 of them are certificated as national industrial specialized towns (DRCGP, 2009; GDSYST, 2010; NDRC, 2008).[1] Leliu town is one of the largest town specialized in home appliances. Its industrial output exceeded 100 billion *yuan* in 2009. With about 40 billion *yuan* of industrial output in 2009, Shijie Town has been famous for manufacturing computer components in global markets. The total industrial output of these towns is unknown. Upon various news and statistical reports, this study has estimated that most of these towns had an output over 20 billion *yuan* by 2010.

[1] Two criteria for the certification: (1) with an annual industrial output over 300 million *yuan*; (2) more than 70% of the output comes from the electronics industry.

Figure 6.2 Specialized industrial clusters and towns in the PRD's electronics industry



Sources: compiled by author based on the field work and the NDRC (2003, 2008).

Underpinned by the proliferation of industrial clusters, towns and parks, regional upgrading is achieved and it leads to an intra-regional division of labor. Shenzhen city has grown into a global center of the ICT and EMS industries comprising many highly competitive companies, such as Foxconn, Nokia, Philips, Huawei and ZTE. Dongguan and Huizhou accommodate a large number of Taiwanese CMs and currently contribute to 30-40% of the total output in the global personal computer industry (GDDRC, 2009). Zhuhai has specialized in consumer-electronics and IC products based on Japanese firms (e.g. Hitachi, Cannon, and SHIRAI). As the provincial capital with many universities and research institutes, Guangzhou has developed specialty in the software industry with about 1,500 firms creating $1 billion of output value by 2009 (IARE, 2010a). The North West part of the PRD, including

Foshan, Zhongshan, Jiangmen and Zhaoqing, has matured as the largest manufacturing center of the home appliance industry in China, occupying about 60-70% of the domestic market value by 2008 (Lin.D, 2009; Zhang and Xu, 2010). Some of them have become international branded firms (e.g. Midea, Kelon and Galanz). A comment from the vice chairman of the Electronics Industrial Association of Dongguan (EIAD) illustrates well this regional upgrading of the PRD:

> Dongguan has been well known for making easy-and-quick money for decades. But nowadays, we [the electronics industry] are no longer dependent on those low-end crabs [EPEs]. We are competing in the global market with qualified products based on multi-national FIEs and promising local firms located in specialized towns. In our survey during the economic crisis last year, we found out that labor wages in other developing countries such as Vietnam and Philippine were lower than here. But FIEs did not move away in a hurry because they cannot find a better supply base than here. Thirty years ago, you might make money by importing components and then assembling here. But now, it is unaffordable to do so. It costs too much than local sourcing (Interview 100807, on 17th Aug 2010 in Dongguan).

6.3.4 Persistence of captive coupling

Although regional upgrading is progressing in the PRD, the pattern of captive coupling is persistent. On the one hand, the region is still captive to the global industry for importing key electronics components. On the other hand, local firms are still captive to FIEs as their lower-tier suppliers. Fundamentally, the functional upgrading of the region is contributed by FIEs, rather local firms.

According to the RCA index, the PRD's electronics industry has been improving its competitiveness in the global industry (see Table 6.4). Between 2000 and 2009, the index of general electrical and electronics products increased from 0.05 to 0.16. The index of high and new tech products also increased from -0.04 to 0.1. Computer and communication products

(e.g. computer parts, cellphones, or network facilities) became the most competitive products in the PRD as their RCA index has grown from 0.37 to 0.59. However, trends from another two indexes show that the PRD is still heavily dependent on importing sophisticated components. Though having a noticeable drop, the index of products about computer-integrated technology was still at -0.48 in 2009. The index of electronic technology remained steady at about -0.7. The combination of these indexes implies that the PRD has become more able to manufacture and assemble electronic products within the region, but it still relies heavily on importing some sophisticated components and machinery.

Table 6.4 RCA index of the electronics industry in the PRD

Product Types	**2000**	**2003**	**2006**	**2009**
General electrical and electronic products	0.05	-0.03	0.06	0.16
High and New-tech electronic products	-0.04	0.03	0.08	0.10
Computer and communication	0.37	0.47	0.54	0.59
Electronic technology	-0.68	-0.77	-0.70	-0.67
Computer-Integrated manufacturing	-0.83	-0.79	-0.73	-0.48

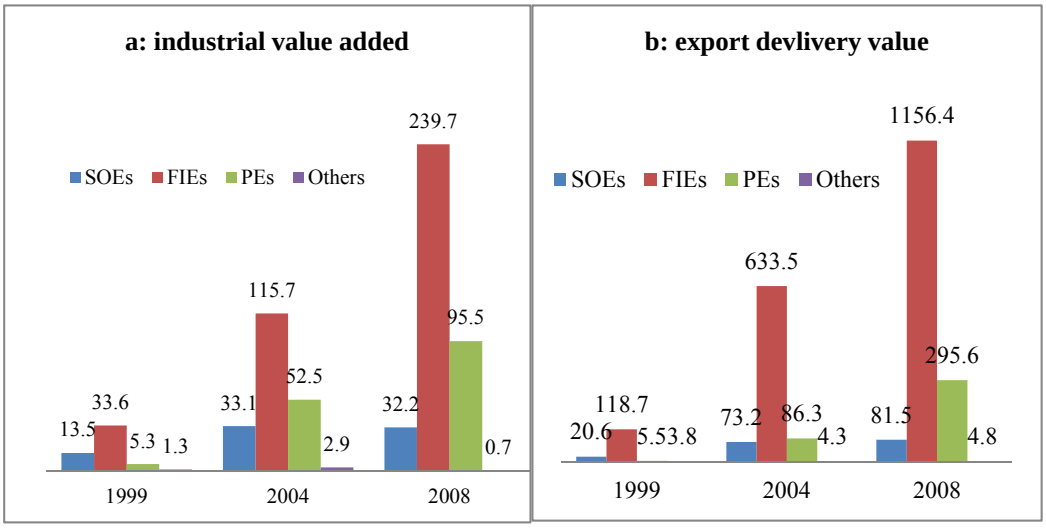
Notes: Data are at the provincial level. But in the electronics industry, the proportion of the PRD accounted for more than 95% of total foreign trade value in the whole province. It is thus considered as representative.

Sources: Guangdong Statistic Yearbook in multiple years, data before 2000 are unavailable.

Figure 6.3 generally shows that FIEs still considerably dominate the industry in the latest decade. The gap between FIEs and local firms was even enlarged. In terms of industrial value added, the share of FIEs increased from 60% in 1999 to 65% in 2008. During the same period, private firms had made great progress by increasing the share from 10% to 26%, but the share of SOEs dropped from 25% to 9%. In terms of export value, FIEs accounted for 75-80% of total exports. Private firms' share of exports achieved the most significant increase from 4% to 19% and replaced the role of SOEs accordingly. It should be noted that the number of

SOEs has declined sharply during this period. Therefore, at individual level, the value added per enterprise of SOEs would be much higher than FIEs and local firms. But at the regional level, the contribution of SOEs to regional upgrading was rather insignificant.

Figure 6.3 Changing driving forces of the PRD's electronics industry



Notes: SOEs = state owned enterprises; FIEs = foreign invested enterprise; PEs = private enterprises; others = collective owned enterprises and enterprises with annual turnover lower than 5 million *yuan*. Unit: billion *yuan*.

Sources: The national economic census conducted in 2004 and 2008; Guangdong Industrial Census Yearbook 2000.

6.3.5 Limitations of local upgrading: operating under the shadow of FIEs

The above analyses have demonstrated that the PRD's electronics industry has achieved noticeable regional upgrading in various ways. However, as the pattern of captive coupling is persistent, most of the upgrading outcomes are produced by FIEs. This finding echoes previous studies which have revealed the dependence of local firms on TNCs (Lin, 1997; Naughton, 1997; Sit, 1998). Through knowledge spillover effects, FIEs provided learning/benchmarking opportunities for local firms to use new machines, adopt new product systems, and absorb matured managerial skills. However, local firms met great difficulties in

further upgrading, because the regional production networks were substantially controlled by FIEs. These FIEs, particularly Taiwanese computer firms in Dongguan, tended to confine the knowledge within their backward linkages or the 'global pipelines' which are part of their GPNs, (Xiao and He, 2010; Xue, 2009; Yang and Liao, 2009). Although sophisticated components were exposed to local firms, the modular form of integration made reverse engineering less possible (Chesbrough and Kusunoki, 2001). The circumstances in Shijie town and Shilong town illustrate this upgrading predicament.

Shijie is labeled as "Delta Town" because it is entirely dominated by Delta Electronics from Taiwan, the world's largest producer of power supply units for personal computers. Within the town, Delta is surrounded by dozens of transplanted suppliers and about 200 local firms. This mini regional production network accounts for more than 80% of total output value in the town (IARE, 2010a). By 2010, just a few of local firms were serving as first-tier suppliers. All other local firms were satiated in manufacturing peripheral components and packing works. In a different sector, Shilong specializes in the optoelectronics industry led by a group of Japanese FIEs such as Kyocera, TKR, Konica Minolta and Nidec Sankyo. In 2005, it was certificated as China's national base of the electronics industry with millions of annual production volume in various products including camera, copy machine, printer and desktop computer and so on (Zhu, 2010). These Japanese firms originally were EPEs. Since the mid-1990s, they were encouraged to convert into FIEs. Japanese firms agreed with that but decided to acquire most of the best local firms rather than investing in new plants and factories. Local states devoted abundant efforts to satisfy the needs of these Japanese firms and even persuaded local firms to be acquired. This transformation turned most of the

promising local firms into FIE's subsidiaries and diminished the possibility of local functional upgrading, as told by the vice chairman of EIAD:

> In order to convert the Japanese EPEs into FIEs, local states almost mobilized all available resources, such as providing additional institutional services, offering more fiscal incentives, training professionals and persuading local firms to be acquired. The joint ventures were proved to be effective and successful. But we did lose something. Now we hardly find promising local firms that are wholly private-owned in Shilong. None of them can be the first-tier suppliers of those Japanese FIEs. As I know, some of the local talent entrepreneurs have left to establish new business somewhere else (Interview 100807, on 17 Aug 2010 in Dongguan).

Within these networks, some FIEs further integrated production vertically. This effort led to less and less space for skilled local firms to pursue further upgrading due to the increasing complexity of transactions and asset specificity. Foxconn and Flextronics are two relevant examples. As the world's largest EMS provider, Foxconn has integrated all production segments within several industrial parks in Longhua town in Shenzhen since 1988. This effort had shaped Longhua into a 'Foxconn Town' with more than 400,000 employees by 2009. This giant stood as the top export company in Shenzhen with a new record of $48 billion in 2010 (Wu, 2011). This kind of huge industrial complex is what American plants cannot compete against (see the opening story in Chapter 1). The limited upgrading opportunity of Foxconn's suppliers can be seen in the comment of a former manager of Foxconn:

> The strong capability of vertical integration of Foxconn is not only a nightmare to its competitors, but also a serious headache to it suppliers in Shenzhen. Most of the suppliers can only earn a marginal profit, since Foxconn knows the procedures and costs very well. Whichever sophisticated components or products, Foxconn makes by itself. So I don't think there is a lot of knowledge spillover happening. Unless like me. When leaving it, I did carry away some knowledge (Interview 100706, on 6th June 2010 in Guangzhou by telephone).

Similar to Foxconn, the world's second largest EMS provider, Flextronics, built its own

industrial town in Zhuhai in 1996 and subsequently relocated all 13 key business units into the town. In 2009, Flextronics (Zhuhai) produced a total output value of $ 60 billion and also accounted for 41% of total export value in Zhuhai.[2] During this process, Flextronics upgraded the function of its Zhuhai base from printed circuit board (PCB) assembly into a full range of EMSs, such as mobile devices, automotive components, computing devices, touch displays, camera modules and power suppliers and so on. An exclusive local supply network was constructed in three steps: (1) transplanted 26 Flextronics' suppliers from elsewhere; (2) established 11 solely owned subsidiaries surrounding the industrial park; and (3) acquired four competent local suppliers directly. Its Vice President noted that:

> Compared with Foxconn, we were a bit late [in the PRD]. So we moved faster. We asked our suppliers to come, established our own one, and even acquired local [private] firms. Those local firms were out suppliers originally in PCB manufacturing. As they were growing fast, we saw their competences as well as potential challenge. So we bought them with an irresistibly good price instead of relocating our owned factories from elsewhere (Interview 100704, on14th May, 2010 in Zhuhai).

In summary, this chapter finds that captive coupling has been developed and reinforced in the electronics industry in the PRD throughout three decades of development. Regional upgrading is possible in various ways. But it is mainly contributed by FIEs. Although local private firms have been catching up quickly, they still lag behind substantially with limited functional upgrading under the shadow of FIEs. This phenomenon can be found in the examples of Shijie and Shilong, Foxconn (Shenzhen) and Flextronics (Zhuhai). Nevertheless, the prospect of local upgrading should not be viewed too pessimistically. There are some new institutional-spatial conditions that may give local firms a chance to upgrade via a different

[2] Interview with a vice president of Flextronics on 14 Mar 2010 in Zhuhai.

pathway. This issue is addressed in the next section.

6.4 Potential pathways of local upgrading: leveraging the power of FIEs

The above section has demonstrated a process of FIE-led upgrading within captive coupling. This process resonates with many previous studies which assert that TNCs (or global lead firms) play a determinant role in defining latecomer upgrading in the electronics industry (Cho et al., 1998; Gereffi and Fernandez, 2011; Hobday, 1995; Schmitz, 2004). However, as critiqued in section 6.2, these studies overlook certain potential in local upgrading. Although captive coupling has been reinforced, local firms may utilize some resources embedded in changing institutional-spatial contexts to leverage the power of lead firms.

Based on my fieldwork in the PRD[3], this study finds that local firms in the electronics industry are leveraging the power of FIEs by utilizing two resources most frequently: new regional assets and competitive dynamics within GPNs. This section articulates three cases in relation to these strategies of upgrading. Specifically, the case of Shunde shows how emerging regional assets can increase the bargaining power of local firms in the home appliance industry. The case of CZC illustrates how local firms may bypass the control of TNCs and CMs by taking advantage of recent competitive dynamics in the computer and cellphone markets. Finally, the case of Jingtuo exemplifies how local firms can synthesize various assets to achieve product upgrading under the shadow of FIEs. It should be noted that these cases merely shed light on some possible new pathways of local upgrading. They do not

[3] In the electronics industry, 42 interviews were conducted including 37 firms and 5 regional institutions during the fieldwork in 2010.

mean that the entire electronics industry the PRD has fully moved away from captive coupling.

6.4.1 New regional assets and the home appliance cluster in Shunde

Compared with the historical moment in 1978, the institutional-spatial contexts of the PRD's electronics industry have substantially changed. Various regional assets have been developed during rapid industrialization in this region. A regional innovation system has been emerging, though it is yet to be effective. Since the late 1990s, regional governments in the PRD have started to nurture many industrial associations (Xiao and He, 2010; Xue, 2009). Industrial associations were established in all the PRD cities and also in most of the specialized towns in the electronics industry, such as Beijiao and Leliu in Foshan city or Shilong, Shijie, Qingxi in Dongguan city. During the 2000s, 20 technological innovation centers, named as centers of productivity facilitation, were established in the electronics industrial clusters in the PRD. However, these tech-innovation centers had little innovation content and merely functioned as public platforms for prototype experiment and testing. Half of them were even privatized before 2005 due to operational difficulties (Qiu and Yang, 2008). Intensive indigenous innovation was absent in the PRD because local firms tended to focus on transferring and absorbing external technologies, while many electronics FIEs relied on their backward linkages to transfer technologies that are innovated and developed in their headquarters or home-country R&D centers (Fan et al., 2007; Yang and Liao, 2009). Industrial associations were also facing difficulties in facilitating collective learning in the electronics industry, as noted by the vice chairman of EIAD:

> In the past decade, we did try a lot to build up the so called 'regional learning platform' by providing various business meetings, learning workshops and training programs, as requested by the Dongguan municipal governments. However, this outcome was less significant because technologies in the electronics industry were too diverse and sophisticated. The attendants had few common languages and became less and less interested. They preferred to work closely with their clients where they learned more. Thus we still more focused on our normal duties like organizing business trips and local trade fairs which seemed to be more effective (Interview 100817, on 17 Aug 2010 in Dongguan).

While the regional innovation system is yet to be effective, domestic markets become a rather important asset that gives rise of new upgrading opportunities. Originally, the electronics industry in the PRD relied highly on export markets since the 1980s. But the situation has changed now. China has become an emerging key market in many electronics sectors for global firms (APCO, 2009; Gadiesh et al., 2007; Jin, 2006; Naughton, 1997). In the past decade, the PRD's electronics firms were selling more products in the domestic market than in the international markets. As shown in Table 6.5, in the electronic machinery and equipment products, the portion of sale value in the domestic market increased continuously from 41 % in 1999 to 61% in 2008. The domestic share of electronics and ICT products also experienced a similar growth from 25% in 1999 to 36% in 2008. Interestingly, when FIEs are concentrating more in the domestic market, local private firms are focusing more on international markets.

Additionally, a regional supply network was emerging by the growth of local firms and the further localization of FIEs. This supply network comprised dozens of specialized industrial clusters and industrial parks with specialties in different segments in the electronic industry (see section 6.3.3). Among 31 surveyed firms,[4] only 9 of them were largely based on

[4] Among 37 interviewed firms, only 31 of them completed the questionnaire survey.

regional supply networks in their early stage of development. But currently 24 of them said that the majority of supply chains were grounded in the PRD.

Table 6.5 Comparing the roles of market in PRD's electronics industry

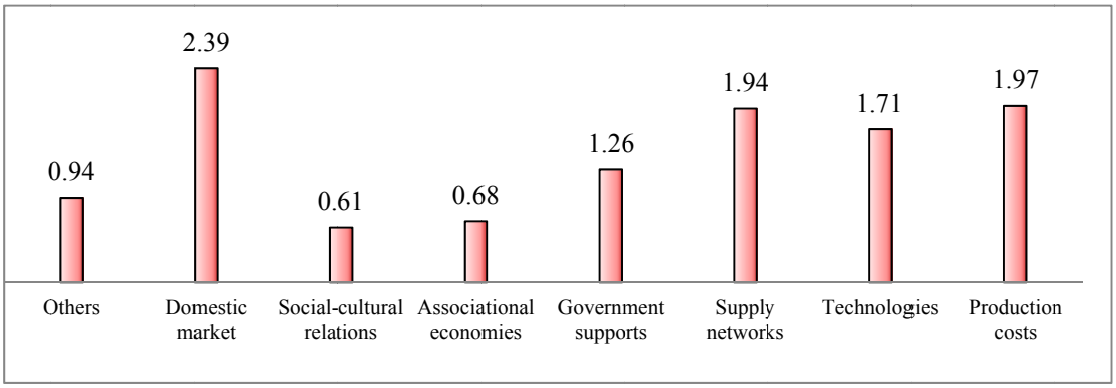
Year	**Total Industrial sale value (Billion *yuan*)**	**Global sale (%)**	**Domestic sale (%)**	**Total (%)**
Electronic Machinery & Equipment				
1999	92.0	59.7	40.8	100
2004	304.0	49.7	50.3	100
2008	696.4	38.7	61.3	100
Electronics & ICT				
1999	175	75.1	24.9	100
2004	802.1	74.3	25.7	100
2008	1595.6	64.3	35.7	100
FIEs				
1999	151.6	78.3	21.7	100
2004	859.2	73.7	26.3	100
2008	1666.2	69.4	30.6	100
Private firms				
1999	50.8	11.8	89.2	100
2004	320.7	27.9	73.1	100
2008	870.1	34.0	66.0	100

Sources: The first and second Guangdong Economic Census in 2004 and 2008. All data refer to enterprises have an annual turnover over 5 million *yuan*.

My survey found that the influences of regional assets varied towards local upgrading. As shown in Figure 6.4, domestic markets, production costs and regional supply networks were the three most important regional assets with a value of 2.39, 1.97 and 1.94 respectively. Governmental supports and associational economies were less significant, and the social-cultural relations were the least important. According to my fieldwork, the combination of domestic markets, production costs and regional supply networks increased the bargaining power of local firms, particularly in some products with lower technological entry-barriers,

such as home appliances. The advantage of lower production costs kept attracting global buyers and traders to subcontract their orders to the PRD. Assisted by the growing body of regional supply networks, local firms reduced technological dependency on global lead firms and gradually moved forward to develop OEM business, and then bargained for ODM business with global buyers. During the process, local firms reduced their market dependency on global buyers by selling their products in the huge domestic market. Compared with products in the global market, their initial products were not competitive or less qualified. But the less-demanding domestic market gave then a critical opportunity for accumulating profits, production skills and marketing knowledge. The success of home-appliance clusters in Shunde exemplifies this mechanism of local upgrading.

Figure 6.4 Importance of regional assets in the electronics industry in the PRD



Notes: informants were requested to evaluate the degree of importance of regional assets during the upgrading of their companies. A value ranged from absent (0) to high (3) was attributed to each type of assets. The result was averaged.

Sources: author's survey on 31 informants in the electronics industry.

As a district of Foshan City, Shunde is located in the North West part of the PRD. During the 1980s, Shunde was merely an export-processing base of electronic components and clothing products. It hosted hundreds of EPEs captive to Hong Kong firms. In the mid-1980s, a few firms were privatized from EPEs and began to make simple electrical products that

were quite needed in domestic markets such as fans, water heaters and electronic cookers later on. Without assistance from FIEs or TNCs, these local firms conducted reverse engineering to bridge the knowledge gap. The early electronic products from Shunde were poor in quality and functions, but those products were sold at an extremely low price in comparison with the ones made by Japanese and European lead firms. Hence these products were 'acceptable good' to a certain extent (Gadiesh et al., 2007). By taking the opportunity of booming domestic markets, many local firms achieved functional upgrading into domestic branded name companies, such as Midea, Rongsheng, Kolen, Galanz, Macro, Dongling and Wanhe.

The preliminary success of these local branded firms stimulated the further development of local suppliers. Some of them were privatized from EPEs or township and village enterprises (TVEs); some of them span off from the branded firms; and some of them were joint ventures between local firms and global lead firms (Liu.W et al., 2010). This supply networks underpinned local branded firms to provide OEM services for global buyers, such as such as Electrolux, Hitachi and Mitsubishi during the mid-1990s. In 1995, Shunde contributed to about 80% of production volume in air conditioners and fridges in the China market (Lin.D, 2009). By 2000, the sale records of many Shunde firms in the China market exceeded global lead firms, such as Panasonic, Electrolux and Siemens (Li and Wang, 2011). In 2006, Shunde was certificated as the "National Town of Home Appliances"[5] with more than 2,000 competent local firms, about 20 domestic branded lead firms and vertically integrated production networks interwoven among three clusters: Leilu, Beijiao and Daliang (see Figure 6.2).

[5] This honor was awarded by the National Industrial Association of Home Appliances in China. Apart from the branding effect, this honor makes Shunde more eligible in receiving funding and institutional supports from regional and national governments.

Midea is one of the most successful local branded firms which have fulfilled upgrading by relying on regional innovation systems and their own absorptive capacities. Starting by hiring part-time technicians[6], Midea has developed various partnerships with many public research institutions and universities in the PRD since the early 1990s. These technicians enabled Midea to manufacture their owned-brand home appliances in domestic market through reverse engineering and technological imitation. Meanwhile, Midea also articulated itself into the global market to be an OEM supplier for earning stable profits and learning up-to-date product technologies.

An important functional upgrading was fulfilled in 1996 in which Midea developed cooperative coupling with Toshiba through establishing a joint venture known as GMCC.[7] GMCC was meant for making compressors (for air conditioners and fridges) for the China market based on Toshiba's X1C and X2C models. It initially sold compressors for many Chinese firms, and then consolidated clients in a few domestic lead firms. Synergy was developed because Toshiba was attracted by the emerging China market, while Midea was eager to access the key technologies of compressors. The nuance power relation during this functional upgrading is well noted by a manager of the GMCC:

> There were three reasons contributed to the establishment of the joint venture. First, Toshiba had problems in acquiring land for building factories at that time and it needed some local partners to solve this problem. Second, it was also too costly for them to establish their own plants. More importantly, Toshiba had foreseen the huge potential of China markets and did not want to miss the opportunity. Hence Toshiba agreed to develop joint venture with Midea. If Toshiba declined, Midea would surely turn to other partners for the joint venture (Interview 100902, on 2 Sep 2010 in Shunde).

[6] These technicians were employed by SOEs and were officially not allowed to work for private enterprises. Therefore, they worked was technical consultants during weekend and were called 'weekend engineers' at that time.

[7] http://www.chinagmcc.com

Midea kept absorbing knowledge from Toshiba through technological licensing, engineer rotation and conducting co-development between Midea and GMCC. It then became the largest client of GMCC and successfully persuaded Toshiba to co-develop new compressor models with Midea. After years of accumulation, Midea eventually purchased necessary intellectual property rights (IPRs) from Toshiba and acquired the Toshiba's shares (40%) of GMCC in 1998. In 2010, GMCC made the first turbo compressor based on Midea's proprietary IPRs. This functional upgrading of Midea did not created much tension towards Toshiba because Toshiba did not consider the compressor technologies as their core competences and was more interested in developing more advanced technologies, such as clean and variable-frequency technologies.[8]

In order to strengthen absorptive capacities and develop more promising patterns of coupling with global buyers, Midea established several R&D divisions in the past decade, such as the Midea-Toshiba Research Center of Variable-frequency Technology, Midea Motor Research Center (Shanghai), Midea Refrigeration Research Center and an in-house training center called Midea College. These R&D subsidiaries enabled Midea to provide qualified and rapid-renewing products for both global and domestic markets.

What is the role of domestic and global markets in such local upgrading examples as Midea? An answer was provided by vice CEO of the Donglin Group (Interview, 100701). It should be cautioned that the domestic market here is not a necessary condition for local upgrading, but it does provide an opportunity for local firms to increase their bargaining power with global lead firms and to nurture their technological and marketing skills.

[8] A similar story of local functional upgrading also happened in another joint venture in Guangzhou between Panasonic and Wanbao during the 2000s.

> China's domestic market is extremely important to us. All local firms [in Shunde] started by selling imperfect products in China in the 1980s. We then learned how to make them better and how to manage a brand. But I should admit that we learn the most significant technologies from our OEM customers. They bring us to understand the state-of-art technologies, new designs and rapid changing consumer behaviors in the global market. Nowadays we keep both domestic (OBM) and international (OEM) businesses for balancing risks in volatile market changes, such as the economic crisis last year [2009] (Interview 100701, on 1st July 2010 in Shunde).

6.4.2 Competitive dynamics within GPNs: the functional upgrading of CZC

Apart from the growing availability of regional assets, *competitive dynamics* within GPN is also a critical but implicit asset to local electronics firms. Since the mid-1990s, some new platform developers from East Asia have been challenging global lead firms in various product markets, such as the Creative Technology (Singapore, audio processing chipset), MTK (Taiwan, mobile phone baseband) and VIA (Taiwan, motherboard platform). Assisted by these turnkey solutions, many local firms in the PRD upgraded from component suppliers into branded manufacturers directly. Meanwhile thousands of *shanzhai* manufacturers[9] joined the game by making copy-cat products. The growth of these products led to a market shake out later on and only a few local firms survived such as K-Touch (mobile phone), OPPO (multi-media products), Seavo (desktop computer) and CZC[10] (netbook/tablet computer). These firms were mainly located in in Shenzhen and Dongguan (Liu.Y et al., 2010). This section specifically examines the case of CZC to illustrate how competitive dynamics have influenced local functional upgrading.

[9] Shanzhai (山寨) product refers to Chinese imitation and pirated brands and goods, particularly in electronics industries. Shanzhai products are look alike, and low-quality or with improved functions done in parody. Recent dynamics in many Shanzhai products shows that they are no longer pirated brands, but are still based on imitation from global lead firm strongly.

[10] Chuang Zhi Cheng Technology, established in Shenzhen.

The upgrading strategy of CZC was to decouple with Taiwanese CMs so as to escape from their strict control; and meanwhile recouple with platform developers to launch its own products. CZC was established in the mid-2000s to exploit the domestic market of netbook computers. Being captive to Taiwanese CMs for procuring key components, CZC supplied netbook motherboards for local branded firms including *shanzhai* manufacturers. However, the problem of captive coupling kept CZC at bay, as told by the former vice-director of CZC:

> About 80% of our components were sourced from top Taiwanese CMs. They fully controlled us by price and volume. Whenever they claimed that they were out of stock, we had to take it and stop our work. When they raised price, we could not say no. We could not escape from them. If we use other CMs' components, we will meet a problem of heat dissipation and systematic compatibility (Interview 100907, on 7th Sep 2010 in Shenzhen).

Tension increased between Taiwanese CMs and CZC, when CZC's market share gradually increased. CZC suffered from unstable supply of key components (e.g. chipset) from the Taiwanese CMs which tend to prioritize Taiwanese firms. CZC had risks in switching to other component suppliers because this segment was firmly controlled by Taiwanese CMs. Once CZC decoupled with Taiwanese CMs, it might have nowhere else to procure key components.

An upgrading opportunity emerged through the availability of the Atom chipset solution from Intel. Atom was deliberately designed to solve the problems of heat dissipation. It helped latecomer firms in the PRD like CZC can utilize a wide range of component suppliers in the global market to make motherboards, so as to reduce dependency on Taiwanese CMs. CZC thus decoupled from its Taiwanese suppliers and recoupled with Intel to develop its own motherboard solutions. The incentive of Intel's strategy resulted from the competition

between Intel and VIA for years.[11] Based on the Atom chipset, CZC quickly developed turnkey solutions in the S30 platform which was cheaper but less sophisticated than VIA's platforms (Pei and Hu, 2009). This effort made CZC become a platform developer in the low end of the notebook computer market. The S30 platform was quite welcomed in the domestic market. In 2009, CZC hit the top seller record among its peers in China.[12]

To a certain degree, the CZC was functionally upgraded into a new platform developer but in a shallow form. The technological competence of CZC did not improve fundamentally. The S30 was still technologically lagged behind VIA's products, though it did capture some market shares from VIA. The growing local supply network in Shenzhen also sustained the upgrading of CZC. A comment from Mr Mao, the CEO of Hedy Holding has described this change:

> The power of Taiwanese computer giants is weakening, with the rise of domestic OEM and ODM suppliers [such as CZC] and regional supply networks in the PRD. Now we can buy most of the components and the designs right here from the non-Taiwanese firms (Interviewed by Nandu Daily, published on 3rd Jun 2009).

In 2011, after evaluating the cooperation of the Atom chipsets and the technological capabilities of CZC, Intel further authorized its Meego system (for tablet computer) to be used by CZC. The incentive of this strategy was derived from the competitive pressures between Intel and Microsoft, Apple, Google in operation systems occupying the top of the value-chain hierarchy. CZC was regarded as a strategic partner helping Intel to venture into the tablet computer market in China. Hence CZC enjoyed certain privilege of installing the Meego

[11] VIA launched the Global Mobility Bazaar (GMB) alliance in 2008 that challenged Intel's market shares by providing new turn-key solutions called the Nano platform. At: http://gmb.via.com.tw/resource/jsp/PartnersSolutions/PartnersSolutions.jsp

[12] Source: Nandu Daily on 3 Jun 2009, at: http://epaper.oeeee.com/D/html/2009-06/03/content_808524.htm.

system in its indigenously developed tablet computers. Domestic market opportunities increased the bargaining power of CZC in this deal. This Inter-CZC partnership is not unique in the PRD, but is a common phenomenon in the tablet computer market. As shown in Table 6.6, there were at least 32 branded domestic firms in 2010 that had developed cooperative partnership with 9 global platform developers in the PRD. Some of these local firms had already achieved good sale records in global markets. For instance, Zenithink's product was ranked just after Apple's iPad and followed by Samsung, Archos and Motorola and so on in a global market survey in 2011.[13]

Table 6.6 Global-local partnership in the tablet computer industry in the PRD

Platforms	Branded local firms
Intel, 450//455/470/Z530	CZC, Bben, livefan, G's Five Telsda, Viewpad, Idea, Jumper, Dianji,
Qualcomm 7227/7627-T	Lenovo, Huawei, Voosoo
Freescale, iMX515/535	Grefu, Azpen, Eben
VIA, 8505/8650	1pad, Flytouch, Chuangshizhe, Shuziyin, Jinghan,
Rockchip 2818/2918	TCL, Aoson, Hyundai, Simai, Yuandao
Infotmic, iMAPx210/220	Zenithink, Doken
Amlogic 8726	Zenithink, Ramos
Ranesas, Cortex A9	Linyun
Telechips, TCC8803/9201/8902	Emdoor, Yufeng,

Sources: media reports and author' fieldwork.

Taiwanese CMs had little power to block the functional upgrading of CZC. Although they were in the same GPN, the upgrading opportunity was given by Intel which Taiwanese CMs could control. This generation of opportunity looks like a trickle-down effect of competition on the top of the value-chain hierarchy. However, this functional upgrading should not be overemphasized. Local firms may encounter a modularity trap in which they become more and more captive to platform developers in technologies. In terms of functions

[13] Zenithink's tablet computers ranked at the second of world-wide costumer likelihood in 2011 according to a recent survey done by iSuppli., see: http://lowendmac.com/inews/11ios/0829.html#8

and products, they indeed upgrade. But in technological capabilities, they do not. Moreover, the marketing capabilities of local firms are still greatly lagging behind global lead firms. How many local firms can survive in future market shake out remains unknown.

6.4.3 Synthesizing resources under the shadow of FIEs: Jingtuo Automatic

In contrast to Midea or CZC, many of the local electronics firms may not be able to increase bargaining power or bypass the control of FIEs. But they may leverage the power relations with FIEs by nurturing more mutual interests with them. The rest of this section draws upon the case of Jingtuo to illustrate a scenario of incremental upgrading within captive coupling and how asymmetrical power relations can be smoothed by nurturing better synergy.

Jingtuo Automatic Equipment Ltd (Jingtuo) was established in 2000 in Shenzhen to manufacture lower-cost soldering machines for substituting expensive imported machines which cost 1 million *yuan* each at that time. In term of quality and function, Jingtuo's soldering machines were not competitive against imported machines from global leading manufacturers (e.g. ERSA). But Jingtuo grasped a market niche by offering the machines at 40% of the international prices.

The rise of the local computer industry and *shanzhai* manufacturers in the PRD generated a huge demand of low-cost soldering machines which sustained the rapid growth of Jingtuo. Initially, the performance of Jingtuo's machines was unstable, while Jingtuo overcame this weakness by providing timely and intensive after-sale maintenance. Proximity to local market served as a crucial asset underpinning the growth of Jingtuo. As noted by the Vice President of Jingtuo:

> Collocation with our customer makes our products accepted by the market. Indeed, our products got many problems at the beginning, like operation halts or disordering temperature control. But our technician crews stand by 24/7 and can arrive at the factories in time. Even when our machines are operating quite well, I may bring some sellers and engineers together to visit the customers to see what we can improve or what they expect us to do. In doing so, we earned our reputation and collected a lot of useful feedbacks from our local customers (Interview 100908, on 8th Sep 2010 in Shenzhen).

In the early 2000s, Jingtuo attracted the interest of Flextronics (Zhuhai) and developed captive coupling with Flextronics. After relocating major business units into Zhuhai, Flextronics had a strong imperative in cost reduction and they needed to replace thousands of soldering machines within every 3 to 5 years. A qualified and low-cost supplier was needed and Jingtuo was selected. As a designated key supplier with certain priority, Jingtuo was required to provide specialized-design machines according to rapid-changing product ranges in Flextronics. In return, Flextronics provided certain technological assistances and co-innovation opportunities for Jingtuo in product development. Synergy was well fostered based on long-term mutual interests. Jingtuo considered Flextronics as an important stepping stone to entry the global EMS industry, while Flextronics preferred Jingtuo's flexibility in engineering designs and efficiency in cost reductions. As told by a vice president of Flextronics:

> Our international suppliers [ERSA] mainly provide standardized machines with a few revisable functions. But Jingtuo works much more flexible. They are willing to revise the whole designs to fit our demands. We just tell them what we want and what the others can do. Sometimes we work together to figure out how we can improve the machines better, which saves us a lot of time and human costs. We now use quite a lot of machines from Jingtuo, apart from some high-end products in which we still use Siemens and ERSA's machines (Interview 100514, on 14th May 2010 in Zhuhai).[14]

Based on the synergy with Flextronics, Jingtuo has innovated and developed four series

[14] Information about the exact amount and production lines that use Jinguo's machines was kept as confidential by the interviewee.

of machines in reflow soldering and wave soldering by which Jingtuo earned its reputation in the global EMS industry as a low/middle-end machine provider. The revenue of Jingtuo in 2009 reached 400 million *yuan*. By 2010, Jingtuo held 30 patent rights and ten sets of software copyrights on the basis of only 80 technicians.

Local contexts have played a critical role in spurring the innovation and upgrading of Jingtuo. To many electronics Shanzhai manufacturers in the PRD, the major concern was to make products cheaper and faster. Jintuo kept hearing complaints from local customers about the complexity of IC designs and the limited capability of soldering processing lines. Hence Jingtuo was inspired to innovate with a dual-track machine to satisfy diverse and flexible demands of local customers in 2008. The dual-track machine could process two types of product simultaneously within a single production line.

Shanzhai manufacturers became the lab for Jingtuo to experiment the machine. Jingtuo initially sold the dual-track machines at half price to local manufacturers for testing. After rounds of revisions and adjustments, the dual-track machine was recommended to Flextronics. Eventually, the dual-track machines were patented and adopted by Flextronics and other EMS manufacturers. This product upgrading even pressured ERAS to develop a similar machine. But it was sold outside China so as to avoid being deemed as a follower or triggering IPR disputes with Jingtuo.

In order to maintain the synergy and pursue its own upgrading goal, Jingtuo has paid a lot of attentions in lowering tension with Flextronics. All requirements from Flextronics were strictly enforced in Jingtuo. Although Jingtuo also sold machines to Foxconn which was a key competitor of Flextronics, Jingtuo's relationship with Foxconn was based on market

transaction and did not develop any close partnership (such as technological collaboration) as the one with Flextronics. In the mid-2000s, Jingtuo was encouraged by local customers to upgrade into a small EMS provider. But it would turn Jingtuo into a new competitor of Flextronics. In order to maintain the synergy with Flextronics, Jingtuo gave up this upgrading strategy. As its Vice President said:

> We can earn more profit by upgrading into an EMS supplier. Even many local entrepreneurs encouraged us to do so because they were tied of being controlled by Taiwanese CMs. But we decided not to do that because it would harm our relationship with Flextronics. We need this industrial name card and the learning opportunities in the global market in a long term. (Interview 100908, on 8 Sep 2010 in Shenzhen)

Instead of pursing functional upgrading which will challenge Flextronics, Jingtuo turned to pursue sectoral upgrading. It has started to invest in developing photovoltaic equipment for the domestic market in 2009. This equipment shares some technological similarity with soldering machines which Jingtuo are familiar with. The new customers of photovoltaic equipment do not overlap with Jingtuo's original clients. Therefore, this sectoral upgrading did not raise much tension toward the existing coupling relations of Jingtuo. The only problem Jingtou has to face is that the sunk costs of developing photovoltaic equipment are much higher than soldering machines. Whether Jingtuo will successfully fulfill this sectoral upgrading is yet to be known.

To sum up, the case of Jingtuo exemplifies how a local firm in the PRD can achieve upgrading in two steps: (1) deepening captive coupling with FIEs with more synergy; (2) synthesizing various assets to increase bargaining power and identify more upgrading opportunities, such as cost advantages, local markets, proximity to customers, and a competent regional supply network and so on. This synthesis provides a reasonably good

opportunity for local firms to leverage the power of FIEs and implement upgrading.

6.5 Conclusion: identifying the alternatives

On the mechanisms of upgrading in the electronics industry, previous studies tend to believe that modular governance has determined inter-firm power relationships and the effect of knowledge diffusion. Hence, it seems reasonable that indigenous innovation would possibly be the only option for latecomer upgrading. Since TNCs would not offer advanced knowledge, local firms better make it by their own efforts. I regard this strand of discussions as a stereotype of latecomer upgrading. It appreciates neither the dynamics of power relations and synergy within inter-firm relationship, nor the institutional-spatial conditions that influence governance power. Once new mutual interests or the fragility of governance power is identified, power relations could be reshaped, despite that the pattern of strategic coupling may remain the same.

Understanding latecomer upgrading in this way, we can recognize many alternative pathways of regional development beyond the stereotypes of being a humble follower or an active innovator. Empirical investigations in this chapter have verified this point. Generally, this chapter offers a different story along three dimensions.

First of all, the PRD did not own promising regional assets in accordance with previous studies, such as strong state intervention, intensive indigenous innovation, regional innovation systems or associational economies (Cooke and Morgan, 1998; Douglass, 1994; Lazonick, 2004; Zhou and Wei, 2011). Instead, this study found that upgrading in the PRD's electronics industry was driven by captive coupling whereby local firms were highly dependent on FIEs

in providing rapid changing technologies and up-to-date information of market demands. This captive coupling led to substantial product and process upgrading in the PRD. But the dependence of local firms on TNCs was reinforced simultaneously. Regional functional upgrading was realized to a significant degree. The PRD was upgraded from a processing or sub-contracting base to a global integrated manufacturing center. But the major contribution of this upgrading came from FIEs. During this process, the technological capacities and performance of local firms were improved, but apparently were still lagged behind FIEs.

Second, drawing upon several detailed case studies, this chapter has illustrated that the trajectory of upgrading is neither pre-determined by the pattern of global governance, nor restricted by the stereotypes of upgrading that highlighted innovation. Instead, it is subject to dynamic synergy within captive coupling and is constantly reshaped by changing mutual interests and firm strategies. The pattern of captive coupling has yet to be changed and FIEs still exert strong and strict control based on their modular governance of local firms. But FIEs cannot stop local firms in seeking upgrading potential within the broader and changing institutional-spatial conditions. In the PRD's electronics industry, local firms have managed to utilize various emerging assets to increase their bargaining power.

Third, my study finds three local strategies as alternative pathways of local upgrading in the PRD's electronics industry. Local firms may increase bargaining power and earn more learning opportunities from foreign firms, such as those home appliance firms in Shunde; local firms can also bypass the control of foreign firms by utilizing opportunities embedded in competitive dynamics within GPNs, such as the case of CZC in Shenzhen; finally, local firms may gradually upgrading by fostering more mutual interests with foreign firms and lowering

tension within captive coupling, such as the cases of Jingtuo and Flextronics (Zhuhai). All these strategies point to the potential in the formation of cooperative coupling in future, but it is yet to be fully realized at the regional level. In contrast to the electronics industry, cooperative coupling is evident in the apparel industry, as will be discussed in the next chapter.

Chapter 7 Local upgrading in the apparel industry: from captive coupling to cooperative coupling

7.1 Introduction

Chapter 6 has demonstrated the formation and persistence of captive coupling in the PRD's electronics industry. This chapter aims to reveal a different scenario of strategic coupling and the corresponding outcomes of local upgrading in the apparel industry.

Although clothing products are mostly low in value-added and unsophisticated in technologies, the apparel industry serves virtually as the initial step of industrialization and even an important part of survival for latecomer economies (Dicken, 2007). It is also considered as a primary industry that transfers upgrading opportunities from developed countries to developing economies during the process of globalization (Gereffi, 1999; Gereffi and Korzeniewicz, 1994a). However, there is a bottle-neck for latecomer firms to conduct functional upgrading from OEM into ODM/OBM in this industry, because global buyers discourage this upgrading to prevent the emergence of new competitors (Bair and Gereffi, 2001; Humphrey and Schmitz, 2002b; Schmitz, 2004). Latecomer firms are thus kept at bay and suffer high competitive pressures, because they are making undifferentiated products and can be quite easily substituted by lower-cost producers (Hill and Fujita, 1996; Ozawa, 2005).

Situating in this context, local functional upgrading in the apparel industry seems to be rather difficult. However, this study finds that the apparel industry in PRD has undergone a different trajectory of local upgrading. After three decades of development, the region has

achieved functional upgrading to a certain degree. It has become a global manufacturing hub and a domestic design and fashion center, rather than just a "world factory" full of sweat shops and low-skilled labor. This achievement goes beyond the explanations in previous studies. To address this dynamics, this chapter focuses on three issues in the PRD's apparel industry: (1) the progress of local upgrading and changing driving forces; (2) the formation and evolution of strategic coupling; (3) power dynamics and local strategies during the evolution of strategic coupling.

This chapter is organized into five sections. The next section interprets recent dynamics in the global apparel industry and critiques the potential of local upgrading in contemporary literature. After a brief review of the national institutional context, the third section analyzes the formation and evolution of strategic coupling driven by multi-scalar forces in the PRD. Drawing on two industrial-specialized towns (Humen and Xintang), the penultimate section addresses how the improvement of local capabilities and changing institutional-spatial conditions enable local firms to reshape their power relations with FIEs and global buyers. Key findings and theoretical implications are discussed in the last section.

7.2 Local upgrading in the apparel industry

The apparel industry is primarily concerned with the design, manufacture, distribution and retail of clothing products. In order to be consistent with the statistical term in China, the apparel industry in this chapter refers to clothes, underwear, footwear, headgear, processed feather and other related products. It does not include textile, fabric and machinery sectors. Generally, its technological and capital entry barriers are much lower than those in the

automotive and electronics industries. While production technologies are increasingly standardized, the competiveness of the apparel industry is more premised on the capabilities of design marketing and branding which are deeply embedded in popular culture, fashion trends and geographically variegated consumer preferences (Aspers, 2010).

7.2.1 Global tendencies in the apparel industry

In the past half century, the key episode of the apparel industry is a process of global shift from old-established manufacturing hubs located in West Europe and North America to newly developing regions in Asia, Mexico and Eastern Europe (Dicken, 2007). The United States and European Union, as well as Japan became the largest import markets. Most of the developing countries became exporters within globally dispersed production networks under the governance of Multi-Fibre Agreement (MFA, 1974-2005) and Agreement of Textile and Clothing (ATC).[1] The largest regional production network was constructed among East Asian NIEs.

During ATC and post-MFA period, the global trade of the apparel industry has consolidated on a smaller number of large apparel exporters (Frederick and Gereffi, 2011). In 1995, the 15 largest exporters accounted for 79% of the world export total. In 2009, the share of the top 15 increased to near 87%.[2] Together with Hong Kong, China became the largest exporter. Its share of exports grew from 22% in 1995 to 41% in 2009, representing an increase of export value from $33 billion to $123 billion.[3] Following China, the other developing countries (Bangladesh, India, Vietnam, Indonesia, Sri Lanka, Pakistan and

[1] During 1995-2005, MFA was in a ten-year transition period under the Agreement on Textile and Clothing.
[2] The WTO data at: http://www.wto.org/english/res_e/statis_e/its2009_e/its09_toc_e.htm
[3] World Trade Report 2010 from World Trade Organization, International trade and tariff data.

Cambodia) were increasing their export shares at the same period. Nevertheless, some other developing countries lost their market shares, such as countries in North and Central America, South Asia (e.g. Thailand and Philippines) and Central Europe (e.g. Romania and Poland). While many East Asian late-comers have achieved substantial industrial growth, whether industrial upgrading has occurred and contributes significantly to regional development is still unclear.

Recent studies in China's apparel industry have shown the occurrence of industrial upgrading. As Frederick and Gereffi (2011) has argued, China has been a clear winner with significant technological upgrading according to its performance in global exports, the amount of imported machines, and the improvement of product quality, capacity and diversity. Meanwhile, Mexico and Latin American countries are losing competitiveness because these regions lack integrated production networks, clusters and sufficient investments in logistic facilities, machines and so on. Apart from the advantage of lower production costs, China's apparel industry has also developed some non-cost-based competitiveness in timeliness and consistency. This competitiveness is supported by world-class distribution networks coordinated by intermediary trading firms from Hong Kong, Taiwan, and South Korea (Frederick and Gereffi, 2011; Robinson, 2010; Tewari, 2006). A more recent study based on Sino-EU merchandise trade also reveals that China's apparel industry has been a highly competitive industry of this country. The index of revealed competitive advantage in textile products (including clothing products) was ranked at fourth among all 14 key merchandises from 1996 to 2008 (Li et al., 2012). However, this remarkable national industrial growth should not be overemphasized because the content of local upgrading is unclear. If FIEs

contribute to the majority of this achievement, local upgrading would be shallow and limited. Meanwhile, upgrading in the above studies is mainly measured by official statistics. The qualitative nature of upgrading, such as functional upgrading, also remains unknown.

7.2.2 Potential of upgrading in the apparel industry

In the apparel industry, the primary imperatives of global lead firms are to provide clothing products at a lower price, in a more flexible manner, and within a shorter time. Global lead firms premise their bargaining power not only from financial risk-taken during ordering and selling products, but also from expertise and lavish expenditures in advertising, building market channels, renting retail shops, and other operations as well (Sturgeon and Lester, 2004a). These competences enable global lead firms to have dominant power (normally buying power) over their suppliers. Due to the very substitutable nature, suppliers suffer pressures and have to improve their performance through upgrading, because other lower-cost producers keep entering global markets and intensifying competition.

During the process of global industrial shift, developing regions are chosen as sites for industrial relocation from industrialized regions. Because technologies in the apparel industry are less sophisticated, local firms can gradually upgrade through learning by doing (Gereffi and Korzeniewicz, 1994a; Hudson, 1989; Kim, 1993; Ozawa, 1991). In order to maintain precise product definition and to avoid supplier failures, global lead firms have incentives to help local technological improvement. This effort nurtures substantial product and process upgrading in local suppliers, such as the rise of East Asian apparel firms (Gereffi, 1999; Humphrey and Schmitz, 2002b; van Grunsven and Smakman, 2005). These latecomer firms were upgraded from simple subcontractors into OEM suppliers as the strategic partners of

global lead firms, such as the Pou Chen Group and the Feng Tay Group from Taiwan in the sport wear industry. Some of them also grew up as intermediary trading firms coordinating subcontractors located in multiple developing regions, such as Itochu from Japan and the Li & Fung Group from Hong Kong (Gereffi, 1999; Hobday and Perini, 2005; Lüthje, 2004; Yeung, 2007b).

While product and process upgrading is possible during the global industrial shift, functional upgrading in latecomer economies is rather limited according to the GVC literature. This is because local functional upgrading will challenge the position of global lead firms. Hence it tends to be restricted, constrained, and even deliberately blocked by global lead firms which have strong governance power over their suppliers (Bair and Gereffi, 2003; Humphrey and Schmitz, 2002b, 2004). In the view of Gereffi (2001b:1620), "the main leverage in buyer-driven industries is exercised by marketers and merchandisers at the design and retail ends of the chain". The changing trend of modern consumption, the alleged 'consumer fetishism', also reinforces this asymmetry of power relations between buyers and suppliers. This trend increases the difficulty of latecomer firms in mastering core knowledge (e.g. fashion design and branding). Such knowledge is intensively contextualized in an immense variety of consumer demands which are subject to complex social and cultural preferences including consumers' desire to express their tastes, social status, identity and lifestyles through their choices of clothing (Appadurai, 1990; Aspers, 2010; Tokatli and Omur, 2010). Global lead firms reinforce their governance power through taking advantage of this industrial feature, such as the strategies of specializing in marketing and logistics, creating socialized values of brands, and spending lavishing budgets in advertising to make 'brand

bully' over branded late-comers and so on (Arvidsson, 2005, 2007; Klein, 2002).

Following the logic of the above studies, local functional upgrading would be extremely difficult. However, these studies have been too deterministic and neglected the potential of local upgrading grounded in broader institutional-spatial contexts. There are two critical points needed to be recognized.

First, core knowledge in the apparel industry may not necessarily be confined within global buyers. Different from the electronics industry, production technologies in the apparel industry are less technological sophisticated and more standardized. Latecomer firms would not have great difficulties to approach production technologies. Global buyers have no intent to confine the diffusion of production technologies because they do not rely on manufacturing capabilities to sharpen their competitive edges. Global buyers have strong expertise in the skills of marketing and branding, but it is hard for them to block the diffusion of this knowledge. Latecomer firms can approach these skills through various learning channels, such as public research institutes, associational economies, educational training programs, professional service providers and trans-regional communities of designers or talents (see my review in Chapter 2). Therefore, latecomer firms do not necessarily depend on global buyers for absorbing market knowledge from them. The problem is that latecomer firms need a critical mass (market and time) to accumulate profits, practice skills and train designers so that they can internalize the skills of understanding, capturing and commercializing rapid changing fashion trends and consumer preferences.

Second, markets are not a universally globalized field that is fully occupied by global lead firms. Previous studies tend to oversimplify markets as a uniform place controlled by

global buyers which play as a gate keeper. In fact, there are diverse market niches for latecomer firms to explore, particular to those firms are located in a country with a huge domestic market. By identifying new market niches, especially the domestic market which may be less demanding and less regulated, latecomer firms may reduce dependence on global buyers and conduct functional upgrading. Indian and Turkish apparel firms have provided some positive cases in which local firms realized functional upgrading through exploring domestic and Russian markets (Tewari, 2008; Tokatli, 2003, 2007; Tokatli and Kizilgun, 2004). Specific to local firms in the PRD, regarding to the market size of China and the liberalizing domestic environment, they do have an opportunity to practice functional upgrading. Moreover, local firms may improve their production capabilities and develop some non-cost-based advantages, such as competent supply networks, regional learning networks and domestic distribution channels. The combination of these conditions may incentivize international buyers/traders to cooperative with local firms.

By recognizing these points, power relations between global buyers and local suppliers are possible to be reshaped. Local firms would have some alternative strategies to leverage the power of global buyers. They can diversify learning channels to reduce dependence on global lead firms. They also can nurture more synergy by venturing new market niches with international buyers. The next two sections draw on the case of the PRD's apparel industry to demonstrate this potential.

7.3 Development and upgrading in the PRD's apparel industry

This section starts by reviewing the national context and the formation of captive

coupling in the PRD. I then trace the progress and features of industrial upgrading. The main analysis focus rests at the evolution of coupling on the basis of the relational framework proposed in Chapter 3.

7.3.1 National contexts of the apparel and textile industries

Before the opening reform in 1978, SOEs and COEs in China had dominated the apparel industry through nationalization. But the apparel industry achieved little progress in upgrading due to rather limited usage of modern machines and other production technologies (Hua, 2008). After the reform, export-oriented development in the this industry was highly encouraged by the central government in order to provide mass employment and accumulate foreign currency reserves (Jiang, 2009). Key strategies were marketization, promotion of FDI, and structural adjustment in which SOEs withdrew from the apparel industry and created space for private and foreign firms. The central government turned to focus on coordinating two issues: rationing export quotas according to the regulation of MFA; and leveraging export-rebate rate.[4] The rate was frequently adjusted as an infant industrial policy to offset negative impacts from global markets (Jiang, 2009). It was raised to 16% for helping domestic firms overcome the negative consequences of the global financial crisis in 2008.

The reform of marketization was expanded further in 1992. The disallowance of vertical integration in fiber-textile-apparel-retail chains was removed and various market regulations were set up for providing a competitive domestic market environment (Gu and Yang, 1999; Hua, 2008). For the first time, international branded-name retailers were allowed to enter into

[4] China set up the infant policy for the textile and apparel industries based on a floating rebate rate based on export values.

China[5]. These foreign branded firms spurred the growth of the domestic market and also provided a benchmark for local firms to learn.

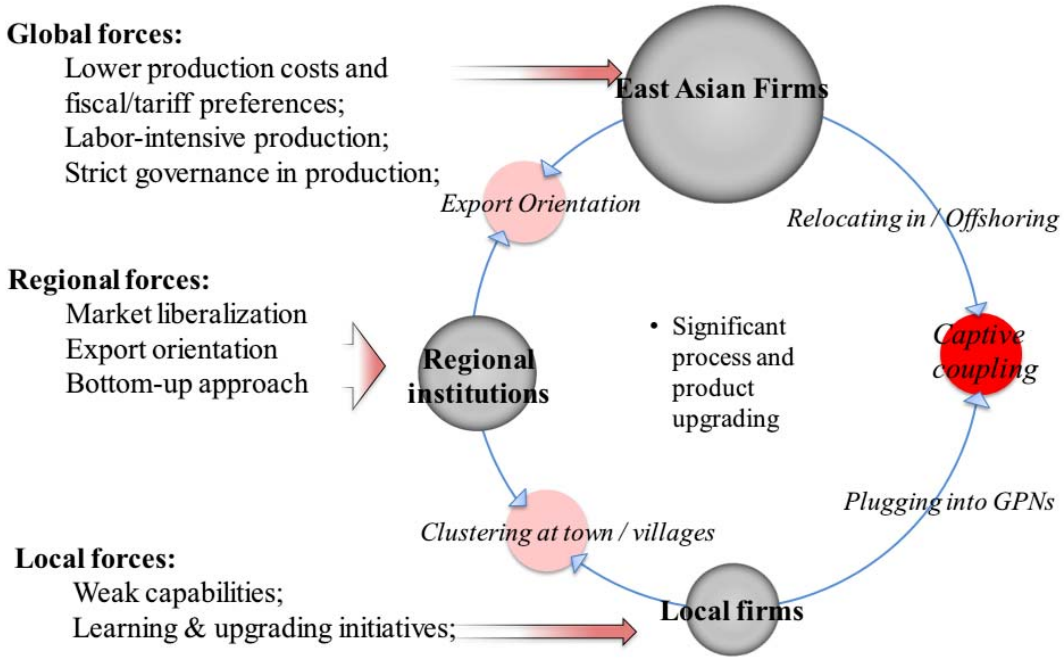
While SOEs withdrew from the apparel industry, they consolidated in the textile industry. They received tremendous state investments in upgrading machines and equipment. From 1985 to 1997, Chinese SOEs invested over $1 billion annually in importing advanced textile-processing equipment (Chandra, 1998). During the 2000s, China was the largest global recipient of circular knitting machinery (both single and double jersey), electronic flatbed knitting machines, shuttle-less looms, open-end rotors, and short-staple spinning machines (Frederick and Gereffi, 2011: 84). Although these SOEs largely do not locate in the PRD, the technological upgrading of these textile SOEs does help domestic apparel firms reduce dependence on foreign firms in raw material procurement.

7.3.2 Formation of captive coupling

As the above elaboration has indicated, the apparel industry in the PRD was sharing a similar context with the electronics industry at the beginning of the reform. The difference is that local authorities were the key actors in promoting foreign investments in the apparel industry (Chen and Pu, 1999). Prefectural and provincial governments preferred constructing industrial parks for higher value-added industries such as the electronics and chemical industries. Due to huge technology and market gaps, captive coupling was form in the apparel industry as shown in Figure 7.1.

[5] The early pioneers were Giordano (Hong Kong), Nike (US.), Stefanell (France) and Esprit (Hong Kong) in 1992; Adidas (German), Mexx (Holland) and Jeanswest (Hong Kong) in 1993; and Liz Claiborne (US.) and Benetton (Italy) in 1994 (Gu and Yang, 1999: 14).

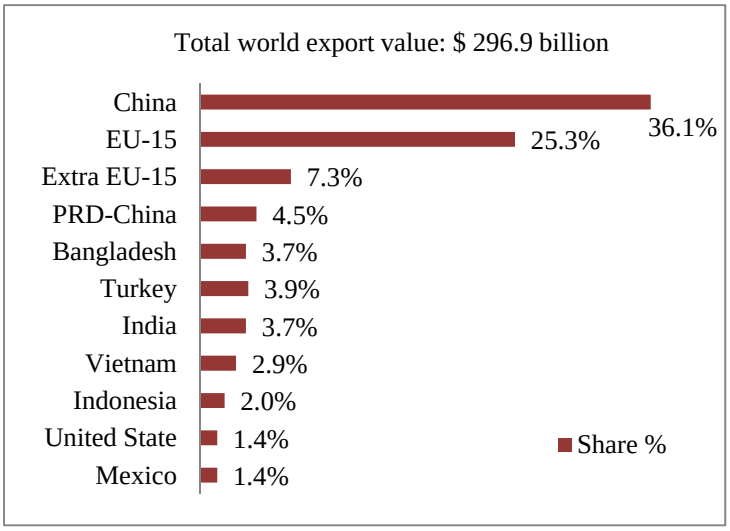
Figure 7.1 Captive coupling in the PRD's apparel industry in the 1980s



Source: compiled by author.

Synergy was fostered between the global imperative of industrial relocation and the local initiative of industrialization whereby the 'front-store-back-factory' pattern was developed and dominated by Hong Kong apparel firms (see Chapter 5). Substantial industrial growth has been achieved during the 1980s. In 1991, the total industrial output of the apparel industry reached 73 million *yuan* which was mainly contributed by EPEs. During the 2000s, most of the EPEs were restructured into FIEs or local private enterprises. By 2008, EPEs only accounted for less than 1% of both industrial value added and export values in this industry (GDPBS, 2009). In 2009, the total output value of the apparel industry had reached 125 billion *yuan*. Meanwhile, its export value reached $13.5 billion which accounted for 4.8% of the world total exports. This amount exceeded the total exports of many latecomer economies such as Bangladesh, Turkey or India respectively (see Figure 7.2).

Figure 7.2 Global top exporters of clothing products in 2009



Source: World Trade Organization, International Trade Statistics 2009, at: http://www.wto.org/english/res_e/statis_e/its2009_e/its09_toc_e.htm.

7.3.3 Characteristics of upgrading and the catching-up of local firms

After decades of rapid industrialization, upgrading in the apparel industry has been significantly achieved in the PRD (see my summary in Table 7.1). In terms of functional upgrading, many local firms have been upgraded from export processing firms into OEM suppliers and then further into ODM and OBM suppliers. According to records in Guangdong Apparel Industrial Association (GAIA) and Guangdong Apparel Designer Association (GADA), more than 60% of local firms which attended Canton Fair[6] have provided ODM business for global markets since 2007. There were over 2,000 local firms which officially registered their own brands in GAIA by 2009. Most of them created more than one brand. By 2010, 18 local firms were entitled the National Famous Trademarks[7] in China. Each of these 18 firms had an annual turnover over 1 billion *yuan* and at least owns 1000 retail stores in the

[6] Canton Fair is held biannually in Guangzhou every spring and autumn, with a history of 53 years since 1957. The Fair is a comprehensive one with the longest history, the highest level, the largest scale, the most complete in exhibit variety, the broadest distribution of overseas buyers and the greatest business turnover in China. see: http://www.cantonfair.org.cn/en/

[7] National Famous Trademarks are authorized by China State Ministry of Industry and Commerce. Firms with this certificate will enjoy more superior privilege in institutional supports, particularly in IPR protection than other normal trademarks in China market.

China market.[8] As one of the largest local branded firms, Yishion has franchised 4,000 stores and established 500 outlets in China and another 22 countries. The design capabilities of the apparel industry have also been upgraded. Hundreds of foreign firms have established design and brand-development centers in the PRD in collaboration with local partners. By 2010, there were 860 registered designers in GADA. About 100 of them have been awarded the Guangdong Top Designers. 13 of them were entitled the China Top Designers. They regularly launch personal design shows in China and 6 of them have launched personal design shows in Paris, New York and London in the past decade.[9]

Table 7.1 Upgrading in the apparel industry in the PRD

Types of upgrading	**Contents**
Function	· Processing & assembly (1980s) → OEM (1990s) → ODM (2000s) → OBM (domestic → international)
Channel / Network	· truncated subcontracting base → global manufacturing center (4% of the world export in 2010) · Re-export through Hong Kong → World-class logistic infrastructure · domestic wholesale hub → domestic fashion design center
Product	· low value added → higher value added · simple types → diverse, all product ranges, particularly in sport wear, underwear, women wear, jeans and leather ware;
Process	· Hand-made, low efficient machines→ the most advanced production lines in domestic environment · Vertically integrated Clusters · Mass production → more flexible and specialized

Source: author's fieldwork.

Besides functional upgrading, product and process upgrading is also achieved apparently. As shown by Table 7.2, from 1991 to 2009, the IVA of apparel firms increased dramatically from 5.2 billion *yuan* to 38.8 billion *yuan*. IVA per enterprise increased by seven folds and

[8] *The competitiveness of Guangdong Apparel Industry in 2010,* at http://www.gdfz.org/?action-viewnews-itemid-4575.

[9] Sources: interview with the vice chairman and an officer of GAIA on 31 May 2010, in Guangzhou; official website at: http://www.gdfz.org/.

IVA per employee also grew up with four times. In contrast, the number of employee per enterprise increased a bit firstly and then declined after 2005. This trend indicates that the production efficiency of firms and labor were both improved significantly and this achievement did not result from massive usage of labor. In 2009, the normal lead time of clothing-sample confirmation in the PRD has been shortened into 20-30 days. This lead time was higher than the national average standard which was about 30-40 days (IARE, 2010b).

Table 7.2 Indicators of upgrading in the apparel industry in the PRD

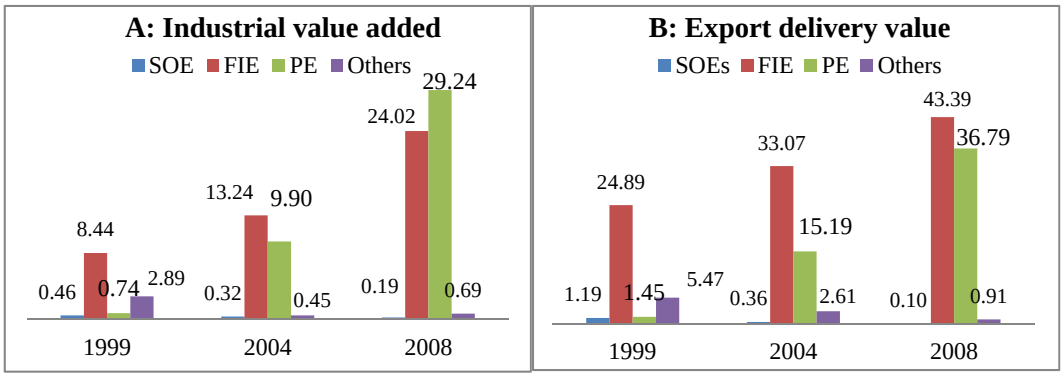
Year	**No. firms**	**IVA**	**IVA-E**	**IVA-L**	**NEE**
	unit	*billion*	*million*	*thousand*	*person*
1991	1138	5.2	4.6	16.9	269
2001	1513	12.3	8.2	21.3	382
2005	1992	20.7	10.4	30.1	360
2009	2656	38.8	14.6	45.6	333

Notes: currency is Chinese *yuan* at constant 2000 price. IVA-E= industrial value-added per enterprise; IVA-L= industrial value-added per Employee; NEE = number of employee per enterprises. All data refer to enterprises have an annual turnover over 5 million *yuan*.

Sources: Guangdong Statistic Yearbook 1992, 1996, 2000, 2006, 2010.

While the electronics industry in the PRD has been led by FIEs, local (private) firms in the apparel industry have caught up and overtaken FIEs as the leader of the region. The watershed roughly appeared around 2000 (see Figure 7.3). By 1999, FIEs still contributed to a major share with more than 67% IVA and 75% export value in the region. However, local firms subsequently outperformed. From 1999 to 2008, in terms of IVA, local firms increased by more than 40 times and exceeded FIEs in 2008. In terms of export value, local firms increased by 26 times and matched closely the contribution of FIEs in 2008. But SOEs and other firms totally lost their influence within the same period.

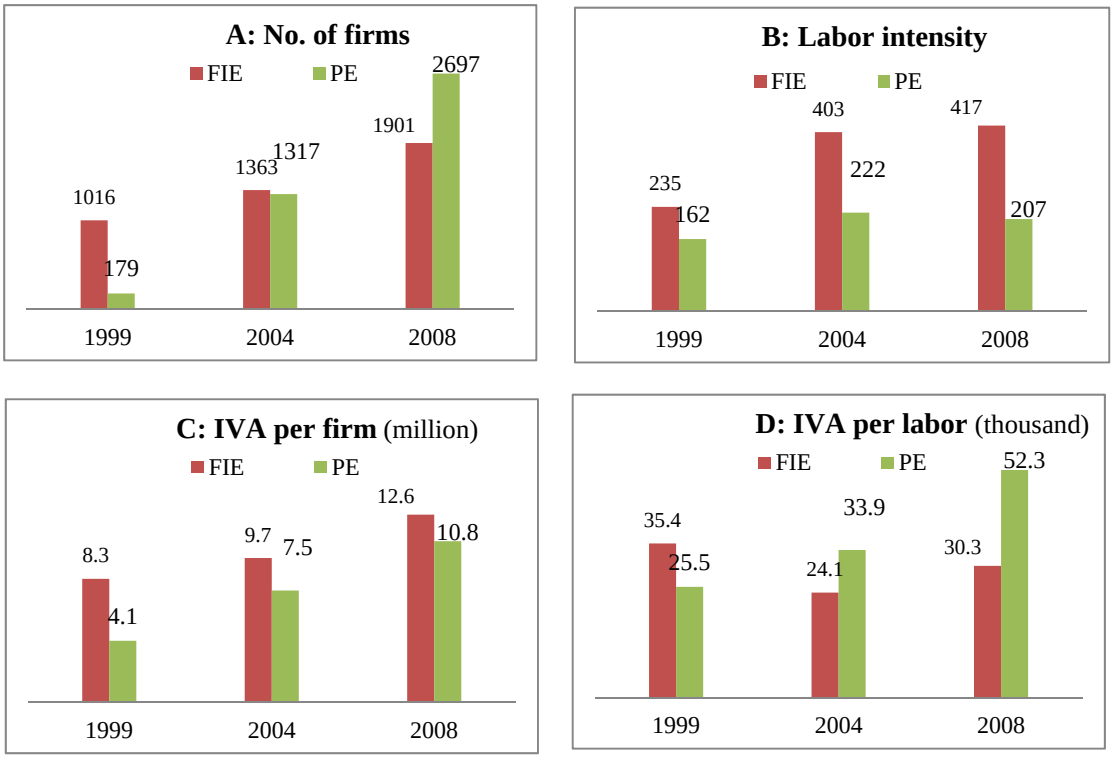
Figure 7.3 Value creation of firms in PRD's apparel industry



Notes: currency is billion *yuan* at constant 1999 price. PE refers to private enterprises. Others refer to COEs and enterprises with annual turnover lower than 5 million.

Sources: The national economic census conducted in 2004 and 2008; Guangdong Industrial Census Yearbook 2000.

Figure 7.4 Performance of firms in PRD's apparel industry



Notes: currency is *yuan* at constant 1999 price. PE refers to private enterprises. Others refer to COEs and enterprises with annual turnover lower than 5 million. Data at PRD level are unavailable. Regarding that the output of the apparel industry in the PRD accounted for more than 75% of the whole province throughout the 2000s, provincial level data were used to represent the PRD roughly.

Sources: The national economic census conducted in 2004 and 2008; Guangdong Industrial Census Yearbook 2000.

A further comparison illustrates that local firms have developed their competiveness with

smaller sizes and more efficient performance (see Figure 7.4). Between 1999 and 2008, the number of local firms mushroomed with a ten-time increase, but the labor intensity of local firms declined (see part A and B in Figure 7.4). During the same period, FIEs had doubled their firm number and had a four-time increase of employees. This phenomenon led to a better performance of local firms in comparison with FIEs. From 1999 to 2008, the gap of IVA per enterprise between FIEs and local firms was almost bridged. Moreover, the IVA per employee of local firms remarkably increased from 26,000 yuan to 52,000 yuan, while the IVA per employee of FIEs decreased from 35,000 yuan to 30,000 yuan. This trend implies that local firms have been upgraded from a captive follower into a competent competitor.

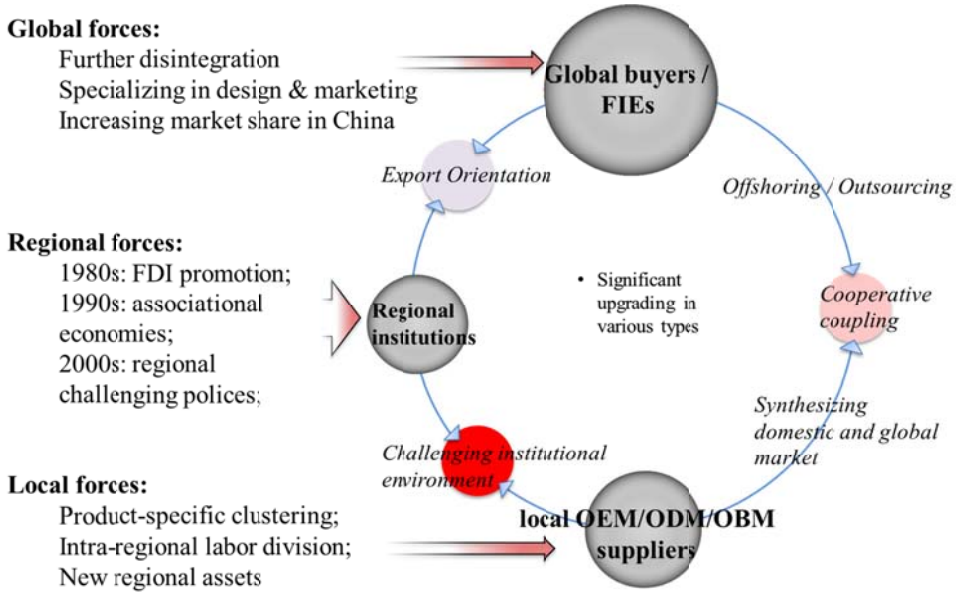
7.3.4 From captive to cooperative coupling

The above analyses show that local upgrading has been achieved to a substantial degree, particularly during the 2000s. Examining changing multi-scalar forces and institutional-spatial contexts, this chapter argues that this local upgrading is produced by the formation of cooperative coupling between the PRD and the apparel GPNs. *Cooperative coupling* refers to a situation that local (latecomer) firms in a region develop a complementary relationship with foreign firms in GPNs (see section 3.4.1 in Chapter 3).

The formation of cooperative coupling can be reflected by the changing types and numbers of firms. By 1999, the majority of apparel firms comprised about 1000 FIEs. More than 60% of them were from Hong Kong, Taiwan and Macao. More than half of them were wholly foreign-owned enterprises (GDPBS, 2000a, b). But this configuration was reshaped during the 2000s. By 2008, among 4700 apparel firms, 66% of them (3100) were joint ventures comprised of equity joint venture, contractual joint venture and other forms of

collaborative enterprises. 1755 of them were controlled by local private investors, while 1330 were controlled by foreign investors. This change meant that most of the firms had become cooperative forms of enterprises. This study has mapped the formation of cooperative coupling in the apparel industry as Figure 7.5.

Figure 7.5 Cooperative coupling in the apparel industry in PRD in the 2000s



Source: compiled by author.

At the *global* scale, the imperative of global lead firms/buyers is shifting from offshoring into outsourcing. This change enables the PRD to transform into a global manufacturing hub rather than a subcontracting node which is controlled of East Asian CMs. The incentive of this changing imperative is derived from increasing competitive pressures and attraction from higher value-added in non-manufacturing segments (Bair and Gereffi, 2003; Gereffi, 2001b; Robinson, 2010). In doing so, global buyers can concentrate their investments in fashion design, brandings, logistic and marketing. The PRD has grasped this opportunity chiefly in three steps: (1) agglomerating East Asian CMs; (2) constructing regional supply networks and serving as the local suppliers of these CMs; (3) learning the capabilities of systematic

integration and upgrading into CMs (OEM suppliers). For instance, the Hongying Apparel Group from Foshan has been serving as a key supplier for two Taiwanese CMs (Pou Chen and Feng Tay) since the 1990s. By learning from them for years, Hongying mastered the capabilities of supply chain management and vertically integrated production. It then constructed its own supply networks and upgraded into a CM as a competitor of Pou Chen and Fend Tay. Hongying currently has been the strategic partner of many global brands such as Lee, Woolrich, Harley Davidson, Chicco, Energie and so on.[10] With the growth of local CMs like Hongying, the PRD presently has become a global supply base for a wide range of global lead firms, like Nike, Adidas, Rebook and Puma in the sport wear industry; Levis, Tommy-Hilfiger and Ralph Lauren in the leisure wear industry; as well as some luxury brands like Prada, Gucci and Armani.

At the *regional* scale, a regional innovation system is emerging with the growing body of associational economies since the 1990s through a bottom-up process. The first regional industrial association in the PRD was found by 25 local private firms and five industrial associations in towns in 1990. It was recognized by the provincial government as GAIA two years later. GADA was also established subsequently. After that, more than 80 industrial associations have been established among all cities and industrial-specialized towns in the PRD by 2005. The key efforts of these industrial associations are to organize fashion festivals, trade fairs and design competition within the PRD, such as Guangdong International Fashion Week and the Top-Ten Designer Competition of Guangdong[11]. Since 2000, these activities have attracted thousands of producers, global buyers, international designers and traders to

10 Source: interview with an anonymous supplier of Hong Ying Apparel on 25 June 2010 in Foshan.
11 Source: the above data come from interviews with the vice chairman of the GAIA on 31 May 2010 in Guangzhou and the chairman of Humen Apparel Industrial Association on 9 July 2010 in Dongguan.

the PRD annually. Moreover, these associational economies actively built up collective learning networks by organizing various learning groups, public lectures, training programs, enterprise fieldtrips and international business trips and so on. By devoting tremendous efforts, these associational economies helped local firms bridge knowledge gaps in marketing and design. The CEO of Watermark Co. Ltd who is also one of the National Top Ten Designers told me that:

> Normally it needs ten year to bring up a qualified fashion designer. A good designer needs a time to learn and a place to practice for years. In my view, the PRD should be one of the best locations for developing indigenous fashion designers in China. Obviously, we cannot compare the PRD with Paris, New York, Tokyo or Hong Kong. But at least, firms, industrial atmosphere and fashion events here provide us a chance. We can know the peers, present our works and learn from each other without going abroad necessarily (Interview, 100525, on 25th May 2010 in Guangzhou).

Her sentiment was echoed by the vice chairman of GAIA:

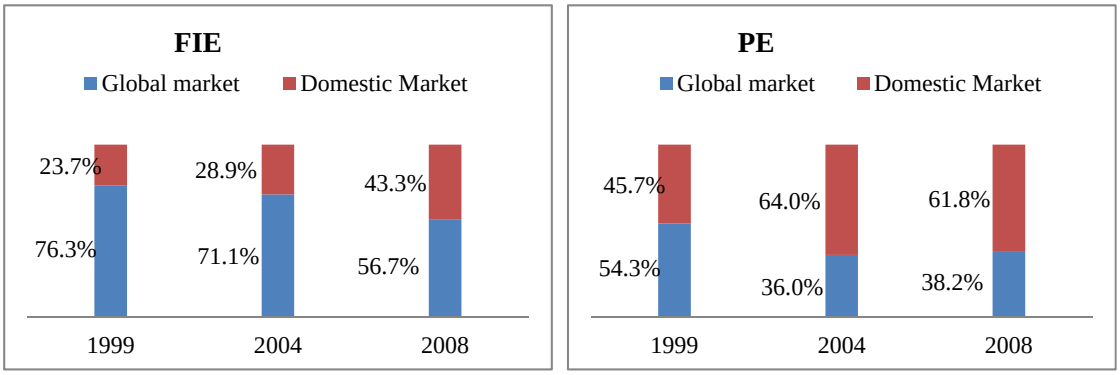
> It should be summarized that the most important contribution of our work is the construction of such an information-sharing and fashion-exhibition platform. It provides an opportunity for local entrepreneurs, designers and professionals to learn, cooperative and compete with each other. All these prosper the growth of the industry, particularly in the segments of design, exhibition and branding (Interview100531, on 31 May 2010 in Guangzhou).

The above two quotations articulate the important role of these associational economies in diversifying learning channels for local firms. A collective learning platform is gradually formed and helps local designers accumulate knowledge and practice what they have learned through various fashion events within the PRD. For instance, the Guangdong Fashion Festival in June 2010 gathered hundreds of global buyers, domestic lead firms and local firms, as well as designers to show their newest designs and learn from the peers. In the opening ceremony of the Festival, a few global buyers from Europe exhibited some of their conceptual designs,

especially the ones for China market; domestic lead firms showed their new designs in the coming seasons; some local firms hosted thematic shows together such as jeans products or woman underwear. The newly awarded top designers also exhibited their personal shows during the festival. Some outstanding colleges and schools in apparel designs also hosted graduation exhibitions respectively in which several excellent students were employed by corporate participants after the festival. These fashion events serve as various types of temporary relational clusters that facilitate local learning processes and benefit the proliferation of local apparel firms, traders, suppliers and designers at the regional scale.

Apart from regional innovation systems, the domestic market is another crucial emerging asset that facilitates the formation of cooperative coupling. This asset enables firms to sell own-branded products in a more flexible and lower-cost manner (see case studies in section 7.4). Today, China has become an arena of global competition rather than simply a global factory in the global apparel industry (Ghosh and Rao, 2010; Ma, 2010; Yu, 2008). In 2010, 44 billion pieces of clothing products were produced by firms within China. Meanwhile, the domestic market sale reached 1.4 trillion *yuan* (not include import values).[12]

Figure 7.6 Changing market structure in the apparel industry in the PRD



Notes: All enterprises have an annual turnover over 5 million *yuan*. FIE = foreign invested enterprises; PE = private enterprises.

Sources: National economic census 2004 and 2008; Guangdong Industrial Census Yearbook 2000.

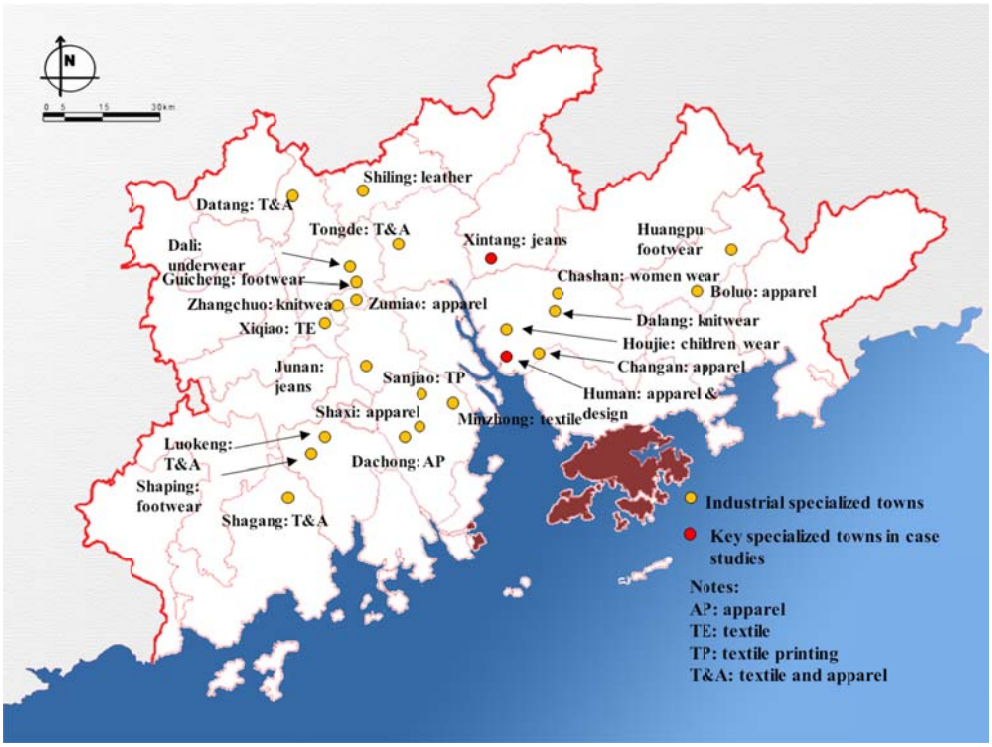
[12] Data from China National Apparel Association, http://www.cnga.org.cn/news/View.asp?NewsID=29607

Figure 7.6 shows that the important influence of the domestic market on firms in the PRD. Since 2004, the domestic market has accounted for more than 60% of local private firms' outputs. FIEs were also attracted to increase the share of the domestic market from 24% in 1999 to 43% in 2008.

At the *local* scale, the PRD firms have managed to strengthen their capabilities and power on the basis of two important regional assets: dozens of product-specific clusters and a huge domestic market. Although foreign firms are not excluded to access these assets, local firms have socio-cultural advantages in utilizing these assets. Through an agglomeration effect, the PRD has developed 24 industrial-specialized towns by 2010. Different from the electronics industry, local firms are playing a dominant role in all these towns. Most of the towns are product-specific clusters, such as jeans in Xintan and Junan towns, woman wear in Chanshan and Humen towns and underwear in Dali town (see Figure 7.7). Serving as local integrated production networks, these clusters enable local firms to conduct flexible production or industrial specialization with certain collective efficiency. The owner of Xinyi Group is the chairman of Yanbu Underwear Industrial Association. He exemplified this point by telling me that:

> Yanbu now is called the 'China Sexy Town' according to our scale of production volume and good reputation in the lady underwear products. This industry was developed initially by a Hong Kong firm. Now the town becomes led by six local [private] spinoff firms from that Hong Kong firm. We got at least 150 competent local firms which have created owned brands for domestic markets. About ten of them have explored international markets…My firm almost can source all materials without going out of the town. There are also professional companies helping me to sort out some technological or design problems. More interestingly, we [the six key enterprises] often subcontract to each other for casting the time limit of orders (Interview 100530, on 30th May 2010 in Foshan).

Figure 7.7 Industrial clusters in the apparel industry in the Pearl River Delta



Source: compiled by author.

7.3.5 Challenges to local upgrading

Although there are emerging regional assets, there are also new challenges to the PRD's apparel industry. Since the mid-2000s, regional policy makers in the PRD attempted to spur local upgrading by proposing the dual-transformation policy (see Chapter 1). In Schmitz's (2007) language, the regional institutional environment was shifting from supportive into challenging in the apparel industry. This industry was deemed as low value added and suggested to be relocated from the PRD. This challenging policy has generated tension between local authorities and firms in which local firms had to find a way to show that they had promising performance. Otherwise, they would be required to move to designated industrial parks without competent supply networks and less geographical accessibility (Yang, 2012). According to the policy, environmental-sensitive segments like dyeing and printing

must be compulsorily relocated. For instance, all dyeing factories in Xintang towns were forced to leave because their licenses were ceased soon after the township government declared to enforce the policy. Simply manufacturing firms without owned brands, design functions or strategic partnership with global buyers were also suggested to relocate. As estimated by the vice chairman of GAIA, about eight to ten hundreds apparel firms were moved out from the PRD within the past two years. Many local firms rushed to create their own brands and develop marketing partnerships with global buyers in order to fulfill the 'upgrading' requirement set by regional policy makers.

The case of Xinyi Group can exemplify the tension and power dynamics during this policy shift. As the leader of local industrial association and a local corporation group with eight subsidiaries, Xinyi has strong corporate power and is supposed to be in an advantage position in bargaining with local authorities. However, the institutional power of local authorities overrode corporate power. The township governments argued that the apparel industry was not as promising as the electronics and other high-tech industries. By enforcing the policy imperative from provincial governments, the apparel industry was still suggested to be relocated to designated industrial parks outside the Yanbu industrial cluster where Xinyi was located. The owner of Xinyi Group reflected the risk of relocation and his struggle to keep the firm in his comments:

> Even though I am the chairman of the local industrial association and the owner of four local brands, my factories have been suggested to move to Shaoguan which is more than hundreds mile away from Here [Yanbu town]. Moving to there will be a nightmare to my business. I even cannot find enough skilled workers to operate my machines, let alone the logistic problem of material procurement. I did try to argue but my voice was ignored. Hence I did a calculation carefully in front of local cadres. I showed them that I was producing more value added than many electronics firms here and contributed more taxation and wages to local economies. Only in so doing, they agreed to let me stay. It looked funny, but that was the true story (Interview 100530, on 30th May 2010 in Yanbu).

In order to bargain with township governments, Xinyi also mobilized collective power by organizing a group of local entrepreneurs to lobby with the governments. Eventually, the headquarters, offices and key factories of these local firms were allowed to stay in Yanbu town, but their unbranded suppliers or subcontractors have to move out so as to vacate more land resources for new investments. This result was acceptable because these local firms did not need to relocate to designated industrial parks which were hundreds miles away, but were allowed to relocate to the peripheral areas in the PRD, such as Sanshui town in Foshan city or other towns in Zhaoqing city.

7.4 Upgrading dynamics: changing rules of the game

On the basis of cooperative coupling, power relations between local and foreign firms are changing in the PRD's apparel industry. On the one hand, local firms reduce dependency on global buyers in terms of technologies and markets. On the other hand, they have certain autonomous power in selecting partners and partnerships. Sustained by the improvement of indigenous capabilities and the emergence of new regional assets, local firms are able to develop more synergy with foreign partners and achieved functional upgrading eventually. This section exemplifies this change based on two cases of industrial towns: Humen town in

Dongguan City and Xintang town in Guangzhou City.

The common thread of these two cases is that local firms tend to adopt a synthesized strategy through developing domestic and global markets simultaneously. In global markets, local firms strengthened their OEM/ODM business for learning state-of-art fashion trends and accumulating sufficient profits. Local firms used the domestic market as a low-cost experimental field and practice design and marketing skills. In doing so, they realized functional upgrading in the form of brand creation. It went through a step-by-step marketing process: wholesaling – dealership leasing – franchising – systematic marketing and branding. Meanwhile, global buyers were further attracted to the PRD because of the growing-up local supply capabilities and the large market size of China. More synergy was thus developed within cooperative coupling.

Institutional conditions between the cases are a bit difference. Local firms in Humen more relied on domestic markets in the beginning and were backed up by pro-active local authorities. In contrast, Xintang firms more depended on international markets and received limited supports from associational economies. More recently, they suffered pressures from the new industrial policy. To overcome this problem, Xintang firms deepened their embeddedness in GPNs and strengthened their bargaining power. Specifically, they adopted a multi-tasking strategy that performed multiple functions and certain technological cutting-edges for global buyers. The case in Humen reflects the influence of regional assets and local institutions on upgrading, while the case in Xintang articulates the importance of local entrepreneurship and upgrading opportunities embedded in GPNs.

7.4.1 Humen town: creating fashion China

Located at the West bay area of Dongguan city, Humen was merely a small fishing-based town before 1978. Based on the effort of pro-active local authorities, the first EPE in China, Taiping Handbag Factory, was established in Humen. The demonstration effect of this factory made Humen industrialized quickly. By the end of the 1980s, Humen had established about 600 EPEs in the apparel industry. In 2007, Humen agglomerated 350,000 workers employed by 2,000 apparel firms (Yu, 2008:6). By 2010, its total sale value of the apparel industry reached $2,200 million and its export value grew to $600 million.[13] There were over 2,000 local brands registered in Humen in which four were entitled as National Famous Trademarks and 22 were entitled as Provincial Famous Trademarks.[14] In fact, 1/3 of them were newly created due to the pressure of the 'dual-transformation' strategy. This problem is reflected by a chief officer of the Foreign Economy and Trading Office of Humen:

> As Humen has been a National Industrial Town, we did not have serious pressures under the new challenging policy. However, the apparel industry was still deemed as a low value added industry. So we must do something. We thus shut down all EPEs if they did not covert into a FIE or a normal enterprise in due call. We also encouraged local firms to establish an owned brand so that we could argue with the governments with some good reasons at least. Nevertheless, we still got about 50 sound brands in domestic markets and a couple of them in international markets. That earns the industrial reputation for Humen (Interview 100709, on 9 July 2010 in Humen).

The essence of Humen's accomplishments is a combination of a vertically integrated cluster, a pro-active local state and a domestic wholesale center. The vertically integrated production network comprises about 2000 manufacturers, 400 local suppliers and 50

[13] http://www.humen.gov.cn/hmnewsread.asp?newid=32910

[14] The listed data of Humen in this subsection are sourced from the official website of local authority, at http://humen.gov.cn/

professional-service providers (Li, 2011a; Yu, 2008). This kind of agglomeration economies also exists among other clusters within the PRD.

Besides establishing the first EPE in China, local authorities (Humeng township governments) have devoted tremendous efforts in fostering a supportive institutional environment within the town, such as providing fiscal incentives, organizing business trips and trade fairs, constructing educational systems and a knowledge-sharing platform and so on. These efforts helped local firms in bridging knowledge gaps with global buyers particularly in supply chain management, production and design. The most important effort was the development of local wholesale economies. Originally, Humen had merely several street bazaars selling smuggled electronics and clothing products from Hong Kong. In 1986, funded by local authorities, Humen commercial committee established the first apparel wholesale market in the PRD named as Fumin.[15] It soon attracted hundreds of retailers and became a famous domestic trading center. In the mid-1990s, the committee aggressively privatized the Fumin market into a business group which still kept a close relationship with local authorities for receiving financial and institutional supports. By 2010, the Fumin Group was restructured into a modernized share-holding corporation owning 9 commercial buildings which accommodate 5000 shops in Humen (see Table 7.3). Encouraged by Fumin, 31 textile/apparel wholesale markets were established so far accommodating 12,000 shops.

[15] It means making people rich.

Table 7.3 Organization of the Fumin Group

Subordinates	**Contents**
Fumin International Trade Town	Currently 1000 shops, 6000 shops in maxima
Fumin Fashion Town	1500 shops
Fumin Underwear market	About 500 shops
Fumin Business Pedestrian Street	
Fumin Drapery Market	600 shops
Fumin Footwear and Leatherwear Market	About 500 shops
Fumin Accessory Wholesale Center	About 800 shops
New Fumin Accessory Wholesale Center	Currently 200 shops, 1000 shops in maxima
Fumin Agricultural Product Wholesale Market	About 200 shops
Fumin Fashion News	Magazine, monthly
Fumin Commercial center	Professional consultancy
Fumin Fashion Net	Official Internet Website

Sources: author's fieldwork and Fumin Group official website at http://en.fumin.com/index.asp.

By attracting thousands of traders and buyers, Humen's wholesale economies benefited local firms with two advantages. First, the arrival of international buyers allowed local firms to develop new coupling relations and decouple with Hong Kong traders. Second, local firms could reduce the dependency on global buyers by exploring the domestic market at a low cost. In the wholesale markets, Humen's local firms sold copy-cat products, imperfect products and the surplus products from their OEM orders by putting a different trademark (Yu, 2008). This local context enabled local firms to accumulate sufficient profits and practice their skills in design, marketing. Over time, these local firms started to invest in brand creation and hired professional designers to develop their own fashion styles. Eventually, some local firms realized functional upgrading and established their brands in the domestic market. This process can be reflected by a former vice-CEO of Huedy. As he told me that:

> In those days [the 1980s], domestic demands exceeded supply totally. Once you could make clothes, people would buy them. After years, some foreign buyers appeared in Fumin markets and delivered order to us. Their orders were large and more profitable. Hence we quitted from the EPE partnership and worked for global buyers. By copying the designs from OEM orders, we made clothes quickly and sold them in Fumin. But soon, we were told that we could not do so anymore since it was illegal. We did some changes. We still copied the designs but made some revision on our own efforts. Since our products were partly designed by our own already, we decided to brand them. After years, we have learned a lot from buyers and our name also became famous in Humen. We then formally set up marketing and branding departments (Interview 100824, on 24 Aug 2010 in Dongguan).

The development of Yishion, the largest local OBM enterprise in Humen, demonstrates a step-by-step process of functional upgrading in brand creation. Yishion was derived from an EPE in the early 1990s. It subsequently decoupled with the Hong Kong partner and upgraded into an OEM subcontractor. Yishion did not suffer a lot from this decoupling because most of the sunk costs were borne by the Hong Kong partner. Meanwhile, by taking advantage of local wholesale market, Yishon sold their branded products before 1997. In 1999, Yishion withdrew from the wholesale market and articulated into domestic retail markets by leasing out the brand to dealers in hundreds of towns and counties. This strategy aimed to avoid direct competition with global lead firms in the main cities of China. Based on the dealership, Yishion sold their products in a large number of areas in China, though marginal profits were low. After years of profit accumulation, Yishion increased investments in branding and marketing by employing Pop stars in their new advertisements. Meanwhile, Yishion ceased dealership and started to construct retail networks (franchised stores). Around 2003, Yishion ventured into prefectural and capital cities to compete with branded lead firms. After accumulating enough profits, Yishion begun establishing owned outlets for sharpening its corporate image. This low-cost strategy helped Yishion earn a critical time for implementing

functional upgrading. In 2005, Yishion ventured into international markets in Middle East by replicating the same strategy in China: wholesale market – dealership - franchised stores.

Based on the efforts of local authorities, the formation of clusters and the prosperity of wholesale economies, cooperative coupling has been developed in Humen. In production governance, most of the local private firms currently are providing OEM and ODM services simultaneously. They are able to manage international supply chains and their products are qualified according to international industrial standards.

In design and branding, Humen has been not only a manufacturing node within the apparel GPNs, but also upgraded into a design and branding center in China. This upgrading was archived by strengthening the endogenous design capacities of the apparel industry. Apart from recruiting designers from colleges and schools in the PRD, many local also directly hired experienced designers from domestic and global lead firms or design companies. For instance, Yishion hired a chief design from H&M as well as two top designers in China. Another example comes from Suosha. This local firm has specialized in middle-end women dress. It has established four retail stores in Paris and hundreds of franchised stores in the central cities of China. The owner of Suosha is one of the top designers in Humen. In order to explore international markets, she hired a designer from a French sound brand during a business trip organized by local authorities in 2004. The designer was attracted by the industrial and market potential in the PRD. The registered number of designers in the Designer Association of Humen increased from 400 in 2004 to more than 1,000 in 2010 (Yu, 2008:51). These designers actively attend various business events and training sessions organized by local authorities. New and young designers are keen in participating in the

Humen International Fashion Design Competition every year. Once they win the competition, they will be sought and hired by local firms.

To summarize the Humen case, market opportunities, local supply capabilities, pro-active authorities and wholesale economies have helped local firms move away from captive coupling. It is the combination of these institutional-spatial conditions that sustains the functional upgrading of local firms in Humen.

7.4.2 Xintang town: deepening embeddedness

Located 50 kilometers away from the North of Humen, Xintang town is hosting about 3 thousand firms specialized in jeans products in which 1/3 are FIEs, comprising about 200,000 workers. In 2009, its apparel industrial outputs reached $3.2 billion in which $1.5 billion came from export value. These amounts accounted for 30% the total exports of jeans products in China (Guo and Wang, 2010:12).[16] There are 1200 brands registered in Xintang, including one National Famous Trademarks and four Provincial Famous Trademarks. An integrated local production network has been developed covering the segments of textile cutting, dyeing, sewing, washing and patterning. In the past five years, about 60 thousand sets of machines were installed in Xintang, such as high-speed tow dyeing machines, multi-wefts rapier weaving machines, and automatic jeans-washing lines.[17]

Different with Humen, pro-active local authorities were interested in the electronics and automotive industries and provided rare supports for Xintang's jeans industry. Local wholesale economies did not come to exist in Xintang until 2006. Therefore, local jeans firms focused on utilizing social ethnic ties, local entrepreneurship and opportunities embedded in

[16] Source: interview with the vice mayor of Xintang town on 21 May 2010 in Guangzhou.
[17] http://www.xintang.gov.cn/Item/1551.aspx

GPNs in their pursuit of upgrading.

The economic take-off of the Xintang town was initiated by a local entrepreneur who introduced his Hong Kong relative to establish the first EPE in the town in 1986. The relative relocated 40 sewing machines from Hong Kong to the EPE. Cooperating with another 11 countrymen, the entrepreneur loaned from local village committees and recruited rural workers for extending the production scale of the EPE. Through this example effect, more and more Hong Kong relatives and businessmen were introduced to Xintang. Local entrepreneurs also mushroomed simultaneously. Xintang was gradually specialized in jeans products and led by Hong Kong firms (Zhu and Li, 2004). Since the 1990s, local entrepreneurs directly established trading agencies in Hong Kong for receiving orders from global buyers. This effort enabled local firms to bypass the market control of Hong Kong firms which had little power to block this local effort. The owner of Changjiang Clothing and Wash Ltd has told the vulnerability of Hong Kong firms' power:

> After a couple of years, we figured out that making jeans was not so difficult. So why we still needed to work for Hong Kong men. We [the 11 entrepreneurs] soon decided to set up a trade office in Hong Kong directly. We mobilized our villagers to tell their relatives overseas that they did not need to go to Hong Kong anymore. They just came to Xintang to deliver orders directly. We could provide competent goods with a lower price already (Interview 100427, on 27 April 2010 in Xintang).

Local entrepreneurs are the key drivers in developing cooperative coupling. All of the eleven entrepreneurs have provided OEM services for global buyers since the 1990s. They gradually specialized in different segments or products for avoiding internal competition. Some of the entrepreneurs chose to specialize in dyeing, printing and washing segment for strengthening the supply base of Xintang. Some of them consolidated cooperative partnership

in a few group of global buyers and strengthened their production capabilities. Hence they got more learning opportunities from global buyers on the basis of mutual trusts and industrial reputations. Some of them collaborated with global buyers to venture into the domestic market. Particularly, some local firms adopted a strategy of multi-tasking by shaping technological edges and cooperating with a wide range of buyers. This strategy helped local firms develop design and marketing capabilities in functional upgrading. These local enterprises have become the mainstay of Xintang's apparel industry, such as Conshing, Zengzhi and Golden Rhino. Their patterns were imitated by many other local firms. This chapter uses the case of Conshing to illustrate the local trajectory of upgrading.

Conshing has been upgraded into an ODM/OBM company integrated with some textile processing segments in the jeans industry.[18] In its pursuit of upgrading, it adopted two strategies to leverage the power of global buyers and bargain for more upgrading opportunities. First, it developed technological cutting edges in jeans washing technics and green production. Conshing built up the largest jeans-washing center in the PRD with about 150 sets of automatic machines and 100 skilled washing talents. In order to improve production environment, Conshing certificated with the ISO 9001 in 2002, the ISO 14001 in 2003 and the GOTS[19] in 2005. It heavily invested 30 million *yuan* in constructing an internal sewage disposal system which recycled 99% wastewater. Conshing further invited Novezymes, a famous Danish biochemical corporation, to set up a collaborative laboratory for developing some high-end solutions in jeans washing and wastewater processing. In doing

[18] Source: interview with a vice CEO of Conshing on 2 July 2010 in Xintang, Guangzhou.

[19] The Global Organic Textile Standard (GOTS) is recognized as the leading processing standard for textiles made from organic fibers worldwide. It defines high level environmental criteria along the entire supply chain of organic textiles and requires compliance with social criteria as well.

so, Conshing's jeans products were qualified in a wide range of environment criteria and international industrial standards. This advantage enabled Conshing to have certain bargaining power in selecting partners, rather than be passively selected and controlled by global buyers. For instance, Conshing frequently bargained for using its own components, materials and designs, instead of procuring designated materials provided by the buyers. In other words, Conshing has better control over its production/supply chain management, comparing with many other local apparel firms in the PRD.

The second strategy was to cooperate with partners in different positions within GPNs for developing ODM/OBM capabilities. Since the 2000s, Conshing has actively worked for first-tier global buyers which have well-known branded names such as Polo, LEE, Abercrombie & Fitch, Hollister, GUESS and Express. These buyers tended to enforce stricter governance in supply chain management with fixed profit margins. Under this control, Conshing earned less than supplying some unknown-branded firms or international traders. But Chonshin insisted on this partnership for learning state-of-art fashion trends and improving industrial reputation. Meanwhile, Conshing strategically worked with second-tier global buyers which were developing both China and international markets, such as Vera Moda, Only, Jack & Jones, Texwood and Clride.N. Empowered by strong technological competence, Conshing bargained with these second-tier buyers for increasing ODM content and providing joint-learning programs, such as organizing field trips in China or attending international fashion salons. Mutual interests were thus developed because these buyers were also interested in China markets and would like to know more.

After years of accumulation, Conshing established its owned brand 'Conshing Jeans' in

China after 2000. The new brand did not create much tension to Chonshing's customers. Conshing provided detail assessment reports about the market positioning of its new brand. It also invited customers to visit factories regularly for securing their copyrights. This effort earned a good reputation for Conshing and lowered tension within the partnership. In 2006, a Hong Kong-based customer of Conshing invited a France design institute and actively cooperated with Conshing for venturing the domestic market. A new brand (Hitwon) was created and positioned in a specific market niche in Chonshing's product range. In sum, Conshing fostered much synergy with global buyers through synthesizing various resources within GPNs. This effort has helped it realize functional upgrading (from OEM to ODM and brand creation) without creating much tension in cooperative coupling.

7.5 Conclusion: the evolutionary nature of strategic coupling

While previous studies hold a pessimistic view of local functional upgrading in the apparel industry, this chapter offers an alternative reading on the basis of the case of the PRD. Local firms in the region have managed to move away from captive coupling, overtake FIEs, and eventually achieve functional upgrading to a certain degree. But this progress should not be overemphasized. Local firms were mostly concentrated in low- and middle-end markets. Only a few of them were able to articulate their own brands in international markets, such as Yishion. Meanwhile, local firms are still significantly lagging behind global lead firms in marketing, branding and logistics.

A key contribution made by this chapter is the demonstration of the evolution of coupling from a captive form into a cooperative form. This chapter finds that associational

economies, product-specific clusters and the huge domestic market are all important institutional-spatial conditions that sustain the formation of cooperative coupling. The combination of these conditions enables the PRD to become a powerful player at the lower end of the apparel GPNs. Cooperative coupling matters because it endows local firms more autonomy in selecting partners and upgrading strategies. It also allows local firms to foster more synergy with their foreign partners; and eventually reduces the asymmetry of power relations. These power relations are different from the ones in captive coupling. Local firms are coupling to foreign firms for advanced knowledge and co-development, rather than just for profits to survive. Foreign firms gradually treat local firms as strategic partners, while not as subcontractors/suppliers. However, not all institutional conditions are playing a positive role to local firms. The new regional upgrading policy has posted great challenges towards local apparel firms because it did not intend to upgrade the apparel industry, but intend to replace it with the higher value added ones. This critical regional policy has raised tension to a certain degree.

This chapter has identified the variety of local upgrading strategies beyond the limited options offered in the GVC literature and development studies (e.g. collective action and innovation). The cases of Humen and Xitnang towns exemplify that the more capable are local firms in channeling knowledge or synthesizing assets, the more possibly will they achieve upgrading. This chapter has revealed the potential upgrading opportunities embedded within GPNs. This effort sheds light on alternative pathways of achieving industrial upgrading and regional development. All these findings resonate with the central argument of this thesis that the dynamic outcomes of local upgrading is subject to the evolving pattern of

strategic coupling, whereas is not pre-determined by the pattern of inter-firm governance.

Chapter 8 Reciprocal coupling and industrial upgrading in the automotive industry: the balance of interplay

8.1 Introduction

The previous two chapters have illustrated two different scenarios of local upgrading. The electronics industry is generally led by FIEs in the form of captive coupling throughout three decades of development. In the apparel industry, upgrading was initially led by FIEs while local private firms took over the role of FIEs in the 2000s. During this process, the pattern of integration in the latecomer region and GPNs has changed. In this chapter, my investigation of local upgrading in the automotive industry demonstrates another scenario. A specific type of coupling - reciprocal coupling - is developed between global lead firms (automakers) and SOEs which is underpinned by strong state interventions. The balance of power relations of these two key actors serves as a critical variable that determines the content and extent of local upgrading in the automotive industry.

Scholars in the literature of industrial governance have argued that the automotive industry is subject to both captive and modular governance. Automakers play a dominant role due to high asset specificity and the complexity of inter-firm knowledge transactions. Auto part suppliers are required to provide competent manufacturing works so as to comply with a wide range of parameters and criteria set by automakers (Gereffi et al., 2005; Gereffi and Korzeniewicz, 1994b; Schmitz, 2004; Sturgeon and Biesebroeck, 2011; Sturgeon et al., 2009).

This pattern of governance posts great challenges to latecomer firms who have to be constantly qualified as suppliers. It would be extremely difficult for latecomer firms to catch up and upgrade into an automaker, particularly when the global automotive is currently dominated by a few giant automotive groups such as General Moto, Ford, Toyota, Volkswagen, Daimler-Chrysler and Nissan-Renault. Scholars in this camp tend to believe that the market and technology gaps between latecomer firms and lead firms are rather large and almost unbridgeable. But what if the primary markets are domestic rather than foreign?

Different with the governance literature, some recent geographical studies have argued that strong national interventions can serve as a source of crucial power to counteract the control of global lead firms and then foster domestic upgrading (Barnes and Kaplinsky, 2007; Harwit, 1995; Hudson, 2002; Liu and Dicken, 2006; Pavlínek, 2003; Sit and Liu, 2000). The logic is that pro-active states may alter the pattern of knowledge diffusion by exchanging their possessed territorialized assets with advanced technologies possessed by lead firms (automakers). The development of China's automotive industry has provided such a case in which this latecomer country utilizes its huge domestic market to bargain with lead firms for more knowledge sharing and technological co-development. This process was termed as 'obligated embeddedness' in Liu and Dicken (2006)'s study which revealed the importance of firm-state relations in fostering domestic industrial development. However, interactions in such a firm-state relation and its consequences to local upgrading are still unclear. How will lead firms strategically react to strong national intervention? What if the upgrading of local firms proposes new challenges to lead firms? This chapter attempts to provide an answer to this point by focusing on local upgrading in such a firm-state nexus.

Specific to the China's contexts, the appearance of pro-active states is a crucial factor that reshapes the pattern of integration between domestic firms and global automakers. According to my conceptualization in Chapter 3, this integration represents a form of *reciprocal coupling* through which actors develop partnerships for exchanging technology and market resources possessed by each actor. In the case of the PRD, it specifically refers to a circumstance in which automakers are complied with specific criteria from the central government so as to get access to the China market. Situated in such a context, this chapter focuses on two issues: (1) the interplay between SOEs, local suppliers and lead firms within the coupling; (2) the mechanism of upgrading, power dynamics and strategic responses result from this interplay. The overall attempt is to argue that local upgrading in the PRD's automotive industry is contingent on the balance of power relations between the coupled firms, rather than on the sole governance power in either lead firms or pro-active states.

To accomplish this aim, this chapter is organized into four sections. The next section interprets global industrial tendencies and current debates in the automotive industry. It demonstrates how reciprocal coupling was developed in the automotive industry in China by Chinese central government, regional SOEs and global automakers. The third section is the core of this chapter which elaborates on the changing fortunes of Guangzhou automotive industry on the basis of a comparative case study: the failure of Guangzhou-Peugeot joint venture; and the contemporary success of Guangqi-Honda joint venture. This case study shows that strong state intervention could bring in rapid industrial growth but did not guarantee successful industrial upgrading. It exemplifies the importance of a balanced power

relationship in nurturing local upgrading. The end of this chapter summarizes main findings and theoretical implications.

8.2 Upgrading in the automotive industry: global governance imperatives or national initiatives

The global automotive industry is predominantly "an industry of very large corporations, which has increasingly organized their activities on transnationally integrated lines. In so doing, they engage very closely – sometimes collaboratively, sometimes conflictually – with national governments" (Dicken, 2007:278). The significance of this industry rests in its scale in terms of input/output, employment, revenue and its linkages to many other manufacturing industries and services. This section begins with an overview of ongoing global tendencies and the organizational pattern of the automotive industry. The implications to industrial upgrading are analyzed in relation to the governance pattern and the political economy within GPNs. This effort helps us understand why reciprocal coupling is possible to be developed in the automotive industry.

8.2.1 Industrial governance in the automotive industry

The automobile industry is an industry in which assemblers and suppliers construct complex production networks at a global scale. The automotive industry stands in stark contrast to the apparel and electronics industries which are high-volume and consumer-orientated manufacturing. In the contemporary process of global industrial shifts, the global organization of vehicle production has three general tendencies which have important geographical implications to upgrading.

First, the automotive industry is characterized by an enduring organizational convergence of automakers. Through waves of mergers, acquisitions, and equity-based alliances in the 1990s and the 2000s, global markets were dominated by twelve lead firms from six countries: the United States, Germany, France, Italy, Japan and South Korea (Sturgeon et al., 2009). By 2010, top 10 automakers accounted for 72% of the world sales of motor vehicles.[1] This trend reinforces the governance power of automakers which have developed strong capabilities to orchestrate GPNs that span multiple production regions. It further spurs the innovation of vehicle platforms which enable a single series of vehicle model to be globally produced among differentiated markets. Moreover, leading automakers have blunted efforts to establish the sort of industry-level technical and business process standards. This standardization benefits automakers by raising technological entry barriers and imposing more asset specificity on their suppliers. But the available platform solution also provides a short-cut for latecomer firms to adopt a vehicle platform without investing in its prototype development.

The second tendency is that the political economy of this industry is increasingly influential and gradually develops the global fragmentation and variegation of production systems among different regions and countries. Each locality feeds a few assembly plants that manufacture certain vehicle models for a regional or national market. This tendency of 'build where they sell' is caused by market saturation in developed countries, the sensitivity to logics costs, and more importantly by political pressuring in both host and home countries (Freyssenet and Lung, 2000; Jurgens and Krzywdzinski, 2009; Sturgeon and Biesebroeck,

[1] http://auto.gasgoo.com//News/2011/03/020839233923298157278.shtml

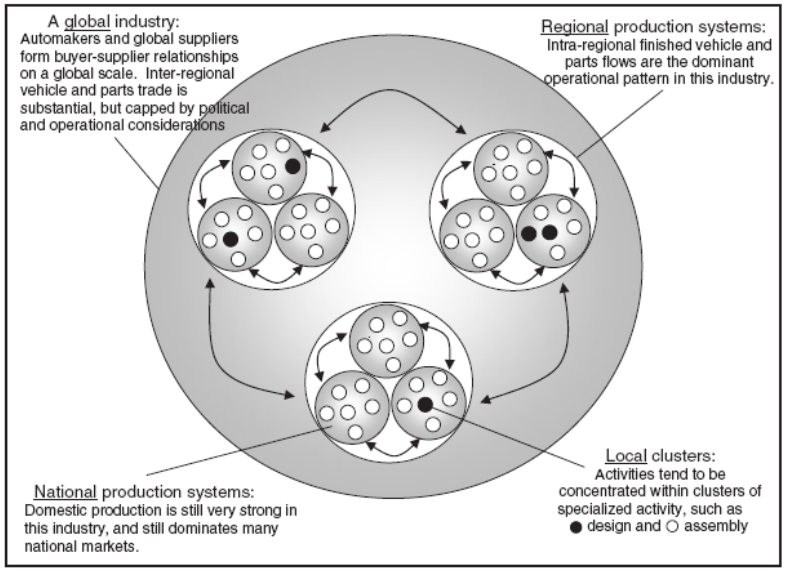
2011). Due to the large scale of industrial organization and economic multiplier effects in jobs and revenues, the automotive industry is often treated as a 'must develop and retain industry'. In both developed or developing countries, substantial state interventions are devoted for avoiding the risk of political backlash when the value of imported vehicles becomes too large and threats the survival of domestic producers (EIU, 1997; Liu and Deng, 2003; Sturgeon and Florida, 2004). This tendency explains why automakers in North America do not concentrate all their production plants in Mexico, despite of lower operation costs.

The third tendency is the imperative of regionalization of production networks at a global scale. The inter-firm transactions of technologies in automotive industry are diverse, complicated and hard to be codified. Automakers require intensive interactions and co-development with their suppliers within a manageable geographical distance (Frigant and Layan, 2009; Gereffi et al., 2005). The prevalence of technology modularization helps automaker reduce geographical dependency, but a strong partnership between assemblers and first-tier suppliers is still developed in this industry. Since the mid-1980s, global suppliers have emerged through the acquisition of firms with complementary assets and geographies so as to resonate the globalization of assembly plants. As automakers set up final assembly plants in new locations and try to leverage common platforms over multiple products and in different markets, they request suppliers (normally first-tier ones) to offshore with them. This strategy causes a process known as the 'follow sourcing' of global suppliers (Humphrey, 2003; Humphrey and Schmitz, 2000; Sturgeon et al., 2008). The prevalence of just-in-time (JIT) system and lean production systems reinforces the imperative of follow sourcing because these systems require closer cooperation between assemblers and suppliers to main a quick

production beat with the least inventory (Hudson, 2002; Imai, 1997; Lung et al., 2004; Sturgeon and Lester, 2004b). Therefore, an imperative of the regionalization of production networks is developed which gives rise to opportunities for local firms (in latecomer regions) to participate in. The formation of regional production networks provides a large number of channels for knowledge spillover whereby local firms can learn knowledge about entire production systems instead of a single processing segment.

8.2.2 Knowledge sharing: when automakers meet state intervention

Figure 8.1 Structure of the automotive global production network



Source: Figure 1 in Sturgeon et al. (2008:304).

The tendencies above constitute the complex economic geographies of the automotive industry. The automotive GPNs tend to be organized regionally and nationally with bulky final assembly plants. Lead firms in these GPNs are often surrounded by a large number of part/model-specific suppliers to ensure timely delivery (e.g. engines, transmission and seats). Lighter/generic parts are produced at a distance to take advantage of scale economies and lower production costs (e.g. batteries and tiers). These regionalized production networks are

not isolating within the region, but interconnected through various global pipelines in a nested and non-linear structure (see Figure 8.1).

Technologies of assembly and auto-part manufacturing tend to be entrenched within these regionalized networks, but are exclusive to outsiders particularly among the networks constructed by Japanese automakers (Ahmadjian and Lincoln, 2001; Cusumano, 1985). Although local firms have been plugged into GPNs, they are often marginalized outside the core of the networks and only achieve some trivial upgrading in processing less-sophisticated components (Freyssenet and Lung, 2000; Kotabe et al., 2003; Sturgeon and Florida, 2004). How can local firms identify a better position within these networks? According to the industrial governance literature, opportunities are limited due to the overwhelming governance power of lead firms (automaker and their key suppliers). The governance power of automakers mainly derives from three sources: (1) technological capabilities in parameter-setting with high asset specificity; (2) capabilities in systematic integration and coordination (3) regulatory advantages based on industrial standardization (Frigant and Layan, 2009; Humphrey and Schmitz, 2000; Schmitz, 2007; Sturgeon and Biesebroeck, 2011; Sturgeon et al., 2008). Local firms would meet extremely hard difficulties in bridging technological gaps if they do not heavily invest in improving technological competence. Moreover, technological lock-in will be developed due to high asset specificity. Local firms face heavy transaction costs if they switch over the partnership. This problem hinders them to look for new upgrading opportunities.

In this predicament of local upgrading, recent geographical studies have offered an alternative view that state intervention can serve as a crucial political force in leveraging the

governance power of automakers. Supported by this state intervention, many latecomer firms are able to plug into the automotive GPNs without the necessity of fully developing their technological capabilities (Barnes and Kaplinsky, 2007; Liu and Dicken, 2006; Pavlínek, 2003). Specific to the automotive industry, latecomer economies may raise the barriers of market access and tariffs and bargain with lead firms for a better partnership, such as more knowledge sharing or additional technological assistances. To achieve this partnership, latecomer economies must possess sufficient scarce assets that attract the interests of lead firms to accept the deal. The more scarce assets do latecomer firms possess, the more bargaining power will they have (see Chapter 3).

While the importance and effectiveness of state intervention is a key to understand contemporary dynamics in the automotive industry, there are two unclear issues needed to be examined. First, how will lead firms respond to these state interventions? This question is critical because their response will determine the content and extent of knowledge sharing which have a strong influence to local upgrading. Second, how can local firms implement functional upgrading without raising tension to their foreign partners? This issue is crucial because it ensures the stability of coupling partnership. It should be noted that there are dark sides of state interventions, such as protectionism, industrial discriminations, and inefficient investment (Huang, 2002; Lin, 1999; Pack and Saggi, 2006). There are failures cases of state interventions in promoting the automotive industry, such as Indonesia and Malaysia (Harwit, 1995; Humphrey and Memodovic, 2003; Liu and Yeung, 2008).

Taking these two issues into account, this study argues that local upgrading in the automotive industry is subject to the balance of power relations between latecomer economies

(firms and states) and lead firms in reciprocal coupling, rather than merely a matter of state power or firm power. With a balanced power relation, synergy will be developed to foster knowledge diffusion and reproduction within the partnership. Synergy within reciprocal coupling is more than mutual interests (such as synergy mentioned in Chapter 6 and 7), but is also related to the committed benefits between actors who exchange possessed assets respectively. However, if state power overrides lead firms' power, lead firms would adopt a short-term strategy as a response. They may deliberately block knowledge diffusion and become resistant to further cooperation. If local upgrading incurs tension and local firms fail to lower the tension, lead-firm partners would also constrain knowledge sharing to defend their positions. If tension lasts overtime and local upgrading fails, decoupling will happen. The concept of 'obligated embeddedness' is insufficient to explain this tension, because the literal meaning of it tends to privilege the influence of state power at the expense of lead firms. This study thus prefers the concept of *reciprocal coupling* to describe the pattern of integration, as it emphasizes the balance of interactions between firms and non-firms actors.

8.2.3 Formation of reciprocal coupling in China's automotive industry

In China, reciprocal coupling happens in the way that automakers comply with specific regulatory criteria set by China's central government as an exchange to get access to domestic market. The criteria include ownership structures, local content and technological agreements. Meanwhile, Chinese partners accept the requirements of corporate governance, supply chain management proposed by automakers. The formation of reciprocal coupling in China reflects how domestic firms are assisted by state institutions to avoid being captive to global automakers.

From 1958 to 1984, China pursued indigenous innovation for developing domestic automotive industry due to political reasons. But technological gaps between China and the global automotive industry was enlarged during this period. Japan and Korea had grown up sharply through coupling with global lead firms since 1960s (Dyer and Chu, 2003; Kim, 1998; Liang et al., 2010; Liu and Deng, 2003). China's domestic automotive industry was seriously lagging behind.

Reciprocal coupling was developed around 1984 when China decided to restructure the domestic automotive industry and cooperated with global automakers. Preparing for the coupling, the central government merged SOEs among different provinces into a pillar group[2] for increasing the capability of a single SOE. A directive of the *State Guidance of Car Price and Product* was then established in 1984. Under the directive, joint ventures were encouraged between SOEs and global automakers. All product ranges and vehicle prices were governed and allocated by the central government (Jiang, 1999). The directive was revised into an industrial policy in 1994 (NDRCSC, 1994; see table 8.1). Three specific criteria were consolidated for fostering knowledge transfer and local upgrading. First, to avoid monopoly and ensure competition, all automakers had to establish joint ventures with Chinese SOEs, but were only allowed to couple with two SOEs maximally. Second, all SOEs must have an equity share not less than 50% in joint ventures. Minimal local content of production was 40% with a tariff rate of 30% on components. Third, all joint ventures were encouraged to establish R&D centers funded by the central government.

[2] In1988, the central government designated six SOEs as the 'Three Big & Three Small' group. Projects beyond these groups generally would not be approved. They are FAW, Second Auto Work (renamed as Dongfeng in 1990) and Shanghai Auto Work; the three small are: Beijing Auto Work, Tianjin Xiali Corporation and Guangzhou-Peugeot joint venture.

Table 8.1 Key criteria of the automotive industrial policy in 1994

Criteria	Contents
Market entry requirement	· FIEs are allowed to develop set up maximally two joint ventures with a designated Chinese partner. · With a few exceptions, Chinese partners will be one of the pillar enterprises in the 'Three Big & Three Small' group*, and will own no less than 50% of equity share.
Localization requirement	· minimal local content of production is 40%, while tariff rates on components are subject to the level of local content (ranging from 50% to 20%); · Introducing a new car model or an engine project must meet the minimal volume of vehicle production (ranging from 10,000 to 200,000); car models invented before 1990 are not allowed to be introduced; · the SKD or CKD patterns of component production are disallowed.
Local R&D requirement	· R&D activities are encouraged with preferential financing policies in bank loan, treasury capitalization and stock funding; minimal R&D expenditure is required when applying national subsidizes for upgrading; all joint venture must establish at least one R&D center in due call.

Notes: The group of pillar enterprises was subsequently extended into a three-layer system comprising 2-3 core auto groups, 6-7 second-tier auto assemblers and 8-10 motorbike makers. SKD: semi-completely knock down; CKD: completely knock down.

Source: NDRDSC, 1994.

The overall strategy of the 1994 policy was to 'exchange domestic market with foreign technologies' in which the domestic automotive industry was protected as an infant industry (Lu and Feng, 2005; Wang, 2003). As a response, foreign automakers invested 50% of equity stake which was the same as Chinese partners so as to ensure full access to managerial rights in the joint ventures. Meanwhile, as requested, foreign firms were allowed to establish wholly own suppliers. A reciprocal partnership was thus generated, as commented by a director of Guangzhou Automotive Research Institute:

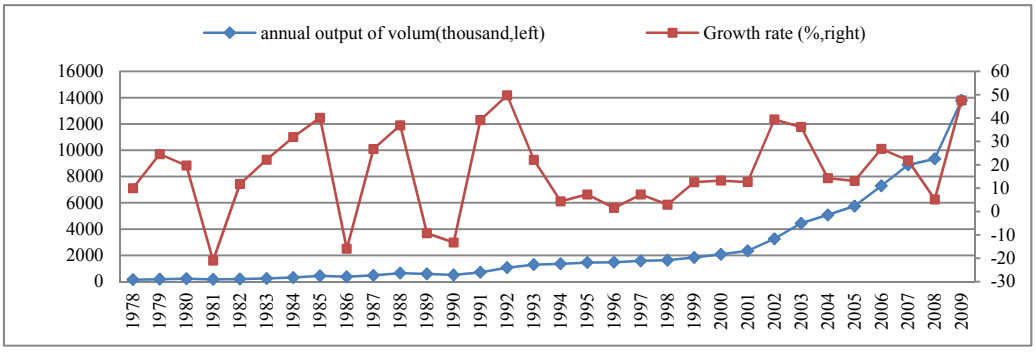
> The policy was welcomed at that time. In the beginning of 1990s, key automakers have noticed the potential of China markets due to its significant growth, and particularly, the previous succeed of the Shanghai-VW joint venture. Moreover, China also had abundant cheap labor. That was crucial to all big automakers when North America and Europe markets were increasingly saturated… On the issue of technological transfers, automakers were not worried about so much because localized production systems were fully under their control (Interview 100519, on 19th May 2010 in Guangzhou).

Reciprocal coupling was reinforced through further liberalization after the accession of China into the WTO in 2001. The state guidance of price and product control was abolished. The restriction of tariffs and import quota was tapping off gradually. In 2004, the 1994 industrial policy was revised for spurring more domestic upgrading with three key adjustments (NDRCSC, 2004). First, the joint ventures were required to develop new car models specific for the China market with a proprietary brand. SOEs in the pillar group must develop at least one proprietary-branded car model before 2010. This requirement directly spurred local functional upgrading in brand creation and model development (local R&D for developing new models). Second, after-sale and service markets were open to foreign firms. This strategy was meant for indirectly upgrading the marketing capabilities of SOEs by intensifying domestic competition. Third, to all firms, the average fuel consumption of vehicle must reduce 15% before 2010 and new car models with energy-saving or new-energy technologies were encouraged with less restriction. This requirement was for stimulating technological upgrading. These changes indicated that the strategy of coupling was gradually shifted from: ‘exchanging domestic markets with foreign technologies’ into ‘co-developing new technologies for domestic markets’.

This form of reciprocal coupling was proved to be effective in booming China’s industrial growth. Figure 8.2 shows that the growth of Chinese automotive industry has

accelerated since 1984, speeded up after 1994, and significantly soared after 2001. By 2010, 26 joint ventures were established which involved most of the global leading automakers (see Table 8.2). Meanwhile, due to market liberalization, automakers in China have increasingly faced fierce domestic competition. The existing provincial federalism intensified market competition because each SOE was embedded in their respective regional/provincial markets under certain local protection (Brandt and Thun, 2010; Li and Zhu, 2010; Liu and Yeung, 2008). The fierce competition can be reflected by Table 8.3 which presents that the China market was regionally fragmented in 2009. In terms of production volume, none of the joint ventures had a share more than 5%. None of the TNCs (owning more than one joint venture) accounted for more than 10%. This competitive pressure spurred the joint ventures to upgrade their product ranges and production efficiency so as to make more vehicles with a cheaper price and better quality. However, regional protectionism constrained SOEs to launch large-scale projects in vehicle model and platform innovation. In the PRD, Guangzhou Auto Industrial Group (GAIG) hardly received funds and investments from the central government and could only rely on limited supports from provincial and municipal governments (Li and Zhu, 2010; Liang et al., 2010).

Figure 8.2 Annual output of volume and growth rate in China's automotive industry



Sources: Li and Zhu (2008, 2010), NDRDSC (2008).

Table 8.2 Automotive joint ventures in China

Year of Entry	Name	Register capital ($ million)	Shares of Chinese partner%	location
1983	Beijing Jeep (Daimler-Chrysler)	605.21	50	Beijing
1984	SAIC - VW	335.4	50	Shanghai
1985	GAIG - PSA(Peugeot)	156	74	Guangzhou
1991	FAW - VW	1857	60	Changchun
1991	Jinbei - GM	230	50	Shenyang
1992	Dongfeng - PSA (Citroen)	1202	73	Wuhan
1992	Hainan-Mazda	80	75	Hainan
1993	Chang'an - Suzuki	190.85	51	Chongqing
1998	GAIG - Honda	139.76	50	Guangzhou
1998	Sichuan - Toyota	67	50	Chengdu
1999	Nanjing - Fiat	362	50	Nanjing
1999	Shanghai - GM	1521	50	Shanghai
2000	Dongfeng - Nissan	2000	50	Wuhan and Guangzhou
2000	Tianjin - Toyota	100	50	Tianjin
2001	Chang'an - Ford	98	50	Chongqing
2001	Dongfeng-PSA(Peugeot)	152	50	Wuhan
2002	Beijing - Hyundai	400	50	Beijing
2002	Huachen-BMW	110	50	Shenyang
2002	Dongfeng-Yueda - Kia (Hyundai)	90	50	Yancheng
2003	Dongfeng - Honda	98	50	Wuhan
2004	GAIG - Toyota	560	50	Guangzhou
2004	Jianghuai-Hyundai	780	50	Hefei
2006	Chang'an& Ford - Mazda	60	50	Chongqing
2009	Chery-Fiat-GAIG	182	50	Wuhu
2010	BYD-Daimler	100	50	Shenzhen
2011	Changan-PSA	80	50	Shenzhen

Note: the joint ventures only refer to passenger car.

Sources: Li and Zhu (2008), Yang (2010) and author's fieldwork.

Table 8.3 China's vehicle sales in 2009

Ranking	Name	Sale volume	Location	Region
1	Shanghai-VW	728	Shanghai	East
2	Shanghai-GM	708.4	Shanghai	East
3	FAW-VW	669.2	Changchun	North East
4	Beijing-Hyundai	570.3	Beijing	North
5	Dongfeng-Nissan	519	Guangdong	South
6	Chery	466.5	Tianjin	North
7	BYD	445.1	Guandong	South
8	FAW-Toyota	417.3	Sichuan	West
9	Guangzhou-Honda	365.6	Guangdong	South
10	Geely	329.1	Anhui	East
11	Chang'an-Ford-Mazda	316.1	Hainan	South
12	Shenlong-PSA	270	Hubei	Center
13	Dengfeng-Kia	241.4	Hubei	Center
14	Tianjin FAW	212.2	Tianjin	North
15	Dongfeng-Honda	210.6	Hubei	Center
16	Guangzhou-Toyota	209.6	Guangdong	South
17	Changcheng	155.2	Hebei	North
18	Chang'an-Suzuki	150.1	Chongqing	West
19	Huachen	134.7	Liaoning	North East
20	Jianghuai	123	Anhui	East

Notes: Unit = thousand vehicles; passenger vehicles only.

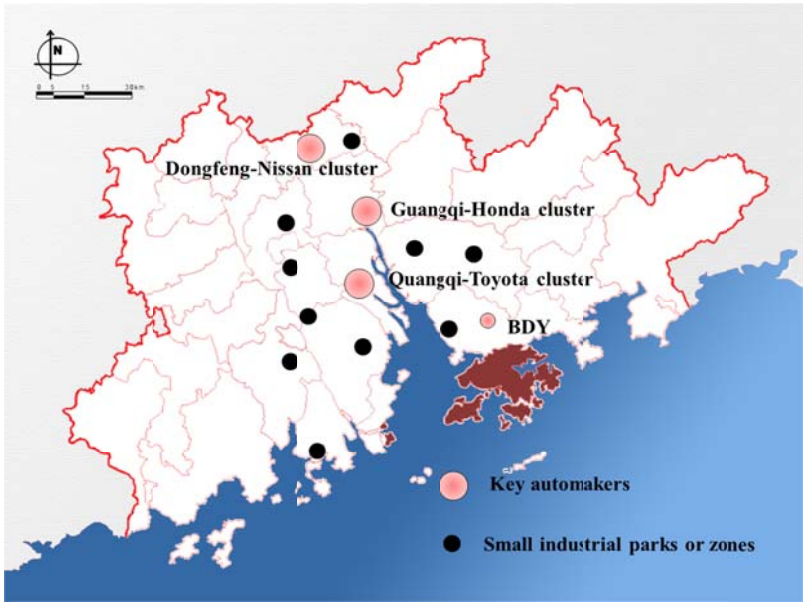
Source: Yang, 2010.

8.3 Industrial upgrading through reciprocal coupling: the changing fortunes of GAIG

The development of China's automotive industry has presented an upgrading trajectory in which the domestic market and industrial policies were used for developing reciprocal cooperation with global lead firms. The automotive industry in the PRD was involved because GAIG was selected in the national pillar group in 1984. The industry was initially developed in the mid-1980s based on the establishment of Guangzhou-Peugeot joint venture. Currently the PRD has become one of the largest manufacturing hubs of China comprising three joint

ventures located in Guangzhou: Dongfeng-Nissan, Guangqi-Honda, Guangqi-Toyota, plus a private enterprise - BDY in Shenzhen (see Figure 8.3).

Figure 8.3 Location of the automotive industrial clusters in the Pearl River Delta



Source: compiled by author.

This section aims to trace the formation of reciprocal coupling in the PRD's automotive industry. The key effort is to exemplify the critical role of synergy in fostering upgrading at both a firm level (in the joint ventures) and a regional level (local production networks of the joint ventures).

As discussed in Chapter 3, the relative bargaining power of actors involved mainly depends on the extent to which each possesses assets sought by the other party and the extent to which either party can control that access (Appleyard, 1996; Liu and Dicken, 2006). When local firms possess more assets, they tend to have more bargaining power. Within the joint ventures, the balance of power relations is reflected by a set of operational variables ranging from technological capabilities, equity participation, ownership structures, managerial structures, decision-making, profit sharing and risk sharing and so on (Killing, 1982; Lecraw,

1984).

This section does not go into analyzing these operational variables in great detail, but focuses on the general pattern of collaboration between Guangzhou SOEs and Japanese automakers. The common thread of the cases is that reciprocal coupling leads to substantial industrial growth, while not necessarily leads to significant upgrading subsequently. In the case of Guangzhou-Peugeot, coupling was formed under strong intervention of state institutions, but Guangzhou-Peugeot failed to achieve the balance of interplay due to an unequal equity structure, mismatched interests and contested responsive strategies. This problem generated high tension within the joint venture. As the local SOE failed to reconcile the tension, industrial upgrading was inhibited over times and eventually led to the failure of the joint venture. By learning from it, Guangqi-Honda devoted a great deal of efforts in maintaining the balance of power relations and developing synergy, such as keeping an equal equity/managerial structure, complying with the foreign partner's governance, fostering mutual interests in product development, and exploring new market niches to avoid competition in functional upgrading. These efforts lead to significant local upgrading at both the local and regional scales.

8.3.1 Rise and fall of Guangzhou-Peugeot

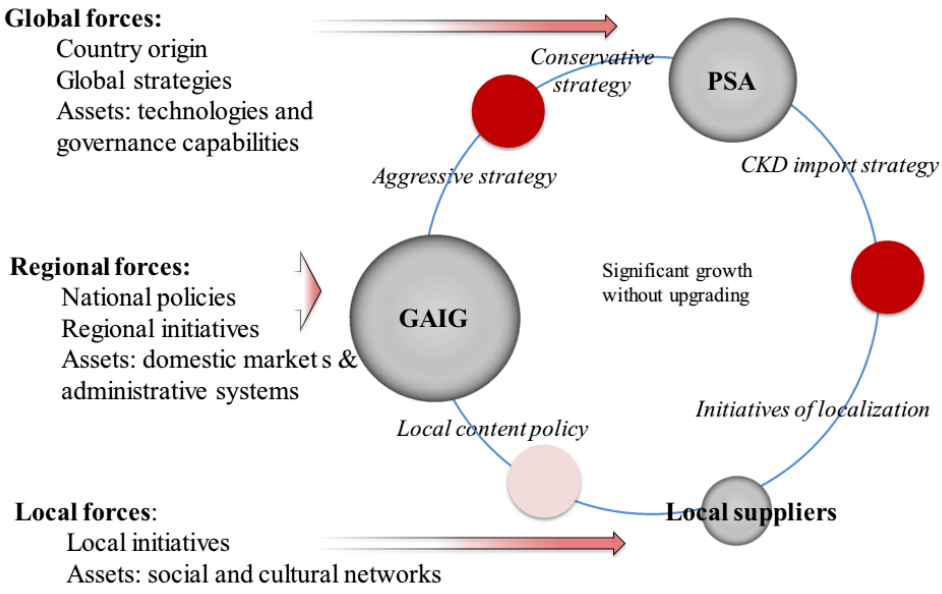
Similar to the electronics industry, the automotive industry in the PRD hardly had any industrial base in the early 1980s. After the opening reform in 1978, China's central government allowed Guangdong Province to establish a joint venture project with foreign firms. The motivation of the central government was to balance domestic regional inequality and improved industrial development in Southern China. As the provincial capital,

Guangzhou government grasped this opportunity and developed partnership between GAIG and Peugeot from the French PSA Group. Originally, the central government only allowed Guangzhou-Peugeot to manufacture light trucks for preventing direct competition with other key SOEs (e.g. First Auto Work, Dongfeng Group and Shanghai Auto Work). But provincial and municipal governments strongly requested the permission to manufacture passenger vehicles. This central-local mismatched interest was finally reconciled at the expense that Guangzhou-Peugeot needed to rely on self-finance without any additional support from the central government.

Strategic coupling between GAIG and PSA was formed with the establishment of a joint venture in 1984 (see Figure 8.4). At that time, the *State Guidance of Car Price and Product* only set up national criteria in ownership structure, the type of vehicle model and the volume of production. It had no criteria about technological sharing. The coupling of Guangzhou-Peugeot did not reach a reciprocal stage due to mismatched interests and imbalanced power relations. In the terms of capital investment, GAIG bore more responsibilities and risks. GAIG had to provide full investments in capital, infrastructures and facilities, while Peugeot invested in the forms of technological licensing and training. In terms of technologies, the gap between two partners was quite huge. GAIG had little industrial base and there were no regional supply networks. Local SOEs in the automotive industry hardly had experience in organizing modern production systems. Having concerned about these conditions, Peugeot decided to install two manual production lines in the joint venture, though automation production lines had been prevalent in Peugeot's production networks. Moreover, Peugeot insisted on introducing the 505 car model which was going to exit the Euro market at

that time. Base on Peugeot's strategy, GAIG was situated in a disadvantaged position with limited power in production management and product development. Under the pressure of self-finance, GAIG insisted on holding a major share so as to defend its governance power. As a result, Chinese partners occupied a larger equity share of 74%[3], while the share of French partners was just 26%.

Figure 8.4 Reciprocal coupling of Guangzhou-Peugeot joint venture



Source: compiled by author.

Tension was generated within the partnership under asymmetrical power relations and mismatched interests. The highly asymmetrical ownership structure disappointed Peugeot which in turn took a conservative and short-term strategy as a response. This strategy caused serious tension that inhibited the upgrading of product models and local production network. On the one hand, Peugeot refused to construct local supply networks and implemented the CKD (complete knock-down) strategy in component procurement. This strategy was meant for offsetting its disadvantage position in equity structure. Because all components were then

[3] In equity share, Chinese partners held 46% from the GAIG, 20% from the Citic Auto China, and 8% from China International Finance Ltd. French partners held 22% from PSA-Peugeot and 4% from Paris Banque Nationale.

purchased from and distributed by a designated trader which was virtually a subsidiary of the PSA Group, PSA reaped huge profits from the component procurement of the joint venture. Apart from the CKD strategy, Peugeot denied GAIG's suggestion and postponed introducing new car model, the 405 series, as a reservation for further renegotiation. GAIG was highly disappointed but had little power to bargain with Peugeot due to its weak indigenous capabilities. The disappointment further reinforced tension because GAIG decided not to reduce its equity shares in the joint venture. Tension was also raised among the workforce of Guangzhou-Peugeot. Chinese workers considered themselves as the major party and should own larger decision-making power. However, the French managerial teams were fully in charge of production management in the joint venture which made workers in production lines quite unhappy. Labor and managerial disputes happened now and then. In a word, tension was generated but both party of the joint venture did not reconcile it. This problem was told by the chief of technology division of Guangqi-Honda:

> GAIG looked like a provider of capital and Peugeot was a technology provider. This kind of cooperation was not good, because there was a lack of harmony. Whatever Guangzhou-Peugeot was profitable or not, they [Peugeot] were earning profits [from the components]. I may exaggerate the situation, but they did seem to get nothing to lose in the joint venture…Surely there were other reasons that led to our failures, but I think this problem [synergy] was one of the keys. We were both too short-sight (Interview 100526, on 26 May 2011 in Guangzhou).

Due to the tension, reciprocal coupling was not truly developed in Guangzhou-Peugeot. Coupling did lead to the significant industrial growth of Guangzhou-Peugeot, but industrial upgrading was not accompanied. From 1985 to 1994, the annual production volume of Guangzhou-Peugeot increased from 5,000 to 25,000. Before 1990, Peugeot 505 model was highly welcomed by Chinese consumers due to increasing domestic demands and lacking of

competitors in the domestic passenger-vehicle market. But after that, the 505 model gradually lost market shares and was beaten by Santana from VW. In 1995, Guangzhou-Peugeot suffered from over inventory with an amount over 8,000 vehicles in warehouses. This problem put the joint venture in debt seriously.[4]

The 505 model was losing competitiveness due to two reasons. First, without product upgrading, VW's Santana series turned out to be a better option for Chinese consumers, because it had better performance at a lower price. Second, without upgrading production systems, the 505 model met a bottle neck of cost reduction. The CKD strategy and manual production lines put the 505 model at bay. Tariffs imposing on components made the 505 model had a much higher production cost than Santana. The later one was using locally manufactured components and assembled by automated production lines.

When the market share of the 505 model declined sharply, after rounds of renegotiation, PSA decided to introduce the 405 series to take back the market lost. However, Guangzhou-Peugeot had missed the window of industrial opportunity due to changing institutional environment. According to the new industrial policy in 1994, the 405 series could only be introduced by satisfying two requirements: (1) the production volume of the 505 model must reach 30,000; (2) the local content of the 505 model must reach 40%. Regarding to the problem of over inventory and the CKD strategy, it was an impossible mission for Guangzhou-Peugeot to achieve these requirements within a short time. In 1997, Guangzhou-Peugeot collapsed with the divestment of the French PSA Group. The entire joint venture was sold to Honda at a price of one *franc*.

[4] Source: Interview with the former vice president of Guangzhou Seat Factory of GAIG, on 19th July 2010 in Guangzhou.

There were many problems leading to the failure of Guangzhou-Peugeot, such as the wrong market strategy of PSA or the weak capability of GAIG, but the lack of synergy within Guangzhou-Peugeot should be the key. Although reciprocal coupling was developed, the partnership was not truly reciprocal. PSA held a conservative and short-term strategy due to its disadvantaged position in the equity share. GAIA did not have sufficient competence to conduct product and functional upgrading on its own efforts. Both parties did not devote positive efforts to lower tension. Therefore, local upgrading was impeded and the joint venture failed when market and institutional environment changed.

8.3.2 Resurgence through the success of Guangqi-Honda

Guangqi-Honda was established between GAIG and Honda in 1997 to replace Peugeot. In 2004, GAIG established another joint venture with Toyota in 2004 as Guangqi-Toyota. These two joint ventures are both manufacturing passenger vehicles. In 2005, GAIG was restructured into Guangzhou Auto Ltd. Co. (GAC).[5] By learning from Guangzhou-Peugeot, GAC devoted a great deal of efforts in fostering the balance of the interplay for nurturing synergy. Guangqi-Honda currently has grown into one of the best joint ventures in China's automotive industry (Li and Zhu, 2010). The decoupling of Guangzhou-Peugeot did not have much negative impacts to the newly recoupling between GAC and Honda. The sunk costs and institutional burdens of Guangzhou-Peugeot were low because Peugeot did not invested a lot in constructing local supply networks. It just installed two manual production lines in the joint venture which had already been obsoleted in the mid-1990s. Therefore the problem of

[5] GAC also established another two joint ventures: Guangqi-Hino in 2007 in Guangzhou making commercial vehicles; Guangqi-Fiat in 2009 located in Changsha (Hunan Province) manufacturing passenger vehicles and engines.

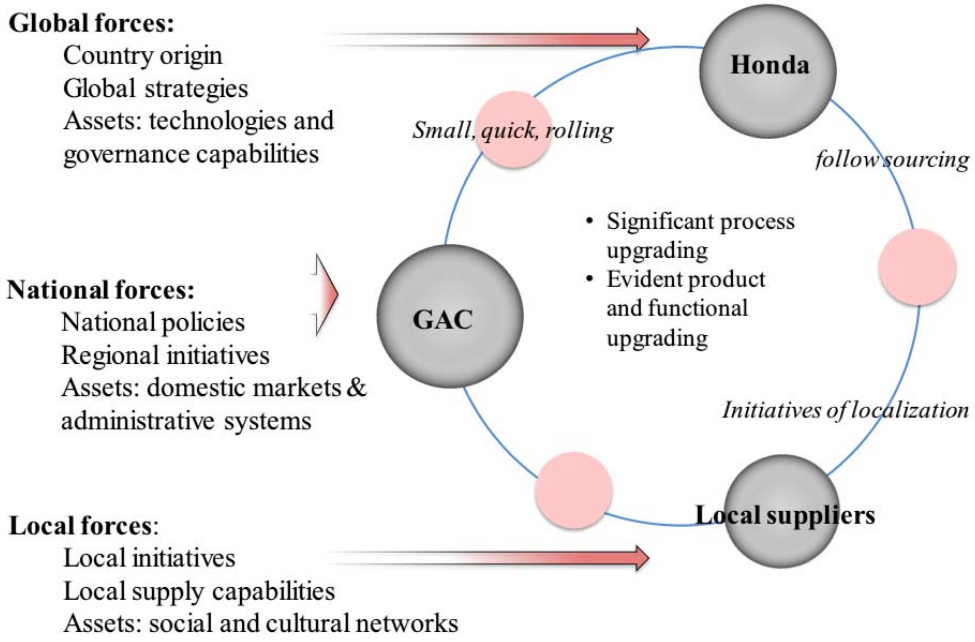
technological or institutional lock-in also did not appear. GAC was also willing to refresh its knowledge base with the up-to-date advanced technologies from its new partner – Honda.

Fostering synergy

The reciprocal coupling of Guangqi-Honda is shown in Figure 8.5 in which more balanced power relations are formed compared with the ones in Guangzhou-Peugeot. Grounded in the new national industrial policy and the imperative of upgrading from provincial governments, GAC strongly demanded three elements of the new partner that was selected to replace Peugeot. First, the new joint venture must develop local supply networks to meet the national criteria of local content (40%). Second, the new partner must gradually introduce new vehicle models that were synchronizing with global markets (particularly the Europe and the US markets). Third, co-development and innovation was compulsory in the new joint venture. These strong initiatives were reflected by comments from the division chief of the production department of Guangqi-Honda:

> The most important lesson of Guangzhou-Peugeot was that we must construct local supply networks to take advantage of low production cost here. Otherwise, we cannot reduce production costs as much as our competitors do in China. Meanwhile, we need to introduce the best models, because other competitors in China market were doing so. Moreover, co-development was very important because it was a foundation of long-term prosperity and we never want to repeat our failure with Peugeot again (Interview 100526, on 26 May 2010 in Guangzhou).

Figure 8.5 Reciprocal coupling of Guangqi-Honda joint venture



Source: compiled by author.

GAC was able to bargain for these requirements by possessing two regional assets: (1) the national industrial policy in 1994 (see Table 8.1); (2) a huge regional market in South China that had not been saturated and the only assembly plant (Guangzhou-Peugeot) had just quitted. There was a niche of the scale of GAC. It was just a new and small SOE without heavy institutional and labor burden. These reasons made GAC an interesting partner to 11 global lead firms such as BMW, Mercedes-Benz, Opel, Fiat, Hyundai, Toyota and Honda. Honda was finally selected because it had the strongest initiative to cooperate with GAC and was willing to meet the demands of GAC. Compared with Honda, Toyota did not have such a strong initiative to cooperate with GAC, because it was simultaneously negotiating with Fist Auto Work (FAW). Toyota considered FAW as a much more promising Chinese partner than GAC at that time.

The initiatives of GAC were satisfied by the Japanese style of management in organizing GPNs. The JIT system has a strong imperative of localization and regionalization in

constructing *in situ* supply networks (Cusumano, 1985). Honda's lean production system is famous for its incremental upgrading on the basis of on-spot technological improvement known as *Gemba Kaizen* (Imai, 1987; Imai, 1997). More importantly, in contrast to PSA, Honda regarded China as an extremely important market. This attitude was embedded in Honda global marketing strategy. While Honda's global market shares were relatively small compared with other Japanese automakers at that time, Honda decided to use China market as a strategic resource to sustain its long-term competitiveness in the global market. The motivation of Honda was revealed by a Chinese director of Guangqi-Honda:

> Comparing with other global lead firms, Honda is a relatively late-comer in the global market. It was hard for Honda to compete in the US or Europe markets which have been largely occupied by giant automakers like GM, VW, Ford and even Toyota. But in the China market around 1997, there were a lot of opportunities for Honda to grasp, particular in South China market. Honda had ambition to win the China market against other gain automakers. Therefore, Honda took a very pro-active and friendly attitude during the negotiation with GAC and made it count (interview 21th May 2010 in Guangzhou).

Balancing power relations & the SFR strategy

The above matched interests serve as a fundamental force in nurturing a reciprocal relationship between GAC and Honda. Based on this relationship, GAC and Honda tried various efforts to ensure a balanced power relation so as to foster product and process upgrading within the joint venture – Guangqi-Honda.

In order to avoid creating tension in ownership structure, GAC and Honda took up 50% of equity share respectively and invested the same amount of capital ($140 million) in Guangqi-Honda. In managerial structure, the managerial team was made of Chinese and Japanese evenly with certain labor division. At the top level, they were two general managers

representing two sides of the partnership. At the department level, Chinese directors were mainly in charge of marketing, human resource, administration and procurement. Japanese directors were in charge of production management and technical supports. In knowledge sharing, Honda's lean production system was fully replicated into the joint venture. Japanese engineering took up several key positions in operating the system, while Chinese workers were fully trained and constituted the majority of work force. The transplant of JIT system in North America had received strong local resistance from the existing Fordism system (Kenney and Florida, 1992; Kenney and Florida, 1994; Mair et al., 1988). However, the installation of JIT system in Guangzhou did not meet such resistance, because it was welcomed by provincial/urban governments and manufacturing workers who were desire to manipulate modern technologies.

In product development, Guqnagqi-Honda Automotive Research Institute (GHARI) was set up in which Honda was responsible for basic R&D and engineering designs and GAC was in charge of product localization and body designs. In order to avoid tension in technological leakage, GHARI is wholly owned by Guangqi-Honda in which technological introduction and transfer is coordinated and supervised upon the satisfaction of both parties. GHARI was also the first R&D institute set up by joint ventures in China at that time. Intensive knowledge sharing was led by Honda for reducing technological gaps between GAC and Honda. But in marketing, the situation was reversed. GAC played an active role and Honda worked closely with GAC's experts for understanding the China market, collecting information, and constructing distribution channels. Based on this collective endeavor, Guangqi-Honda managed to introduce competitive vehicle models to China almost every year from 2002 to

2010 (see Table 8.4). These models were quite welcomed and Guangqi-Honda's market share increased from 5% in 2000 to 14% in 2009. Guangqi-Honda sold about 3.5 million units of vehicles in 2009 (Li and Zhu, 2010: 86).

Table 8.4 Product introduction of Guangqi-Honda

Years	**Products**	**Type**	**Prices**(thousand*yuan*)
1998	Accord 6	Middle	250-350
2002	Odyssey 2	MPV	230-290
2003	Accord 7	Middle	230-350
2004	Fit	Economic	90-130
2005	Odessy 3	MPV	230-290
2006	City	Economic	100-150
2007	Accord 8	Middle	200-330
2008	Everus	SUV concept car	
2009	Odessey 4	MPV	230-290
2010	Crosstour	High	400-430
2011	Everus	Economic	70-100

Note: Honda's SUV series is allocated in Dongfeng-Honda in Wuhan, the geographical center of China.

Sources: author's survey and the official website of GAC, at: http://www.ghac.cn/.

Honda enforced a specific strategy to ensure sustainable market and product development. The strategy comprised three principals: *small input, fast output, and rolling development* (SFR strategy). *Small input* meant that the development of Guangqi-Honda fully depended on the initial investment. No additional loan was allowed. *Fast output* was meant for making investment cycles as short as possible. Starting with a small volume (10 thousand vehicles) of production with one production line, Guangqi-Honda was able to recovery the initial investments, and then further invested in new production lines and facilities with the accumulated profits. In doing so, *rolling development* was accomplished in the sense that all accumulated profits were invested for follow-up development.

The underlined motivation of the SFR strategy was to prevent the joint venture being

driven by ambitious local authorities which tended focus on extending the scale of production. Guangzhou and Guangdong governments did try to offer more investments and persuaded Guangqi-Honda to speed up the extension of its production scale more quickly. But all attempts were declined according to the SFR strategy. In 2010, GZ-Honda extended its annual production volume from 360, 000 to 480,000. All the current assets (0.9 billion *yuan*) came from self-accumulation.[6] In short, this SFR strategy ensured the independence of the joint venture which reinforced synergy and maintained the stability of reciprocal coupling.

Within such reciprocal coupling, Guangqi-Honda has achieved product, process and functional upgrading to a significant degree. In *product upgrading*, Guangqi-Honda totally introduced 11 vehicles models to the China market (see Table 8.4). Although most of these models were innovated and transferred from Honda's GPNs elsewhere, the arrival of them significantly helped GAC absorb Honda's advanced skills including product designs, model development, and the processing technologies of the introduced models. These technologies were also transferred to GHARI for conducting product localization and developing new models. Moreover, the introduction of these vehicle models fostered regional supply networks in which Chinese suppliers were trained to manufacture more sophisticated auto parts, thus achieving product upgrading regularly.

The progress of *process upgrading* is indicated by the improvement of the lean production system, PPM rate[7], JIT delivery and cycle time. These efforts made Guangqi-Honda as one of the best assembly plants in Honda's GPNs. On the basis of *Gemba Kaizen*, Honda paid a lot of efforts in training Chinese workers in the ways of regular training

[6] http://auto.ifeng.com/roll/20100601/328185.shtml
[7] It refers to the number of disqualified part per million. For instance, 100 ppm means there are 100 disqualified products among 1 million manufactured products.

courses, annual study groups, and overseas specialized training sections and so on. Hundreds of Chinese workers were trained every year for manipulating the lean production system. In this way, Guangqi-Honda kept having high performance in PPM rate among its peers. In 1999, when the normal PPM rate in China was about 1,500 to 3,000, Guangqi-Honda had managed to keep a three-digit PPM rate. By 2003, when introducing the Accord 7 to China, Guangqi-Honda had maintained the PPM rate within a two-digit level which was the average level in Honda's GPNs. In 2010 when introducing the first luxury vehicle model (Crosstour) to China, Guangqi-Honda amazingly reached a top-level record in its GPNs by maintaining the PPM rate at 12. This standard was also enforced among regional supply networks in the PRD while suppliers were allowed to have a lower criterion of PPM rate (12 ~ 20).

Apart from improvement in the PPM rate, the JIT system was also gradually upgraded. Guangqi-Honda initially set up its standard inventory at 15 days. The standard was subsequently reduced into 10 days in 2001, 5 days in 2006 and recently 1.5 days in 2010. Meanwhile the cycle time of assembling a single vehicle was reduced from about 65 seconds in 1998 to 53 seconds in 2005. In 2010, the cycle time was improved to 49.3 seconds, hitting the top record among all assembly plants of Honda.[8] From 1998 to 2010, production lines in Guangqi-Honda were significantly renovated at least four times and upgraded from single-line production to mixed-lines production.[9]

Functional upgrading was also fulfilled through the efforts of GHARI in developing a new vehicle mode. In 2008, GHARI innovated with the Everus series which was specific for the China markets. In order to avoid tension between the joint venture and the Honda Group,

[8] Data are from interview with the director of sourcing department of Guangqi-Honda on 21th May 2010 in Guangzhou.

[9] Mixed line production: manufacturing different vehicles in the same production line.

Everus was set as an appropriate brand under Guangqi-Honda which did not belong to the Honda Group (see Table 8.4). The Everus series had three indigenously-developed models by 2010. Combined with Japanese and Chinese technologies, the creation of the Everus is a win-win deal of functional upgrading for both GAC and Honda. To GAC, it identified a new market niche and released the economic and political pressures of GZ-Honda. This point is reflected as the quotation below:

> GZ-Honda was getting near to a bottleneck of cost reduction, since the average of local content of GZ-Honda's product was about 85% now. We also faced the task of creating new proprietary brands. Therefore, innovating new product was the best solution for both of us. That was why we convinced Honda to innovate new vehicles with us. (Zhang Fangyou, President of GAC, interview by the magazine of *Automan* on 20th, May, 200810)

To Honda, it was the 'best solution' because the joint venture could adopt more local-made auto parts without necessity of revising or complying with Honda's global standards. The brand creation of Everus was a way of lowering tension between GAC and Honda. Putting Everus within Honda's brand range would take a long and complicated procedure to get approval from the Honda Group. GAC was also unwilling to do so because it had great contributions in the innovation of Everus. Similarly, Honda did not allow Everus to be wholly owned by GAC.

In order to prevent technological leakage in developing Everus, Japanese partners took charge of platform development, modularization and systematic engineering, while Chinese partners were responsible for marketing research, body design and external trimming. Although GAC did not play a dominant role in this process, GAC's engineers benefited from

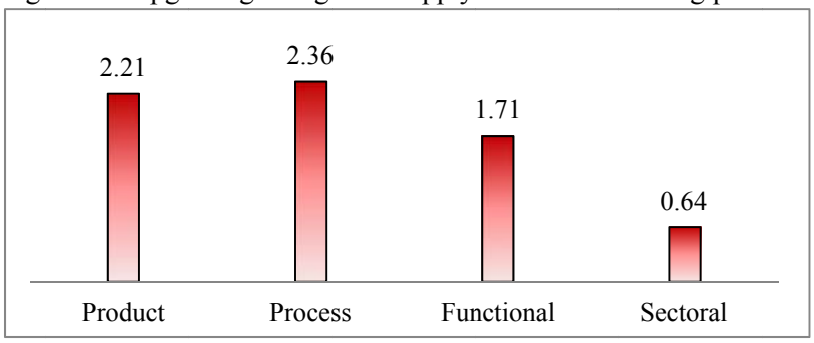
[10] http://www.cb-h.com/news/qcr/2008/520/0852010584C006K71C200JK7993FCC.html

participation observation, learning by doing and knowledge spillover from Honda. GAC finally developed a sufficient group of talents for establishing a proprietary brand two years later (see sub-section 8.3.3). Guangqi-Toyota was established in 2004 and generally went through a similar trajectory with Guangqi-Honda.

8.3.3 Industrial upgrading in regional supply networks and GAC

The above elaborations show the importance of synergy and balanced power relations in maintaining reciprocal coupling and fostering industrial upgrading in the joint ventures. A further question is whether local Chinese suppliers and GAC have also achieved upgrading. Drawing on my interviews with 14 automotive firms in Guangqi-Honda regional production network, this study finds that industrial upgrading among the supply network has been occurring. As shown in Figure 8.6, process upgrading was the most significant among all types of upgrading, which achieved a value of 2.36. Product upgrading was following with a value of 2.21. The extent of functional upgrading was moderate with a value of 1.71. The evident product and process upgrading is driven by the supply network management conducted by Guangqi-Honda which is known as the ‘single-point supply’ (SPS) strategy. Because local R&D activities are encouraged, functional upgrading is achieved to a certain degree. Sectoral upgrading is rather insignificant because these suppliers are specialized in manufacturing certain components and hardly intend to move to a new sector.

Figure 8.6 Upgrading in regional supply networks of Guangqi-Honda



Notes: informants were requested to evaluate the extent of upgrading in four types. A value ranged from absent (0) to very high (3) was attributed. The result was averaged.

Source: author's survey on 14 suppliers of Guangqi-Honda.

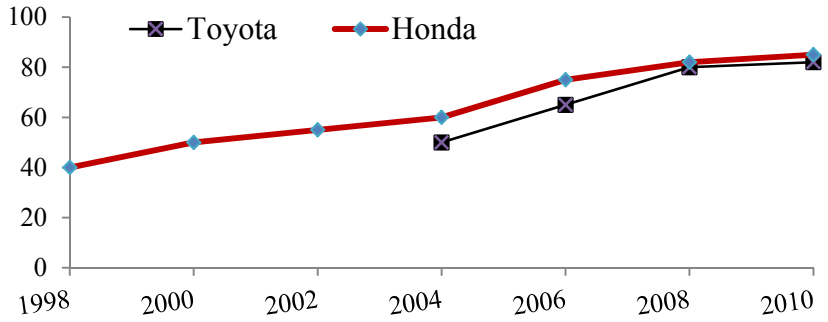
Upgrading in regional production networks

On the basis of the SPS strategy, Honda subcontracts one single component to one supplier for one specific vehicle model. Unless any serious financial or trust failure of the supplier happens, Honda will not change the supplier. Toyota has a similar strategy in its supply networks, but Dongfeng-Nissan tends to maintain 2 to 3 regular suppliers for one single component. Qualified local firms which become first-tier suppliers will receive continuous technological assistance from Honda. Following Honda's standards, the first-tier suppliers will assist the second-tier suppliers in a similar way. Local suppliers are willing to comply with this governance pattern as they can receive up-to-date technological assistances from Honda.

This SPS strategy works as a crucial impetus that nurturing synergy and upgrading among Guangqi-Honda's regional supply networks. This strategy not only comes from Honda's imperative of cost reduction, but also derives from the necessity of maintaining the 'just-in-time' system and the lean production system. When Guangqi-Honda reduces the delivery days of inventory or the cycle time of vehicle assembly, it will have stronger demand

to the stability and punctuality of suppliers. Hence Guangqi-Honda has incentives to help suppliers upgrade their technological capabilities. Since 1998, about 40 local firms have been assisted and 'upgraded' into the first-tier suppliers of Guangqi-Honda and Guangqi-Toyota.[11] At least 3 to 4 hundreds of local firms were upgraded into the second or third-tier suppliers of the joint ventures. As a result, the joint ventures managed to achieve a high level of local content which helped them reduce production costs continuously. As showed in Figure 8.7, the level of local content of the joint ventures was much higher than the national criteria of 40%.

Figure 8.7 Local content of Guangqi-Honda and Guangqi-Toyota (%)



Source: author's fieldwork.

The high level of local content implies that Honda and Toyota did not isolate knowledge diffusion from its GPNs, but have devoted significant efforts in fostering a regional production network in the PRD. The increasing domestic competition has reinforced this localization tendency. This point can be reflected by the division chief of procurement department of Guangzhou-Toyota:

> Today [in China markets], the national requirement of 40% local content is meaningless, because if your local content is less than 60%, your cars cannot be sold out due to higher production costs. Though tariffs and import quotas are liberalizing,

[11] Interviewee in Guangqi-Toyota declined to offer this information.

> the tendency of localization is unstoppable since we have so many global leaders competing with us in China. The more localization of production, the cheaper the car will be (Interview 100601, on 1 June 2010 in Guangzhou).

When Honda and Toyota transplanted their suppliers to Guangzhou, GAC took advantage of the SPS strategy and established dozens of joint ventures with these transplanted suppliers, such as Guangzhou-JFE (auto body sheet), Guangqi-Toyota Engine, Guangzhou-Chuo Seik (wheel), Guangzhou-Showa (damper), Weigao-Stanley (electronic parts), Guangzhou-Mitsuba (magnetic motor), Guangzhou-TSK (car seat), and Guangzhou-NHK-UNI (spring) and so on. Meanwhile, some local firms quickly caught up and been upgraded into the first-tier supplier of Guangqi-Honda and Guangqi-Toyota, such as Haifeng Machinery and Zhongxin Plastic. Surprisingly, this strategy of joint-venturing key suppliers did not raised tension towards Honda, but was welcomed by Honda and its Japanese suppliers. Synergy of the establishment of these joint ventures was not underpinned by the national directive because it did allow the suppliers of auto-assembly plants to be fully foreign owned. However, Honda's suppliers would like establish joint ventures for saving start-up costs and more importantly reducing costs in labor managements. Within these joint ventures, labor departments and labor unions are normally supervised and governed by Chinese managerial teams which are considered to be more competent than Japanese managerial teams. Hence, apart from the factory of gear box and some other key components, many of the first-tier suppliers of Guangqi-Honda were joint ventures. The subsequent development proved the validity of this synergy because most of the labor strikes and disputes tended to happen in wholly foreign owned production plants, rather than joint ventures.[12]

[12] Information about labor strikes and disputes come from the interview with the division chief of the production department of Guangqi-Honda on 26 May 2010 in Guangzhou. But the actual figures and numbers were kept

Functional upgrading of GAC: integrated innovation

While upgrading occurred in regional supply network, GAC has achieved product and functional upgrading. GAC has constructed various linkages to absorb and transfer knowledge from the joint ventures to itself. In a formal manner, GAC sent a large number of study groups to the joint ventures annually for learning the operation of Honda's lead production system and the TPS (Toyota production system). Comprising about 10 to 15 technicians, each group was sent to different production segments for two weeks or one month. The groups were requested to develop at least one upgrading proposal for improving the efficiency of production system.[13] Informally, GAC rotated Chinese engineers between the two joint ventures and the subsidiaries of GAC. When GAC set up Guangzhou Automotive Engineering Research Institute (GAERI) in 2006, 80% of its technicians (about 300 people) originally worked in GZ-Honda and GZ-Toyota.[14] By absorbing knowledge for a decade, GAC implemented functional upgrading in 2010 by launching a proprietary brand termed as Trumpchi.

There was a critical challenge to GAC: how to achieve functional upgrading without creating tension to Guangqi-Honda and Guangqi-Toyota.[15] It would be no doubt that GAC has learned a lot from the joint ventures and the launch of appropriate-brand products will give rise to new competitions between GAC and the joint ventures. GAC must avoid any dispute about intellectual property rights involved in the product development of Trumpchi.

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confidential.

[13] Sources: two interviews with the vice directors of production department in the joint ventures in Guangzhou on 21 May, and 1 June 2010.

[14] From a public interview with the director of GAERI: http://auto.xinmin.cn/rollnews/2010/09/04/6649866.html

[15] There are various difficulties to approach to relevant data to this issue. Most of the information about the appropriate brand of GAC was kept as confidential.

GAC also had to avoid direct market competition between Trumpchi and Honda/Toyota's incumbent product ranges in the China market. In order to secure the synergy with Honda and Toyota, GAC adopted a strategy of *integrated innovation* by using non-Honda/Toyota technologies. The new model of Trumphchi resulted from a combination of multiple sources of technologies which were intensively revised through indigenous efforts. GAC licensed the platform technologies (e.g. decking and engine) of Alfa Romio 166 from Fiat Group and purchased gearbox technologies from Aisin. Nevertheless, GAC revised suspension system and engine so as to transfer the executive car (Alfa Romio 166) into a family sedan. Apart from these core technologies, GAC devoted great efforts in developing electronic systems, internal trim, external appearance and a new body design. All these efforts helped GAC avoid the potential disputes of intellectual property rights with Honda and Toyota. Moreover, in terms of market positioning, the price of Trumpchi was set between 120,000 and 190,000 *yuan*, whilst the major market segments of the joint ventures' products were either lower than 150,000 *yuan* or higher than 200,000 *yuan*. Hence, tension was reconciled to a significant degree because the market segment of Trumpchi bypassed the key markets of the joint ventures.

The strategy of integrated innovation did help GAC create the first own brand without harming reciprocal coupling in the joint ventures. But it should be noticed that the functional upgrading of GAC should not be overpraised, because there is not much innovation in the new model. Most of the key components and technologies were purchased or licensed from other firms. It means that GAC has not been innovative yet. In 2011, Trumpchi sold 18,000

vehicles merely accounting for about 0.1% of the domestic market sales.[16] The future of this brand is yet to be told.

To sum up this section, the comparative analysis between Guangzhou-Peugeot and Guangqi-Honda has demonstrated how important a balanced interplay in reciprocal coupling is. It nurtures synergy, ensures the sustainability of reciprocal coupling, and leads to various outcomes of industrial upgrading. The upgrading is not confined within the joint ventures, but is diffused in a broader regional production network in which local firms benefited indifferent ways.

8.4 Conclusion: the balance of interplay

As the last empirical chapter, this thesis here investigates into local upgrading in the automotive industry in the PRD which is driven by reciprocal coupling between global leading automakers and Chinese SOEs. This chapter finds that reciprocal coupling tends to occur in four conditions: strong national interventions, strong global governance imperatives, small market gap while large technological gap. It has shown that either corporate governance power or state power alone is insufficient to explain local upgrading in the automotive industry in China. This chapter affirms that possessing huge domestic markets is a crucial precondition of developing reciprocal coupling. It serves as a crucial regional asset for local firms to increase their bargaining power under state interventions. In this way, local firms would be able to leverage the governance power of lead firms. However, local firms should try to avoid overriding the power of lead firms.

[16] http://news.21cn.com/caiji/roll1/2012/01/14/10495276_4.shtml

This chapter argues that the formation of reciprocal coupling would bring in significant industrial growth, but does not guarantee that industrial upgrading will be accompanied. If the coupled parties fail to nurture synergy and reconcile tension, upgrading will be inhibited. Therefore, the balance of interplay becomes a crucial factor that produces synergy and nurtures industrial upgrading subsequently. It can be reflected by the relationships in equity structure, profit/technological sharing, mutual interests, responsive strategies, the status of tension and the power strength of each party. There is no fixed pattern or one-off solution to achieve the balance of interplay which virtually is a dynamic and mutually constituted process.

The investigation of two joint ventures in the PRD has verified the key argument of this chapter. The case of Guangzhou-Peugeot has demonstrated a negative example of reciprocal coupling in which industrial upgrading was hindered due to the lack of synergy, mismatched interests and unwelcome responsive strategies. Without local upgrading, reciprocal coupling failed when institutional and spatial conditions changed over time. In contrast, the case of Guangqi-Honda has illustrated a positive example in which reciprocal coupling is sustainable on the basis of balanced power relations and various efforts in maintaining the balance. The efforts of lowering tension within the joint ventures are proved to be crucial in fostering synergy and supporting the functional upgrading of GAC. All these efforts lead to significant upgrading at both local and regional levels. However, the achievements of upgrading should not be overstated. The functional upgrading of GAC is virtually a corner-cut strategy with limited content of indigenous innovation. The technological and marketing capabilities of local firms are still lagging behind global automakers seriously.

Chapter 9 Conclusion

To many developing regions, export-oriented industrialization has become a well-known strategy for promoting industrial growth. But whether local firms in these regions can catch up with TNCs is still in question. What is the scope for local strategies so that a latecomer region can be upgraded and improve its competiveness? This study has probed into industrial changes and dynamics in the PRD to look for the answer. This final chapter summarizes main findings in the beginning and then articulates key contributions which response to the GVC/GPN literature and development studies. In the third section, policy implications are discussed in relation to the key contributions accordingly. In the penultimate section, a reflexive assessment of this thesis is conducted for reflecting the accomplishments and limitations of this study. This reflection leads to an extended research agenda and some prospects towards the future of the PRD.

9.1 Strategic coupling and industrial upgrading in the PRD: summary of findings

The central focus of this thesis is how strategic coupling between latecomer regions and the global economy affects local industrial upgrading. My motivation derives from dissatisfaction with the contemporary literature of GVC and regional development in explaining industrial upgrading in the PRD. This thesis asks two critical questions: how do different ways of strategic coupling between local firms in the PRD and foreign firms in GPNs affect local upgrading? What do institutional and spatial conditions matter during the

process of local upgrading? The existing literature has yet to offer pertinent and cogent answers to these questions (Chapter 2).

In order to fill in the theoretical gaps, this thesis has conceptualized the relational features of industrial upgrading and developed a four-fold typology of strategic coupling as an explanatory variable to the dynamic outcomes of local upgrading. It includes *captive, cooperative, reciprocal* and *absorptive* coupling, referring to different patterns of the global integration of the PRD. The formation of strategic coupling is contingent on the configuration of knowledge gaps and power relations between local firms and foreign firms. However, this configuration is not static but evolutionary. This thesis advocates that local firms are critical actors in the nexus of firm-state-territory relations. They take advantage of institutional and spatial contexts by mobilizing various resources (assets) embedded in those contexts. In doing so, they manage to leverage the governance power of foreign firms and implement upgrading without harming synergy within strategic coupling.

Having addressed the research questions and conceptualization in Chapter 2 and 3, this thesis has examined the achievement of industrial upgrading and the evolution of strategic coupling in the PRD from 1978 to 2010, drawing upon multiple methods of intensive and extensive field research (Chapter 4). Table 9.1 summarizes the main findings of this study at a regional level (Chapter 5). Table 9.2 summarizes the variety of coupling and its consequences to upgrading in three industries (Chapters 6 to 8). The overall findings exemplify the causal relationship between strategic coupling and the dynamic outcomes of upgrading.

Table 9.1 Characteristics of industrial upgrading in the PRD: A summary

Category	**Features and main findings**
Before 1978	· Agricultural backwater · Limited industrial base
Formation of Captive coupling in the 1980s	· Global: seeking for low-cost producers, industrial relocations · National: marketization & export-oriented industrialization · Regional: liberalizing institutional environment · Local: power decentralization and local initiatives · Abundant labor and land resources · Captive to Hong Kong firms under export-processing manufacturing
Evolution of captive coupling during the 1990s and 2000s	· Articulating into global markets and directly trading with developed economies · Reducing dependency on Hong Kong · Reducing dependency on export-processing trades · Disintegration of the front store-back factory model · Rapid catching up of local private firms
Regional upgrading	· From component processing into full-package manufacturing / OEM · From a truncated processing base to a leading global manufacturing center supported by thousands of firms which form regional supply networks · Intensive upgrading in product ranges · Significant improvement in manufacturing capabilities, production efficiency and international competitiveness · Regional sectoral upgrading: moving into more value-added sectors · The rise of the automotive industry
Limitations of regional upgrading	· FIEs made up major contributions to the regional prosperity · FIEs have been playing a dominant role in both value creation and distribution · SOEs had the best efficiency, but totally lost influence in the regional economy · About 50% of foreign trades were still export-processing trades
Changing institutional and spatial conditions	· Local: increasing indigenous capabilities and inter-firm cooperation · Regional: growing body of regional supply networks and associational economies · National: the emergence of huge domestic markets · Global: increasing competitive dynamics in global production networks

Source: author's fieldwork.

Table 9.2 Variety of strategic coupling and the dynamics of local upgrading: A summary

Industries	**Features and mechanisms**	**Local strategies**
Captive coupling in the electronics industry	· Upgrading from a truncated processing base into a global manufacturing and assemble center · Evident product and process upgrading, while functional upgrading was limited; · High asymmetrical power relations with certain synergy · Absent of strong state supports and less significant associational economies; · Intensive localization of FIEs · FIE dominated industrial clusters/parks/districts · Local firms upgraded through being captive to FIEs	· Synthesizing the assets of domestic markets and supply networks: the case of Shunde · Identifying opportunities in GPNs: the case of CZC · Deepening captive coupling with more synergy: the case of Jingtuo
Cooperative coupling in the apparel industry	· Significant functional upgrading · Evident product and process upgrading · Upgrading into a global manufacturing hub and a domestic design and fashion center · Moderate power relations with various mutual interests · Absent of state supports · Helpful associational economies · Increasing outsourcing of foreign firms · Local firms took over the dominate role of FIEs	· Synthesizing domestic and global markets · Constructing local supply networks, embedded into regional learning platforms · Based on pro-active local states and wholesale economies: the case of Humen · Based on ethnic networks and local entrepreneurship: the case of Xintang
Reciprocal coupling in the automotive industry	· Significant product and process upgrading · Evident functional upgrading · A growing-up domestic auto assembling center · Strong state intervention and pro-active regional governments: exchanging markets with technologies · Joint ventures played a dominant role · Balanced power relations enhanced the reciprocity in the partnership	· Maintaining the balance of power relations and lowering tension within the joint ventures: the case of Guangqi-Honda · Integrated innovation as a corner-cut strategy: the case of GAC · Being quick followers: local suppliers

Source: author's fieldwork.

By tracing the post-reform industrial development in the PRD, this thesis has found that

the upgrading trajectory of the PRD cannot be explained by the developmental state literature, because a developmental state did not come to exist in the PRD. Instead, the region was merely mediated by China's central government under the strategies of market liberalization and export-oriented industrialization (Chapter 5). After three decades of rapid industrial growth, the PRD achieved substantial upgrading in terms of corporate performance, international competitiveness, regional industrial structure and functional improvement. The PRD has transformed from a truncated processing base into one of the leading global manufacturing centers composed of a large number of competitive firms located in dozens of industrial clusters/districts/parks (see Figure 6.2, Figure 7.7 and Figure 8.3).

Although some studies have praised the accomplishments of industrial growth in the PRD (Enright et al., 2005; Yeh et al., 2006; Yu and Zhang, 2009), the achievements of local upgrading were still blurred. This study has found that FIEs have been playing a dominant role in the output of IVA and exports throughout the past three decades, particularly in the electronics industry (Chapter 6). In a word, local upgrading is not as significant as regional upgrading (see Table 9.1).

This thesis has shown that the initial upgrading of the PRD was led by the pattern of captive coupling in which rapid product and process upgrading was realized by foreign investors (Chapter 5). Local firms were captive to foreign investors as low-end processers with littler power and space to achieve functional upgrading. This observation resonated with previous studies that advocated the important role of Hong Kong firms and the influence of market liberalization in the PRD (Li, 1997; Lin, 1997; Sit and Yang, 1997; Xu and Li, 1990; Yang and Sit, 1995).

Further investigations have revealed that the captive coupling has been evolving since the 1990s (see Table 9.1). A large amount of EPEs were replaced by FIEs and the front-store-back-factory model was disintegrated. Meanwhile, the PRD were directly articulated into global markets by trading with many developed countries. Patterns of foreign trades changed in which the portion of ordinary trade increased from 20% in 1990 to near 50% in 2009. In statistical terms, the key drivers of the regional economy have delineated a divergent trajectory. While FIEs still played a dominant role, local private firms have caught up with them quickly, particularly in the apparel industry (Chapter 7). SOEs totally lost influence at the regional scale, but highly consolidated in a few industries, such as the automotive industry which was strongly supported by the central government (Chapter 8). This is a valuable finding because previous studies tend to treat the PRD as a uniform entity without differentiating the influences of different types of firms. This thesis has also identified that private firms have already performed better than FIEs from Hong Kong and Taiwan after 2005. This critical finding articulates a different view in contrast to previous studies that keep emphasizing the powerful roles of Hong Kong and Taiwanese firms in the PRD (Liao and Chan, 2009; Yang and Liao, 2009; Yeh and Xu, 2006). All these trends imply that the PRD has been moving away from captive coupling formed since the 1990s. What types of coupling is the PRD evolving into? This study has argued that situation varied among different industries (see Table 9.2).

Chapter 6 investigated into the electronics industry which was the most important industry in the PRD in terms of industrial output and export value. It was too difficult for local firms to bridge technology and market gaps with FIEs. Hence, the PRD's local firms

tended to be further captive to FIEs as local suppliers (see the cases of Shijie town, Shilong town, and the industrial parks of Flextronics and Foxconn). Captive coupling was thus developed, persisted and reinforced. FIEs kept dominating industrial clusters and localizing their vertically integrated production systems in the PRD. This captive coupling yielded evident industrial upgrading but local firms were lagged behind FIEs to a significant degree (Table 6.3 and Table 9.2). Local firms grew up into small firms with higher efficiency under the shadow of FIEs. This observation agrees with the governance literature which asserts that local upgrading tends to be defined by FIEs (Bair and Gereffi, 2003; Humphrey and Schmitz, 2000, 2002b). However, drawing upon case studies, Chapter 6 has demonstrated that local upgrading strategies in the PRD's electronics industry are not as the GVC studies have predicted (e.g. launching joint action) or the development state literature has advocated (e.g. close firm-state relations and indigenous innovation). In contrast, local firms managed to leverage the control of FIEs by taking advantage of emerging regional assets and competitive dynamics in GPNs. In so doing, local firms increased their bargaining power, such as the home appliance firms in Shunde; or bypassed the control of foreign firms, such as CZC in Shenzhen; and also fostered more mutual interests with foreign firms to reduce the asymmetry of power relations, such as the cooperation between Jingtuo and Flextronics (Zhuhai). All these local strategies pointed to the potential formation of cooperative coupling in future. The overall findings in the electronics industry exemplify the first proposition of this thesis that: the deeper local firms become captive to TNCs, the faster will upgrading be facilitated (Chapter 3).

While local firms are still captive to foreign firms in the electronics industry, Chapter 7

has articulated how cooperative coupling has been developed in the apparel industry. Due to lower technological entry barriers, local firms in the apparel industry caught up with FIEs and eventually took over the role of FIEs (see Figure 7.3 and Figure 7.4). During this process, local firms moved away from captive coupling and developed cooperative coupling with foreign firms. In cooperative coupling, the PRD's apparel industry has upgraded into a global manufacturing hub and a domestic design and fashion center, rather than just a "world factory" full of sweat shops and low-skilled labor (see Table 7.1 and Table 9.2).

Further examinations of Chapter 7 have verified that the growing body of the domestic market, product-specific clusters and regional supply networks are important assets in local upgrading. The combination of these institutional-spatial contexts enabled the PRD to become a powerful player at the lower end of the apparel GPNs. The overall findings of this chapter exemplify the second proposition of this thesis that: in cooperative coupling, the more complementarity and mutual interests are developed, the higher is the potential of local upgrading (Chapter 3). This proposition could revise the prediction of the GVC literature which argues that local functional upgrading is less possible in the apparel industry (Frederick and Gereffi, 2011; Gereffi, 1999; Gereffi, 2002; Gereffi and Memedovic, 2003). The cases of industrial clusters in Humen and Xintang illustrate that local firms can synthesize various assets to achieve functional upgrading. Instead of challenging the power of global buyers, these local firms can develop further cooperation with global buyers for co-venturing the China market (see Table 9.2).

Assisted by some specific local institutions, such as wholesale markets, trade fairs and liberalizing environment, local firms did not meet great difficulties in decoupling with EPEs

and East Asian intermediate firms from Hong Kong and Taiwan. Currently, local apparel firms are improving their absorptive capacities by utilizing the regional innovation system and strengthening their design capabilities. There is great potential for local firms to developer absorptive coupling with global buyers in the apparel industry in future. However, recent industrial policy shifts have produced certain tension by attempting to relocate this industry out of the PRD. This action caused negative effects to regional production networks and local firms have mobilized corporate and collective power to bargain with the institutional power of governmental agencies for keeping their production networks in the PRD.

Drawing upon the automotive industry, Chapter 8 has addressed the question that how reciprocal coupling can be developed and retained overtime. In the PRD, the growth of this industry was highly related to the joint ventures between SOEs and global automakers which were established based on the national strategy of 'exchanging domestic markets with foreign technologies'. This chapter has verified that reciprocal coupling can be developed in four conditions: strong national interventions, strong global governance imperatives, a small market gap and a large technological gap. Previous studies have failed to explain the formation and mechanism of reciprocal coupling because they overlook influences from state institutions and regional assets where the industry was embedded (Humphrey and Memodovic, 2003; Sturgeon and Biesebroeck, 2011; Sturgeon et al., 2008). Examining two important joint ventures in the PRD's automotive industry, this thesis has argued that reciprocal coupling does not necessarily lead to local upgrading which is contingent on a balanced power relationship in the coupling.

The case of Guangzhou-Peugeot presents a negative example of reciprocal coupling in which upgrading is hindered due to mismatched interests, lacking of synergy and unwelcome responsive strategies. In contrast, the case of Guangqi-Honda illustrates a positive example in which reciprocal coupling is sustainable with continuous synergy with a balance power relationship. Guangqi-Honda devoted a great deal of efforts in maintaining the balance of interplay in terms of equity structure, management participation, labor training and the mutual interests of co-development. Specific strategies were adopted for lowering tension within the joint venture. These efforts helped Guangqi-Honda and its supply networks achieve substantial upgrading in the 2000s (see Table 9.2). This comparative case analysis verifies the third proposition of this thesis: the more balanced are power relations in reciprocal coupling, the more synergy is there for upgrading.

To conclude, this thesis has verified that local upgrading in the PRD does not result from the pre-determined patterns of industrial governance or merely a matter of state power or lead firm power in defining the content of upgrading as well (see critiques in Chapter 2). Instead, local upgrading is led by the evolutionary patterns of strategic coupling which are subject to specific configurations of knowledge gaps and dynamic power relations. Overtime, changing institutional-spatial conditions serve as a critical factor which enables local firms to leverage the governance power of foreign firms in different ways.

In the specific case of the PRD, this study has found that institutional-spatial conditions are changing over times. At the global scale, the imperatives of foreign firms have changed at the global scale. Foreign firms are not only interested to outsource/offshore sophisticated-manufacturing works to the PRD, but are also attracted by the booming China

market. At the regional scale, the developmental strategies of regional governments are evolving. Some strategies have further liberalized institutional environment (e.g. electronics); some have turned to provide direct supports (e.g. automobile), while some have raised industrial barriers so as to stimulate local upgrading in a radical manner (e.g. apparel). At the local scale, the capabilities of local firms increase based on the indigenous efforts of learning by doing and knowledge absorption from their foreign partners.

These changing conditions sustain local firms to decouple and recouple with their foreign counterparts and lead to the formation of various types of coupling. In the specific case of the PRD, the process of decoupling and recoupling did not meet great barriers because strong institutional and technological lock-in has yet to be developed within such a compressed developmental period. Local firms are able to leverage the power of their partners by frequently deploying three strategies: diversifying knowledge channels; utilizing new regional assets (domestic assets and indigenous supply networks); and identifying industrial opportunities embedded in GPN competitive dynamics. These are changing multi-scalar forces that reshape the outcomes of upgrading in the PRD.

9.2 Contributions

The key contribution of this thesis is the synthesis of insights in both geographical and non-geographical studies for reinterpreting local upgrading in the PRD. Indeed, economic geographers have tackled the issue of upgrading in an implicit way. Some recent efforts of the GPN studies have led us to appreciate the engagement of multi-scalar forces in producing regional industrial growth (Coe et al., 2008a; Yeung, 2009a). But these studies have yet to

articulate the influence of strategic coupling on local upgrading. Moreover, the typology of strategic coupling *per se* remains fuzzy. Non-geographical studies have elaborated on the mechanisms of industrial upgrading. Nonetheless, these studies, particularly the GVC literature, tend to narrow the analytical scope within the pre-determined patterns of industrial governance (Bair, 2005; Gereffi et al., 2005; Staritz et al., 2011). Hence the geography of upgrading in these studies is ambiguous. They have ignored the institutional and spatial contexts where causal mechanisms, power relations and the strategies of upgrading are enacted.

The theoretical effort of this thesis has attempted to make a dialogue between these two strands of literature. Specifically, this thesis has reconnected the missing links by answering a question: how strategic coupling affects local upgrading under changing institutional-spatial conditions. It has offered a more realistic account to the mechanism of industrial upgrading. This section summarizes three specific contributions responding to different strands of literature.

9.2.1 A geographical interpretation beyond the GVC approach

This thesis has incorporated state actors and institutional influences which are generally absent in the GVC studies into central analyses. This attempt offers a geographical interpretation of knowledge diffusion and asymmetrical power relations within value chains. This effort is more capable of explaining the current dynamics of upgrading.

Scholars in the GVC literature believe that upgrading is driven by the patterns of industrial governance because the patterns define the ways of knowledge diffusion along value chains (Bair, 2005; Gereffi et al., 2005; Pietrobelli and Rabellotti, 2011). The variety of

governance patterns is subject to the codification of knowledge, the complexity of inter-firm transactions and the supply-base capabilities. Because lead firms possess advanced knowledge and define industrial parameters, they have dominant power over their suppliers (local firms). According to my analyses, this conceptual causality is over determinant. It seems that the ways of knowledge diffusion is fixed and the power of lead firms is essential. This thesis has questioned this view by asking why firms share knowledge and what would be other possibility.

Basically, knowledge is shared by firms which possess and have the ability to control the knowledge on the basis of anticipated costs and benefits. In other words, firms share knowledge for rent, such as technological licensing, setting industrial standards, or investing in credit and trust in business networks. This rent can be returns of profits in formal or informal forms, direct or indirect ways (Allen et al., 1983; Appleyard, 1996; Arora, 1995; Schrader, 1991; von Hippel, 1988). Therefore, when taking institutional-spatial conditions into account, the essential view of knowledge diffusion should be revised. First, if we situate local upgrading in a GPN while not a value chain, the channels of knowledge diffusion are far more diverse than inter-firm linkages (Bunnell and Coe, 2001; Trippl et al., 2009). Second, by possessing certain scarce resources, local firms or regional institutions may offer non-cost or non-profit returns for TNCs and attract them to share more knowledge (Liu and Dicken, 2006; Scott and Storper, 2003; Storper, 1997a). Third, local firms may take advantage of multi-tasking by serving different functions within the same GPNs. This effort helps them identify more upgrading opportunities, particularly in the competition between global lead firms in the top hierarchy of value chains (Lüthje, 2004; Yeung, 2009a). This thesis has

verified these possibilities with various cases and substantial analyses in the last three empirical chapters (see Table 9.2). These cases have shown that local firms may leverage the governance power of foreign firms through increasing indigenous bargaining power, bypassing the power or develop more synergy with their foreign partners. In doing so, this thesis partly offers a geographical interpretation of the value chain governance.

9.2.2 Whither a typology of strategic coupling for the GPN framework?

Another key contribution made by this thesis is the conceptualization of the typology of strategic coupling. This effort resonates with Yeung (2005:37)'s avocation of "theorizing sufficiently the nature of relationality and its manifestation through power relations and actor-specific practice". It would be able to transcend previous works in the 'relational turn' of economic geography which tend to be restricted in interpreting various themes of social-spatial relations. As a preliminary attempt, this thesis has conceptualized the typology and causal effects of strategic coupling. This attempt is not novel but a reconceptualization of the earlier works in the GPN literature (Coe et al., 2004; Yang, 2009; Yang et al., 2009; Yeung, 2009a). The previous three-fold typology of strategic coupling is a bit fuzzy and internally incoherent (Chapter 3). It is insufficient to develop analysis on power dynamics in that typology. Therefore, this thesis further develops the typology of strategic coupling as a supplement to the GPN literature.

According to my conceptualization, the formation of coupling is subject to the changing configuration of knowledge gaps and power relations. When local firms in a region manage to reduce knowledge gaps or to reconfigure power relations with their foreign partners, the pattern of coupling will evolve. This evolution leads to the dynamics outcome of upgrading.

This conceptual work adds critical and important values to the analytical framework of the GPNs. By consolidating analytical focuses on knowledge gaps and power relations, the GPN approach would be able to avoid the problem critiqued by Sunley (2008) that being trapped by involving immense network relations and related factors. This typology also can incorporate the analyses of value chain governance into the GPN framework. By analyzing the evolution of strategic coupling, we are able to interpret how inter-firm governance power can be reshaped in a nexus of firm-state-territory relations in which each party mobilizes possessed resources to leverage the power of the other party. In the case of the PRD, my empirical examinations have exemplified the existing variety of strategic coupling (see Table 9.2). These results as well as the case studies have proved that the fourfold typology of strategic coupling is a feasible framework for explaining upgrading in latecomer regions.

9.2.3 Alternative strategies of local upgrading beyond development studies

This thesis contributes to development studies by identifying many strategies of local upgrading. As reviewed in Chapter 2, previous studies have provided four important strategies for latecomer economies to catch up: being a quick follower of TNCs, seeking supports from a developmental state, investing in indigenous innovation and launching joint actions (Clark and Kim, 1995; Giuliani et al., 2005; Hobday, 1995; Schmitz, 1999, 2004). Apart from the first strategy which was affirmed in the electronics industry, the rest three strategies were not pertinent in the case of the PRD. In fact, these advocated strategies in development studies might become stereotypes in some degree.

The role of development states in East Asia has been changing with some rise and fall (Beeson, 2004). In recent dynamics, East Asian lead firms tend to deepen their articulation in

GPNs rather than seeking for helps from developmental states, such as the upgrading of Huawei in the PRD (Fan, 2011). Field investigation of this study has notified that a developmental state was absent in the PRD. Conversely, the RPD continuously underwent market liberalization throughout three decades of development. Statistic evidence in Chapter 5 has reported that innovation in the PRD was happening but not significant. This finding resonates with Viotti (2003)'s view that many latecomer economies actually adopt a strategy of learning rather than innovation. The field observation has informed that local firms in the PRD did not launch substantial joint actions or collective movements against foreign firms. There were merely some local collective initiatives in establishing industrial associations and seeking fiscal subsidies from local authorities. These findings critically imply the insufficiency of development studies in explaining the PRD's local upgrading.

Drawing upon three industrial-specific chapters, this thesis has articulated three alternative strategies: diversifying knowledge channels at the local scale (e.g. Jingtuo and Conshing); utilizing emerging assets at the regional or national scales (e.g. Yishion and GAC); and taking advantage of competitive dynamics at the global scale (e.g. CZC). The first and third strategies depend on local entrepreneurship in identifying opportunities and also require local firms to articulate deeply into GPNs. The second strategy is critical, because these assets only become available in recent development. For instance, the huge China market did not exist to most of firms in the 1980s. It was originally small in size and regionally fragmented. Though there was a large population, the household incomes of domestic consumers were limited in the earlier stage of development. Under the export-oriented strategy, EPEs did not have right to access the domestic market. Similarly, regional supply networks were

unavailable initially. The growth of these supply networks has been largely attributed to the localization efforts of FIEs since 1990s. In short, these assets are emerging and increasingly valuable.

This thesis has also contributed to the literature of the regional development of China in some respect. Although the relations between regional development and the globalization of China have been revealed, the actual content and extent of upgrading is still blurred in previous studies (Wei, 2000, 2007; Wei et al., 2007; Wei and Liefner, 2012; Zhou and Wei, 2011). This thesis has made an attempt to measure local upgrading rather than taking upgrading as granted by rapid industrial growth. Meanwhile, the empirical works of this thesis have resonated with previous studies and highly appreciated the importance of global integration to China's regional development, such as the influence of globalization and FDI (Young and Lan, 1997), the knowledge transfer and spillover from global pipelines constructed by FIEs (Yeung et al., 2006), the impacts of strategic coupling (Yang, 2009), the rescaling process of local firms in articulating into the global economy and so on (Lin, 2009b). In line with these studies, this thesis has taken one step further by focusing on the variety of global integration and its impacts to local upgrading. This effort leads readers to appreciate the changing patterns of regional development in China and how some China-specific contexts, such as the marketization reform, liberalizing business environment and the huge domestic market, may influence the process of local upgrading.

9.3 Policy implications

Looking forward, this thesis can provide a great deal of regional policy options for latecomer upgrading and regional development. The most significant policy implication would be the emphasis that policymakers should choose a right way of global integration – an applicable pattern of strategic coupling. The implication is important because it reminds policy makers to appreciate multi-scalar forces, synergy and the dynamics of power relations in shaping regional industrial upgrading. In a latecomer region, policymakers should pay sufficient attention in assessing the features of GPNs both firms and structures with which the region would like to couple. They need to understand the position within GPNs where the region may be situated, rather than select an industry they would like to promote. Meanwhile, policymakers should also critically assess their possessed regional assets and the strategic needs of TNCs within GPNs. Without this positioning work, regional policymakers would not be able to designs suitable policies and build up corresponding regional capabilities for TNCs.

As a critical value added, this thesis suggest that both firms and governmental agencies to pay sufficient attention to the tension and synergy within strategic coupling. Dunning (1991: 315) has rightly observed that "the world is continually throwing up new challenges and openings for multinational companies; and because of this, countries that wish to attract such institutions into their midst will have to abide by the rules of the game and provide them with the right kind of investment climate". Nonetheless, few state institutions explicitly integrate their actions designed to affect the costs and benefits of TNCs' relocation activities into their general economic policies. Many host countries have yet to pay sufficient efforts to identify the balance between the ownership-specific advantages of TNCs as perceived by the host

countries and the locational advantages of host countries as perceived by the TNCs (Dunning and Lundan, 2008; Dunning, 1998). The GVC studies have strongly suggested local firms in developing countries to insert into global value chains as a quick strategy of catching up. Many practical toolkits have been summarized such as the triple-C policy framework[1], building local innovation system or encouraging collective private initiatives (Humphrey and Schmitz, 1996; Humphrey and Schmitz, 2008; Schmitz, 2004). These suggestions by and large are similar to the ones proposed in the new regionalism literature in economic geography (Chapter 2). However, these suggestions lack of a bilateral thinking to how mutual interests between the regions and foreign firms can be matched in a better way. To this point, this thesis suggests policymakers to pay attention in mediating and fostering the 'right' regional assets for developing better synergy within the coupling. There is no panacea or universal solution to this problem. But bearing the question in mind would help regional policymakers develop a more feasible policy framework.

By proposing a typology of coupling, this thesis provides some pragmatic options for regional policymakers to consider the trajectory of upgrading. In the East Asian contexts, regions have developed strategic coupling with GPNs in different ways. A few regions have more or less developed absorptive coupling with GPNs. Local firms in those regions either directly couple with global lead firms, like Taipei–Hsinchu region; or have developed into domestic/international lead firms in their own right, such as Seoul Metropolitan Area. There are many other regions like the PRD in which the majority of local firms have yet to develop strong organizational and technological capacities, such as the Yangzi River Delta and the

[1] In the triple C of local industrial policy framework, customer-oriented, collective and cumulative are proposed as key features of effective approaches for fostering local development.

Bohai Rim region in China, Bankok region in Thailand or the Hanoi-Mekong Delta in Vietnam. These regions are still under tremendous pressures on cost-based competitions from themselves or other continents. What can regional policy makers do to help local firms develop absorptive coupling in future? The thesis provides two optional pathways which can be pursued simultaneously in different industries.

The first option is to develop cooperative coupling with GPNs by helping local firms reduce technological gaps with foreign firms. To achieve this goal, governmental agencies can heavily invest in innovation to improve indigenous competence; or facilitate the formation of local supply networks for strengthening integrated-manufacturing capabilities; or focus on building a regional production platform to reap the economies of scale. The second option is to pursue reciprocal coupling. For this purpose, polices can be designed to identify or nurture a specific type of regional asset, such as domestic markets, associational economies or infrastructures. These efforts increase the bargaining power of local firms which have locational advantages by possessing the assets. Apart from these strategies, governmental agencies can also devote some general efforts, such as encouraging inter-firm cooperation (not a specific collective moment), building up a public learning platform, or simply helping local firms find suppliers and customers. These helps can create more linkages for local firms to diversify their knowledge channels. Last but not the least governmental agencies can foster local entrepreneurship by providing more institutional supports rather than allocating all the supports for foreign firms. By then local firms would be more capable in synthesizing regional assets and identifying industrial opportunities in GPNs.

9.4 A self-assessment

This section develops a self-assessment to assess the main accomplishments and limitations of this thesis in three dimensions: methodology, theory and empirical findings. In terms of methodology, this thesis has deployed multiple methods that go beyond the dichotomies between qualitative and quantitative, primary data and secondary data, or intensive and extensive approaches. This methodological synthesis has sustained my field survey for articulating the historical and ongoing process of local upgrading at regional, industrial and firm levels. Good response rate of the informants supported this thesis in covering three major industries in the PRD and claiming the validity of its findings. But there are still two limitations which could be improved in future.

First, while empirical observations have revealed the importance of dynamic power relations and synergy in producing upgrading, a precise measurement of synergy is still absent. This study has elaborated on synergy on the basis of qualitative methods and case studies, but it did not measure precisely to what extent synergy may affect the outcomes of upgrading and the evolution of coupling. Indeed, this thesis has missed this opportunity to address this critical causality between synergy and upgrading. However, the central focus of this thesis is in the process of upgrading, not just about measuring the extent and degree of upgrading. This imprecision is regarded as acceptable.

Second, this thesis has developed a good coverage of examining industrial upgrading at both a regional and industrial levels. This work provides a solid ground for testing and demonstrating different propositions listed in Chapter 3. However, by casting such a wide net, this thesis has lost some analytical depth and richness in case studies in each of the empirical

chapters. For instance, three sub-cases in the electronic industry (Midea in Shunde town, CZC and Jingtuo in Shenzhen city) should deserve more elaborations about the improvement of absorptive capacities, the strategies in selecting technologies to adopt or the disincentives of industrial upgrading. Given to the time-space constraints, this thesis would not be able to fully elaborate on each of the case studies. This issue will be included in my further study. Meanwhile, the intensive usages of interview quotation may also have a risk of misleading readers in considering context-sensitive interpretation as generalized mechanisms. Hence many of the interpretations in this thesis should be read as subjective and context-sensitive.

In terms of theory, embedded in a critical perspective in REG, this thesis has demonstrated the mechanisms of local upgrading and the contextual contingencies of the mechanisms. Moreover, this thesis has devoted a great deal of efforts in the conceptualization of strategic coupling which avoids the problem of network privilege in REG. But these efforts may commit in making a 'chaotic' concept which may complicate the mechanism of upgrading. This thesis advocates the multiscarity of my analytical framework which involves three key actors from different scales: local firms, foreign firms and regional institutions. These actors are embedded in respective institutional-spatial contexts. The orchestration of three key actors and the embeddedness has made my analyses quite complicated. It is also difficult to distinguish the differences between coupling at an individual level (coupling between firms) and an aggregated level (coupling between region and GPNs). This problem is evident in assessing the representative level of the case studies. For instance, the conclusion of Chapter 6 would be wrong if the success of Jingtuo is exaggerated for representing the entire regional tendency.

The fourfold typology of strategic coupling also would be *chaotic*. Critical scholars may question that whether synergy and power relations are overlapping among different types of coupling. Can a firm develop multiple types of coupling simultaneously? If that possible, what are the implications of this multiplicity to governance and upgrading in value chains or GPNs? These critiques would be valid because this thesis has not reached this theoretical depth yet. But justifying all these issues would go beyond the scope of this study, given to the time-space constraint of this thesis. In this sentiment, this thesis has only provided a preliminary and fragmented attempt shedding light on the casual relations between strategic coupling and local upgrading.

In terms of empirical findings, this thesis has provided many examples to illustrate the variety of coupling and how it produces upgrading in the PRD. But the study has yet to identify the formation of *absorptive coupling* in the examined industries. Correspondingly, the forth proposition has yet to be exemplified. Although over 100 interviews have been conducted, only 69 samples were collected in the questionnaire survey. This survey sample is too small and limited to represent upgrading for the entire PRD. The survey data does not have sufficient validity to verify any proposition or argument. It can only be used as a complementary support to my findings. This problem mainly results from the time-resource constraint of this study and partly from the anti-survey attitude of the PRD's firms (see Chapter 4).

More critically, among different industries in the PRD, multi-scalar forces did not exert influences evenly in all the cases and industries. For instance, regional forces did not play a significant role in the electronics industry, while local initiatives had little power to influence

the reciprocal coupling in the automotive industry. In other word, the analytical richness of this study did not present as a full multi-scalar account. But this issue should not be considered as a shortage. The purpose of this thesis is to deploy a multi-scalar approach to investigate the encountering of local, regional and global forces in strategic coupling. It is not necessarily to present a story evenly produced by multi-scalar forces.

This self-assessment has reflexively informed the limitations of this thesis in methodological, theoretical and empirical levels. Some of the issues are beyond the scope of this thesis, but most of them are critical and insightful. These issues constitute the basis of an extended research agenda addressed in the next section.

9.5 Research agenda in future

The above sections have provided a detail examination on the key contributions and limitations of this thesis. What are the future research issues of this study? By anchoring multi-scalar forces as the central analysis, the first issue should be further addressed is the examination of influence from international industrial standards, the home-country specificity of FIEs and macro-regional economic arrangements. Considering these influences is an increasing tendency in the GPN studies (Coe et al., 2008b). Scholars have emphasized to incorporate international regulatory regimes or organizations, as well as labor, into the GPN framework so as to realize its analytical potential in geo-political economic analyses (Fichter et al., 2011; Glassman, 2011; Rainnie et al., 2011). For instance, case studies of this thesis can be extended by examining the impacts of country origin among global lead firms. The field survey of this study has noticed some differences among Foxconn, Flextronics and Honda in

constructing local supply networks and enforcing management. But empirical data so far cannot sustain this study to detail this issue. This nuance would be a niche for comparing the distinctive features among United States, Taiwanese and Japanese firms. It can critically contribute to the literature of internationalization of TNCs, transnationalizing entrepreneurship or national business systems and so on (Dunning and Lundan, 2008; Whitley, 2000; Yeung, 2009b).

Concerning with the issue of labor, social upgrading can be the second important topic for further investigation. Social upgrading is a process of improvement in the rights and entitlements of workers as social actors, and the enhancement of their employment quality (Sen, 1999, 2000). This topic is a common ignorance of the contemporary GPN and GVC studies. So far, neither of these approaches has well incorporated workers into the upgrading studies (Barrientos et al., 2010; Frederick and Pickles, 2010). One of the fundamental issues is the interrelation between the economic upgrading of firms and the social upgrading of labor. Judging by the empirical observation of this study, it would be fair to claim that firm upgrading does not necessarily lead to social upgrading. Sometimes, it may make the working conditions worse, such as pushing tougher working schedules for the upgrading of production system. The tragedy of suicides in Foxconn (Shenzhen) in 2010 has demonstrated the urgent need of examining social upgrading alongside with economic upgrading. More interestingly, the realm of social upgrading can be extended to a regional scale or even wider to a country or society. Issues of this boarder sense of social upgrading can be living standards, wage levels, work conditions, economic rights, gender equality, economic security, and welfare systems and so on. Contemporary studies have been able to provide many insights for this

topic, such as the literature in labor geography, corporate social responsibility, or ethical trading in value chain studies (Cattaneo et al., 2010; Collins, 2003; Herod, 1997; Hughes et al., 2007; Lund-Thomsen and Nadvi, 2010; Milberg, 2004).

Finally, this study only represents a single developing region - the PRD. To what extent are the findings generalizable to other developing regions? Will the regional trajectories of upgrading follow the same pattern? Will the propositions of this thesis be replicable to both developing and developed regions? Indeed, it is necessary to extend the empirical sample of this study to encompass other developing regions in China, East Asia, South East Asia and other continents if possible. Comparing these regions among different countries or the same country will be quite valuable. For example, a comparative analysis between the PRD and the Yangzi River Delta would be insightful for examining the impacts of different national strategies (see Tang and Tian, 2002). More interestingly, we can analyze a single lead firm's upgrading trajectory among different regions, such as Honda's two joint ventures in China (Guangqi-Honda in Guangzhou and FAW-Honda in Wuhan). This kind of research would open up a line of critical questions related to the responses of lead firm in coupling with local firms in different power and institutional contexts, such as firm sizes, the extent of state supports, investment climate, locational advantages and supply networks and so on.

Looking forward again, what will be fate of the PRD? Will rapid industrial growth continue in the 2010s? On the prospect of such a national economic frontier, there are two different thoughts: the optimists (Yeh et al., 2006) and the pessimists (Steinfeld, 2010). The critical issue here rests in the question that: whether local firms manage to find a way of upgrading. This study has identified the overwhelming economic power of FIEs in the PRD,

particularly in the electronics industry. If PRD's industrial policies do not have major shift in future, the further localization of FIEs may be reinforced unfortunately. Although the advantage of low labor wage is reducing, there are other emerging advantages, such as well-built infrastructures, the growing body of supply networks, booming domestic markets and friendly business environment. These advantages would keep attracting more FDI to the PRD. If state supports are still not provided, local firms are more likely to be further captive to FIEs. A few of them maybe successfully leapfrog into new lead firms due to new industrial opportunities, right business strategies or excellent entrepreneurship. Hong Kong firms may play a positive role in this process by providing professional technological, financial and logistics services (Yeh and Xu, 2006). But this outcome is not guaranteed.

It is also likely that local firms will prevail in some sectors, like the apparel industry, if the regional upgrading policy will not further disfavor it. Sustained by the booming domestic market, most of the local firms would have a chance to achieve functional upgrading. Absorptive coupling is quite possible to be developed in this industry. But a bottom neck may emerge when these local apparel firms try to move up from low- and middle-end markets to high-end markets. Local firms will definitely encounter new knowledge gaps in branding and marketing, especially when they enter global markets. Hence they may go back to captive coupling again. Overall, there is nothing fundamentally wrong with this trajectory of upgrading in the apparel industry. The trickiest part may come from the automobile industry. Any major policy change at the national or provincial governments may lead to recoupling among the joint ventures. Unexpected outcomes are also possible as the SOEs have yet to

develop strong indigenous capabilities. The corner-cut strategy did enable GAC to achieve functional upgrading. But this accomplishment was shallow after all.

In the final comment, this study does not attempt to judge that the economic prospect of the PRD is bound to be bright or doom. Instead, it insists on arguing that the ongoing dynamics should be understood in relation to changing multi-scalar forces and institutional-spatial conditions. Local firms indeed have certain autonomy and space to find a way to upgrade, but the opportunity is contingent on interactions between the region and the global economy in future.

Appendix A: the survey questionnaire

Survey of Industrial Upgrading in the Pearl River Delta (2010)

Name of Enterprise： _____
Name of Informant: _____
Position of Informant: _____

I would be most grateful if you could spare some time to fill in this questionnaire. This survey forms part of a study of industrial upgrading in the Pearl River Delta. The questionnaire aims to understand your local practices of upgrading in your company and the difficulties your company has met during the process of upgrading. All data collected from this survey will be used strictly for academic purposes only. All your information will be kept confidential and will not disclose to the third party without your permission.

These activities are considered as industrial upgrading:

- *Process upgrading*: improving efficiency of production system or introducing superior technologies;
- *Product upgrading*: making better products, adopting new design, adding new component into the products;
- *Functional upgrading*: conducting/acquiring new, high value-add or superior functions such as R&D design, marketing, management, branding and retailing;
- *Sectoral upgrading*: applying the competence acquired in a particular function to move to a new sector

If you have any question in filling this questionnaire, please inquire the investigator immediately.

Title: *Research Project of Industrial Upgrading in the PRD*
Institutes: National University of Singapore & Sun Yat-sen University
Investigators: Liu Yi (PhD student), Li Xun (Professor)
Contact Number: 13538975675;
Email： liuyi0609@hotmail.com

----------Beginning of questionnaire----------

GENERAL INFORMATION

1. When was your company firstly established in the PRD? ( )

2. What is the current ownership type of your company:
   2.1 □ private owned； □ state owned; □ collective owned; □ foreign owned
   2.2 Original country of investment: _____

3. Registered capital: _____million *yuan;* Fixed assets: million *yuan;*
Turnover in 2009 _____million *yuan;*

4. What are your main products and markets
Main products: _____
Main market places: (e.g., the U.S.) _____

5. What are the relationships with main customers in your company ( ) [multiple choices]
(1) strategic partners; (2) OEM clients (3) affiliates (4) normal customers

6. What are the relationships with main suppliers in your company ( ) [multiple choices]
(1) strategic partners; (2) OEM partnership (3) affiliates (4) normal suppliers

7. The production patterns of your company belong to ( ) [multiple choices]
(1)Export processing trades; (2) OEM; (3) ODM; (4) OBM; (5) partly outsourcing; (6)fully outsourcing;

8. What are the relationships with governments ( ) [multiple choices]
(1) Normal
(2) encouraged to relocate and transform;
(3) encouraged to further invest;
(4) under collaborative agreements;
(5) Others:

9. The number of employees is ( ); How of them are conducting research and development work ( );

10. How much did the normal labor wage of your company increase in the past five years? ( )
(1)< 30%；(2)30-60%；(3)60-90%；(4)>90%；

11. How many industrial associations have your company joined in the PRD: ( );

PRACTICES OF UPGRADING

12. What are the estimated expenditures of your company in the below activities

Technological purchase	（	million *yuan*）
R&D investment	（	million *yuan*）
Labor training	（	million *yuan*）
Equipment renewal	（	million *yuan*）
Marketing	（	million *yuan*）

13. Using the scale provided, please assess the extent of upgrading did your company has achieved (the numbers in the scale range from Absent [0] to High [3])

0	1	2	3
Absent	Low	Moderate	High

Product upgrading	（ ）
Process upgrading	（ ）
Functional upgrading	（ ）
Sectoral upgrading	（ ）

14. What may be the incentives of your upgrading activities ( ) [multiple choices]

(1) From indigenous entrepreneurship
(2) From global scale（e.g. pricing, new industrial standards）
(3) From governments (e.g. taxation, supportive industrial policies)
(4) From local scale (e.g. local competitions, rising up labor wage)
(5) others ( )

15.What are the sources of the technologies used for upgrading ( ) [multiple choices]

(1) Direct purchase
(2) Indigenous innovation
(3) Collaboration with other enterprises
(4) Collaboration with research institutes
(5) Transfer from mother companies
(6) Technological licensing
(7) Other: _____

16.What are the sources of the capital expended for upgrading ( ) [multiple choices]

(1) Self-accumulation
(2) Transfer from mother companies
(3) Loan from local banking systems
(4) Loan from non-local banking systems
(5) Private equity
(6) Venture capital
(7) Loan through social relations
(8) Other: _____;

17.Using the scale provided, please assess the importance of external partners to upgrading ( )

0	1	2	3
No influence	Low	Moderate	High

18. Using the scale provided, please assess the degree of tension within the relationships of your company with other firms, individual and regional institutions
(the scale range from Absent [0] to High [3])

0	1	2	3
Absent	Low	Moderate	High

With labor	( )
With governments	( )
With industrial associations	( )
With customers	( )
With suppliers	( )

19. Using the scale provided, please assess the importance of supports from governments and institutions (the numbers in the scale range from Absent [0] to High [3])

0	1	2	3
Absent	Low	Moderate	High

Provide technological supports	( )
Provide financial subsidies	( )
Provide market/business information	( )
Provide infrastructures	( )
Provide labor training	( )
Other public services:_____	( )

PROBLEMS AND STRATEGIES IN UPGRADING

20.Using the scale provided, please assess the bargaining power in the external relation of your company(the numbers in the scale range from Highly disadvantaged [1] to Highly advantaged [5])

With suppliers	( )
With customers	( )
With governments	( )

21.What kind of factors can improve the bargaining power of your company ( ) [multiple choices]

(1) Lower production costs
(2) Leading technological advantages
(3) Financial capabilities
(4) Reputation in the industry
(5) Familiarity of governmental policies
(6) Familiarity of local market
(7) Familiarity of cultural background
(8) Social networks
(9) Entrepreneurship
(10) Others

22. Using the scale provided, please assess the extent of difficulty that your company has met during upgrading (the numbers in the scale range from Absent [0] to High [3])

0	1	2	3
Absent	Low	Moderate	High

Finance	( )
Technology	( )
Human resource	( )
R&D	( )
Brand development	( )
Market entry	( )
Other	( )

23. Using the scale provided, please assess the importance of the below relations in helping your company during upgrading (the numbers in the scale range from Absent [0] to High [3])

0	1	2	3
Absent	Low	Moderate	High

Business relations	
Trading partners	( )
Customers/suppliers	( )
Industrial associations	( )
Business community	( )
Political relations	
Official relations with governments	( )
Personal relations with local officials	( )
Social relations	
Family ties	( )
Ethnic ties	( )
Religious ties	( )
Others:_____	( )

BUSINESS ENVIRONMENT

24.Using the scale provided, please assess the change of firm-government relations in the past decade ( )

1	2	3	4	5
More tighten		No evident change		Much more loser

25.Using the scale provided, please assess the supports received from governments in the past decade ( )

1	2	3	4	5
Much less		No evident change		Much more

26.Using the scale provided, please assess the stability of business environment in the past decade ( )

1	2	3	4	5
Much more volatile		No evident change		Much more stable

27.Using the scale provided, please assess the importance of regional assets to your company ( )

0	1	2	3
Not important at all	A bit important	Important	Highly important

Production costs	( )
Technologies	( )
Supply capabilities	( )
Governmental supports	( )
Associational economies	( )
Social/cultural advantages	( )
Other: _____	( )

INFORMANT PARTICULAR

28. What is your gender group ( )
    (1) Male
    (2) Female

29. What is your age group ( )
    (1) 20-29
    (2) 30-39
    (3) 40-49
    (4) 50-59
    (5) 60 or above

30. What is your educational background ( )
    (1) Primary school;
    (2) Secondary school;
    (3) Senior middle school
    (4) Polytechnic;
    (5) University
    (6) Other:_____

31. How would you describe your designation in the company?
    (1) Chairman
    (2) CEO/Managing Director/President
    (3) Executive Director/General Manager
    (4) Divisional Manager/Branch Manager
    (5) Overseas Operation Manager
    (6) Assistant Manager

(7) Administrative Executive
(8) Executive Secretary
(9) Other (please specify): _____

----------End of questionnaire----------

Appendix B: a sample of interview guideline

THE NATIONAL UNIVERSITY of SINGAPORE

新加坡国立大学

SUN YAT-SEN UNIVERSITY

中山大学

研究课题：全球生产网络，区域制度与珠江三角洲产业升级

Research Topic: Global Production Networks, Regional Institutions and Industrial Upgrading in a Globalizing Region, the Pearl River Delta in China

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To: Midea Group

2 Sep 2010

Institutes: National University of Singapore & Sun Yat-sen University
Investigators: Liu Yi (PhD student), Li Xun (Professor)
Contact Number: 13538975675;
Email：liuyi0609@hotmail.com

I would be most grateful if you could accept this interview. The interview forms part of a study of industrial upgrading in the Pearl River Delta. It aims to examine your local practices of upgrading in your company and the difficulties your company has met during the process of upgrading. All information collected from this interview will be used strictly for academic purposes only and will not disclose to the third party without your permission.

At the beginning of the interview, I would like to know some basic features of your company, such as:

- *Historical development and significant changes*
- *Product characteristics, market structures and shares*
- *Structure of production networks: spatial distribution of suppliers, types of supply chains and management.*
- *Competitive advantages: cost, technologies, brand and marketing*

The second part of the interview is composed of several key questions which are about the decision making process and implementation of industrial upgrading. Questions include the below aspects:

- *Development strategies*
- *Activities for improving production and processing skills in the past five years;*
- *Attempts in conducting new business and the outcomes*
- *Main difficulties in upgrading and responsive strategies*

In the third part of the interview, I would like to discuss with you about the business environment where your company has located in. Questions will refer to:

- *Regional assets: labor markets, infrastructures, the efficiency of governments and so on;*
- *Supports needed from regional governments;*
- *Supports needed from industrial associations.*

The interview will end with a short questionnaire including 30 questions which are mainly about the assessment of the progress and difficulties of upgrading. All data collected from this survey will be used strictly for academic purposes only. All your information will be kept confidential and will not disclose to the third party without your permission.

Thank you very much for your supports!

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