

From trade hub to innovation hub: The role of Hong Kong's innovation system in linking China to global markets

Abstract

Hong Kong has achieved a remarkable rate of economic growth in the last half of the twentieth century, and is widely acknowledged as an important driver of development in South China. The territory occupies a unique position as an international trade and financial hub on the Chinese border, in which capacity it has been well served by the entrepreneurial drive and resilience of its population. Extensive exploitation of technology and innovation in the organization of international production networks have fueled Hong Kong's economic success—but the risks associated with these features of the innovation system also threaten to undermine the territory's future growth. This paper discusses the nature of the global and regional linkages characterizing Hong Kong's innovation system—particularly its integration with a rapidly developing innovation system in China—and its move towards an innovation hub status.

Keywords: Hong Kong; China; Pearl River Delta; Innovation Hub; Innovation System;

1. Introduction

Hong Kong has lately resumed its traditional position as the key transit point for the exchange of goods and services between China and the international economy.

Sophisticated and reliable intermediary services occupy a key role in maintaining this status, but Hong Kong's future depends on the capacity of its intermediaries to retain and expand market share both within Asia and worldwide (Meyer, 2000: 247).

Hitherto, however, the question of technological innovation in Hong Kong's developmental experience has gone largely ignored. The few studies that have addressed the issue have emphasized the *laissez faire* policies that have characterized the industrialization process in Hong Kong (e.g. Hobday, 1995). To be sure, Hong Kong's entrepreneurs have adroitly exploited available technology, but they have not generally carried out research and development (R&D) for the purposes of creating proprietary technology (Davies, 1999; Yu and Robertson, 2000). For this reason, technological innovation has only recently attracted serious attention in Hong Kong, where the government has launched a new strategy in pursuit of knowledge-intensive economic growth. R&D investment in industry has been gradually rising, however, and continuing public support of efforts to generate new technologies are transforming Hong Kong into an *innovation hub* with global links to and from China.

Our point of departure in this paper is the proposition that a system of innovation has been emerging in Hong Kong during the past century, conditioned by major economic and political upheavals at the global level as well as by gradual institutional change at the local level. The maturation of the system of innovation has accelerated lately, as the influence of economic and political forces have re-asserted

themselves through the return of Hong Kong to Chinese sovereignty and the Asian financial crisis of the late 1990s.

It must be acknowledged that Hong Kong's constantly shifting position in the global and regional political and economic landscape has been—and continues to be—a fundamental influence on its innovation system. Many critical factors are situated in political environments that reach beyond the local (or 'national') scale: For example, the influence of global networks has often directly affected regional economies, underscoring the need for local and regional development. Although Hong Kong's government has enjoyed relative autonomy through British colonial rule and now the return to Chinese sovereignty—with a level of authority similar to that of a national government—the international context and indeed the ideology of the government itself (which has generally espoused a *laissez-faire* economic policy) have left the regulation of business in Hong Kong largely to market forces. Consequently progress in the development of Hong Kong's innovation system converges at three distinct spatial levels: local, regional, and global. In other words, what we observe in our analysis of the innovation system reflects causal relationships that transcend "national" dimensions. Indeed, linkages with economic or innovative activities that occur outside the borders of the Hong Kong Special Administrative Region (HKSAR)—which have enjoyed increasing public policy support—have transformed the competitive strategies of business firms in the territory.

In the remainder of this paper, we introduce the concept of an innovation hub and discuss how an innovation hub might develop on the foundation of a trade and financial hub; review the historical background from which current developments have emerged; examine the integration of Hong Kong's economy with that of the Pearl River Delta Region; and assess Hong Kong's prospects for finally emerging as a

key innovation hub in China. In this respect we sketch both optimistic and pessimistic scenarios in the concluding section.

2. Innovation Hub: A Conceptual Discussion

From a literal viewpoint, the word ‘hub’ refers to the central part of a wheel from which spokes radiate. Common usage of the term extends to a ‘hub’ denoting a central point or main part of activity and interest. Qualifying adjectives can be added to the common definition of ‘hub’ to further narrow the usage of this term. Our concept of an innovation hub envisions a center of exchange that builds on the foundation of a ‘trade’ or ‘financial’ hub. Although the term ‘trade hub’ is a recent coinage, it can easily apply to a long history of precedents in the emergence and decline of commercial centers. Commercial cities such as Venice occupied important positions in the European economy of the Renaissance as it acted as the central node for trading activity that permeated much of continental Europe. Later, the key status of a world city shifted to Amsterdam and London, and while these centers increasingly commanded the flow of goods in international trade, they also became important hubs of financial transactions (Braudel, 1986). The ability to consolidate financial or trading activity is, therefore, a key characteristic in making a city or region a ‘hub’. When a city is termed a ‘world city,’ therefore, it is typically because of its ability to act as a hub for a certain activity (i.e., finance, trade or even tourism) or a number of activities, combined. Additionally, from within this city or region, the specified activity which has made it a hub usually extend beyond its immediate borders into neighboring cities, regions or countries. At the very least, the effect of its hub activity is felt beyond its borders.

The term ‘innovation hub’ closely follows from the earlier usage of the hub phraseology—trade hub, financial hub, and transportation hub. In particular, it refers to an area with two intertwined characteristics. First, innovative activity predominates within the region as compared particularly to neighboring regions, and second, there are strong linkages and knowledge flows via the primary region into neighboring regions. The term of an ‘innovation hub’ is not completely new as it has been variously utilized to designate a science park initiative in South Africa and to advertise various Internet Websites promoting high technology business. In the case of the South African science park, the area in question is distinctly sub-national, and indeed smaller than the city-level (located in Gauteng province, South Africa). In the second example, the hub is virtual in nature, promoting businesses in cyberspace.

Under the concept of an ‘innovation hub’ that we apply in the present paper, we conceptualize the innovation hub—Hong Kong—as a distinctly ‘physical’ city-space located at the mouth of the Pearl River Delta, in Guangdong province, PRC. Furthermore, we consider that Hong Kong can perform the functions of an innovation hub by leveraging its facilitator capabilities in the domain of innovation. The functions served by an innovation hub entail not only spending increased indigenous resources on innovative activities in a greater commitment to R&D but also, and just as importantly, effectively applying new knowledge produced elsewhere to enhance value-added inputs to the production chain. We envisage an innovation hub to transcend the confines of a local cluster—as in a science park—and contribute with an extensive network of linkages and value-added activities to the generation and flow of knowledge.

Given this point of departure, there are four concrete ways of demonstrating the existence of an innovation hub, or the efficacy of government measures directed

towards achieving such a status. First, we would expect an innovation hub to have a wide network of linkages facilitating the flow of knowledge and technology. In the case of Hong Kong, these linkages overlay those that have been developed through Hong Kong's historical status as a trade and finance hub. Occupying this latter role, Hong Kong has traditionally been the throughput node for trading and financial activities between China (particularly in the Pearl River Delta region and Guangdong province) and the rest of the world. Additionally, over the last decade, Hong Kong has provided an increasingly attractive alternative to Western finance centers, allowing Chinese firms to access international sources of equity. In both cases, the key idea has been that the flow of goods, services, and capital through Hong Kong is essential to the territory's competitiveness. Hong Kong firms have facilitated this flow by capitalizing on their expertise in logistics, supply chain management, transportation, and a favorable environment for the movement of capital.

Secondly, we believe that actors in an innovation hub should devote substantial resources to innovative activities. That is, we expect to see major expenditure increases on R&D in public as well as private organizations. As firms are the locus of innovative activity within an innovation systems framework, they must be inculcated with an 'innovation culture' or 'ethic' if they are to upgrade their innovative and technological capabilities and also recognize and seize opportunities arising from the effective implementation of innovation and technology produced elsewhere. In Hong Kong's case, the government has implemented measures to increase the amount spent on R&D. The point is to leverage Hong Kong's position as a gateway linking China and the world, which the government has recognized as its greatest historical and present-day competitive advantage. Most notable among these measures was the establishment of the 'Innovation and Technology Fund' (ITF), set

up in 1999 with HK\$5 billion (approximately 500 million Euros/US Dollars 650 million) earmarked to provide funding for projects that contribute to innovation and technology upgrading in both new and established industries. The Innovation and Technology Commission (ITC) was also set up to spearhead Hong Kong's drive to become a world-class knowledge-based society. As far as the private sector is concerned, innovative activity has mainly been increasing among large firms (defined as non-manufacturing enterprises with more than 50 employees and manufacturing enterprises with more than 100 employees).

Thirdly, we assume that an innovation hub provides extensive services and an institutional framework that facilitate various forms of innovation. Key resources include financial institutions such as a venture capital and stock exchange for high technology firms and advanced legal, accounting, and management services. An ideal institutional infrastructure would include protection of intellectual property rights. An example of this in Hong Kong was the setting up of the 'Growth Enterprise Market' (GEM) in 1999, an alternative stock market on the Hong Kong Stock Exchange, which provides 'innovative' firms relaxed regulations to tap into external (public) sources of funding.

Finally, innovation hub status can be demonstrated through an analysis of 'innovation-friendly' government policies. Such policies can include loans, grants, subsidies, etc., for innovation-centered companies; the provision of incubation services; and an emphasis on fostering university-industry relationships for the effective commercialization of new technologies.

3. Trade and Innovation in Hong Kong: Historical Overview

Hong Kong has evolved gradually from a colonial outpost on the coast of China into an important intermediary for the country's overseas economic linkages. From 1847 to 1997, Hong Kong relied on its position as a Crown Colony of Great Britain to provide a safe haven for an expanding group of British trading houses—commonly known as Hongs—that organized the flow of commodities between China and the rest of the world. More recently, the five decades leading up to 1997 have seen Hong Kong emerge as a newly industrialized economy before evolving into an unrivalled trade hub between the People's Republic of China and the rest of the world, in which capacity it has developed an extensive portfolio of business and financial services.

Studies of Hong Kong's economic development in the early part of the twentieth century have identified a variety of informal institutions and state initiatives supporting a regime of industrialization that relied primarily on small-scale manufacturers linked in familial or ethnic networks, connected with expanding markets for products in China, South East Asia, Europe, and the U.S. (Clayton 2000). The recognition of this 'undergrowth' sector of small-scale industrial firms in Hong Kong was important, however, for two reasons: First, it provided opportunities for Chinese entrepreneurs to accumulate technical and managerial skills that could be successfully deployed in subsequent stages of development; second, it gave Chinese firms opportunities to practice organizational modes that supported networking, sub-contracting relationships, and an international search for markets—elements that 'rehearsed' critical features of subsequent industrialization in Hong Kong, prevalent to this day.

With the overthrow of the Kuomintang (KMT) regime of General Chiang Kai Shek in 1949 and the establishment of the People's Republic of China by the Chinese Communist Party, however, a new era was initiated in Hong Kong's history. This

event led to an exodus of about one million Mainland Chinese to Hong Kong. The people of Hong Kong, including its migrants, grew up and developed in a community that had Chinese roots, but were under British administration. These migrants, in turn, brought about an escalation in the establishment and size of manufacturing industries that further expanded the role Hong Kong hitherto had played, mainly as an entrepôt. In the face of the declining power of the KMT in China, the Shanghai textile barons transferred enormous amounts of capital and managerial expertise in textile manufacturing to the colony (Wong 1988). Today, it is estimated that more than half of Hong Kong's seven-million-plus citizens are descendents of post-1949 migrants.

Two events in the 1980s deeply affected Hong Kong's people and thereby its innovation system. The first was the modernization program that the late Chinese leader Deng Xiaoping promulgated in 1978. The other was the opening in 1982 of discussions between the Chinese and British over the future of Hong Kong and its sovereignty. The latter negotiations ended in 1984 with the signing and ratification of the Sino-British Joint Declaration, which stated that Hong Kong would become a Special Administrative Region (HKSAR) of the People's Republic of China and that Hong Kong's capitalist system and 'way of life' would be preserved for 50 years. The 'one country-two systems' framework under which Hong Kong is presently governed was enshrined in the 'Basic Law,' the present constitution of the HKSAR.

The modernization program acted as a catalyst in the transformation of Hong Kong's innovation system. In many ways, the opening of China made Hong Kong's learning curve shorter. This ultimately not only provided economic benefits, but it also helped Hong Kong accept that its fate is inextricably bound to that of Mainland China. The most striking change observed in Hong Kong's innovation landscape following the opening of the Mainland in 1979 was the decreasing role of

manufacturing and the simultaneous rise of the services sector. At its peak in the mid-1980s, the manufacturing sector employed 41.7 percent of the active labor force but by 1995 this figure had dropped to only 15.3 percent (Berger and Lester 1997: 9). In contrast, the services sector grew from constituting 67 percent of Hong Kong's GDP in 1980 to 87 percent by 2002.

Yet far more critical than modernization to Hong Kong's transformation was the return of the British Crown Colony of Hong Kong to the People's Republic of China. Enright et al. (1997: 7) accurately describe how Hong Kong's historical role as a city of departure from China laid the foundation for a reverse flow of business investments during the 1990s not only back to Hong Kong but also to Mainland China, through Hong Kong. They argue that this has "helped Hong Kong become the de facto capital of the 50 million or more overseas Chinese who today play such an important role in the economic modernization of the Asian region and in the reconstruction of China's market economy." The economic impact has been considerable, since overseas Chinese investors—often Hong Kong companies or investors operating out of Hong Kong—now employ 15 million or more people in China.

Furthermore, the migration of production facilities to the PRD in many ways represented growth, rather than decline, in Hong Kong's engagement in manufacturing; however, for political reasons such growth was categorized as outside the territory, even if it was, from a historical perspective, a *re*-integration into the Chinese economy. The result was also that the relocation of production facilities further spurred the growth and increased sophistication of producer business services (Tao and Wong 2002).

Since the Asian Financial Crisis in 1998, however, the Hong Kong government has launched major initiatives to improve innovation in the economy. The economic growth of previous decades had been achieved with very low levels of R&D investment in industry, and with public investment being concentrated in support of research in the higher education sector. A key initiative has been raising the level of R&D investment. Countries with a comparable level of per capita GDP commit 1.5 - 3 percent of their GDP to R&D. Overall investment in R&D in Hong Kong is still a meager 0.60 percent of GDP, and most of this continues to rely on public funding to universities, as shown in Figure 1.

(Figure 1 here)

A report by the Chief Executive's Commission on Innovation and Technology in 1998 inspired a new strategy on the part of the government for enhancing Hong Kong's reliance on high technology in advanced sectors, leading to a range of new schemes to support R&D. Most notable among these measures was the establishment of the 'Innovation and Technology Fund' (ITF), set up with HK\$5 billion (approximately US\$625 million) earmarked to provide funding for projects that contribute to innovation and technology upgrading in both new and established industries. The Innovation and Technology Commission (ITC) was also set up to spearhead Hong Kong's drive to become a world-class, knowledge-based society. The ITC manages the ITF and the Applied Research Fund (ARF) and supports such infrastructure projects as the Hong Kong Science Park. These initiatives in many ways reflect Hong Kong's status as an entrepreneurial city, increasingly intent on participating in the "siliconization" of Asian urban centers (Jessop and Sum, 2000).

4. Integration with the Pearl River Delta Region and Beyond

The Pearl River is one of China's three main rivers. Formed at Guangzhou, it flows east and south to form a large estuary between Hong Kong and Macau. The river links Guangzhou to Hong Kong and the South China Sea and is one of China's most important waterways for trade. The region known as the Pearl River Delta (PRD) is found along the estuary of the Pearl River.

Although the territories of Hong Kong and Macau are geographically integrated parts of the PRD, the 'special' status of these two territories often sets them apart from the rest of the region; therefore, in the literature that has emerged in recent years, the term 'Pearl River Delta' is often used as shorthand for the administrative zones, municipalities, and districts of the PRD in Mainland China (excluding both the Hong Kong and Macau SARs). Some reports use the term "Greater PRD Economic Region" when they include Hong Kong and Macau (e.g., Federation of Hong Kong Industries. 2003).

As part of the Open Door policy introduced during the 1980s, Guangdong Province was given greater political and economic autonomy than other jurisdictions in the Chinese Mainland. The main areas of greater autonomy were finance and fiscal matters, foreign trade and investment, commerce and distribution, allocation of materials and resources, the labor system, and prices. Guangdong was allowed to keep a larger share of its output and foreign exchange than other provinces while being required to achieve self-sufficiency in capital investment. The province was given greater control over economic planning, the approval of foreign investments, and foreign trade. Guangdong also assumed control of several state-owned enterprises

located in the province. These measures fueled rapid economic development in Guangdong Province, with most of this development occurring in the Special Economic Zones established in the PRD.

At this point deeper economic links began to emerge between Hong Kong and the PRD, as Hong Kong's economy shifted from manufacturing to services and manufacturing concurrently shifted from Hong Kong to the PRD. The Open Door policy, coupled with economic reforms, not only provided an enormous production hinterland and market outlet for Hong Kong's manufacturers, but also generated abundant business opportunities for a wide range of its service activities. These include, in particular, freight transport, storage, telecommunications, banking, real estate development, and professional services in such areas as law, insurance, and accounting. This allowed Hong Kong businesses and its managers to build an unparalleled fund of knowledge about what it takes to operate production systems distributed across long distances and to turn out high quality goods in a wide range of industries in China. For this reason, Hong Kong's experience in the PRD region stands as a benchmark for working in China (Sung, 1998). Therefore, while 'Made in Hong Kong' manufacturing declined, 'Made by Hong Kong' manufacturing, that is, manufacturing in Hong Kong-owned and managed plants in the PRD region, flourished (Berger and Lester 1997: 5).

By shifting parts of their operations to China, Hong Kong industrialists vastly increased the scope of their enterprises. By 1997, Hong Kong manufacturing companies were estimated to employ some five million people in their plants in Hong Kong and China (Berger and Lester 1997: 10)—over five times the workforce they had employed in Hong Kong at the peak of manufacturing in the territory in 1984. In 2003, the figure was estimated to be as much as 15 million. Over the period from

1980 to 2001, the PRD region was the fastest-growing portion of the fastest-growing province in the fastest-growing large economy in the world (Enright et al. 2003: 21-25). Since 1997, Hong Kong has thus entered a period of warming economic, political, social, and cultural ties with Mainland China, particularly with the PRD, which have become the focus of much explicit debate in Hong Kong political discourse. It is presently Hong Kong's unequivocal objective to deepen the economic integration of Hong Kong with the PRD.

This suggests that a regional innovation system that includes Hong Kong and the wider PRD region is emerging, and this is indeed what recent reports sponsored by powerful business circles in Hong Kong have argued. For example, a study of economic interaction between Hong Kong and the PRD region sponsored by the Hong Kong-based '2022 Foundation' outlined several clusters of service-enhanced industrial development which involved a division of labor between international services located in Hong Kong and production facilities located in the PRD (Enright et al. 2003). Another report sponsored by the Federation of Hong Kong Industries similarly underscored the close economic linkages in the region. It proposed the strengthening of the overall infrastructure to facilitate R&D activities among companies in Hong Kong and the PRD to take advantage of the various strengths in the region, such as the intellectual property rights protection framework in Hong Kong and the availability of affordable R&D staff in the PRD (Federation of Hong Kong Industries 2003). This report, using a survey, also showed that many firms in Hong Kong were carrying out R&D in both Hong Kong and the PRD. Based on information supplied by 229 such firms (49 percent of the sample of firms operating in both Hong Kong and the mainland), it was clear that the outsourcing of R&D and investments in R&D beyond the borders of Hong Kong was very significant (see

Figure 2). Only 17 percent of the total R&D staff of these firms was located in Hong Kong, while 53 percent were located in Guangdong Province, 3 percent in the Yangtze River Delta, 19 percent in other Mainland provinces, and 8 percent overseas (Federation of Hong Kong Industries 2003: 47-48).

(Figure 2 here)

R&D was relocating to the Mainland primarily because of its supply of talent and research facilities, with lower research costs as a lesser factor. The majority of the firms with Mainland operations surveyed (78 percent) indicated that they planned to continue or expand their R&D efforts, and almost half (46 percent) planned to recruit more R&D staff in Guangdong. Only 13 percent had plans to recruit more R&D staff in Hong Kong (see Figure 2). It is evident from this survey that Hong Kong firms are exploiting the larger pool of R&D talent that has become available in the Mainland, and particularly in Guangdong province. It is also notable that Hong Kong firms planned to focus their R&D recruiting efforts more on Shanghai and other Mainland cities (albeit to a lesser extent than in the case of Guangdong) than on Hong Kong.

(Figure 3 here)

Table 1 indicates comparative figures for R&D expenditures and personnel recruitment in Hong Kong, Guangdong, and Beijing. The table illustrates that Guangdong has become a significant site for R&D, with considerable investments by large and medium-sized firms in the development of new technology. Hong Kong already benefits from being more closely associated with the high technology

industries and services emerging there. In this sense, although Hong Kong still lags behind Guangdong and Beijing in terms of scientific and technological resources, its firms are actively reaching out to exploit available resources to upgrade its technology development capabilities.

(Table 1 here)

Among the initiatives aimed at promoting Hong Kong's economic development is the Closer Economic Partnership Arrangement (CEPA). Under this arrangement, which came into effect on 1 January 2004, 273 Hong Kong products qualify for zero-tariff status under rules governing origin of manufacture, and will be issued a certificate of Hong Kong origin. Hong Kong's business landscape is dominated by small and medium-sized enterprises (SMEs). It has been estimated that Hong Kong will save HK\$750 million from zero-tariff exports. Eighteen service sectors are allowed easier access to Mainland markets, including telecoms, banking, accounting, logistics, and tourism, and there is 'enhanced cooperation' in various areas of trade and investment. In essence, CEPA is designed to allow Hong Kong firms to benefit early from the liberalization of the Mainland's restricted sectors, which will open up to all foreign companies from 2005 as a result of China's accession to the World Trade Organization. For this reason, others have branded CEPA as more talk than action. To be sure, CEPA still includes limitations for the operation of Hong Kong firms in the Mainland market, and all benefits accrue to goods made in Hong Kong (of which there are fewer as manufacturing moves to the mainland) or Hong Kong-based service firms providing a limited range of products in cooperation with Mainland partners.

Nevertheless, CEPA will promote economic integration with the whole of the Mainland, including the PRD region (Hong Kong Trade Development Council 2003).

Both CEPA and China's WTO accession constitute important challenges for Hong Kong, but they also represent opportunities for further development of its role as an intermediary for global commercial linkages. The next stage in Hong Kong's cooperation with the PRD requires further investment and involvement in the upgrading of industrial production in China through the development of joint competitiveness, building on the past experience of out-processing (Sit, 2004).

5. Hong Kong's Emerging Role: Towards an Innovation Hub?

There is no doubt that Hong Kong is closely integrated with the international economic system, and that globalization therefore has had a significant impact on the innovation system in Hong Kong. Because of its colonial status until 1997, Hong Kong's development was linked to the policies of the United Kingdom, and with an open economy, actors in Hong Kong sought opportunities in the international market. During the colonial regime, industrial and innovation policies prior to 1997 were governed by a *laissez-faire* attitude. This attitude in theory opposed all government intervention in a free market economy and therefore also any attempt on the part of the state to engage in the formation of new markets.

Nevertheless, the relationship of Hong Kong to the global economy in both the pre-1997 and post-1997 periods has not been that of a simple "globalization" of its urban economy and governance, but instead should be seen as an articulation at various levels of powerful economic and political actors, operating under the overreaching ideologies of "positive non-intervention" and, more recently, of active

“imagineering” (Pun and Lee, 2002). In particular, since the return to Chinese sovereignty, the Hong Kong government has been consistently supporting foreign investment in the territory and has made a key priority of creating a business environment that would encourage transnational corporations to set up regional headquarters in Hong Kong. The number of overseas firms that have established their regional headquarters in Hong Kong has grown from 602 in 1991 to 906 in 2003, while firms with regional offices in Hong Kong grew in number from 278 to 2,241 during the same period.

Most of these firms exploit Hong Kong’s position in the growing Chinese market, and their activities are concerned primarily with managing global production or supply chains. The rapidly expanding services located in Hong Kong also serve global networks of production or trade. Few transnational corporations have so far located significant R&D functions in Hong Kong, however, and instead appear to focus their overseas expansion of R&D on locations in the Chinese Mainland. Foreign investors had thus set up over 600 R&D centers in China as of June 2004, with a total investment of US\$4 billion (“Foreign R&D Centers . . . 2004”).

Many Hong Kong industries have developed technological capabilities that are significant assets in linking global markets with production bases in the Chinese Mainland. In the garment industry, for example, the technology that Hong Kong firms has accumulated and developed over the years emphasizes capabilities in such areas as human resource management, operations, and suppliers. These technologies are essential if Hong Kong firms are to succeed in selling to buyers in the demanding, fashion-oriented markets of advanced industrial economies. Such technologies, while not particularly R&D intensive, may indeed support the kind of soft managerial technology that is as urgently needed in the Chinese Mainland as any other forms of

technology (Thompson, 2003, p. 94-95). In fact, Thompson (ibid., p. 107) argues that “the historical labor-dependence of the Hong Kong garment sector has resulted in the establishment of firms specialized in satisfying the demand of the highly sophisticated, wealthy fashion-dominated markets of North America, Europe, and Japan. Focusing on these markets obviates many of the benefits of capital-intensive production because of the relatively small batch sizes required and the very short turnaround times imposed by rapidly shifting consumer sentiment. To successfully deal with such markets requires a high flexibility and very skillful value chain management and coordination—in short, managerial-intensive production. Hence, Hong Kong garment firm FDI in mainland China brings with it a high degree of cutting-edge, world-class, soft business know-how that is as much required in China as any hard technology.” That many of the skills and capabilities that Hong Kong garment firms have brought to China have spilled over into increasingly competitive Chinese firms indicates the actual innovative capabilities which such Hong Kong firms possessed when they moved production to the Chinese Mainland.

Some of the most important industry clusters competing from a base in Hong Kong were created in the wave of expansion in the manufacturing and services sectors in the 1970s and 1980s. These clusters include light manufacturing, transportation, tourism, financial and business services, and communication and media industries (Enright 1997). Hong Kong-based industries have remained strong in specialized niches of global product markets. Thus, in the late 1990s, Hong Kong remained among the world’s largest exporters of items such as watches and clocks, toys and games, imitation jewelry, travel goods and handbags, fur clothing, and telephone sets (Enright 2000).

It is interesting to observe that commodity flows from production for global markets orchestrated by Hong Kong firms increasingly bypass the territory. Figure 4 shows that Hong Kong firms once transshipped or re-exported almost 90 percent of goods via Hong Kong in 1994, but that 37.5 percent were shipped directly to markets overseas from the production site (usually PRD) in 2003. Due to textile import quotas and quality control, Hong Kong firms once re-exported most of their garments (Feenstra and Hanson, 2004). The quota requirements are likely to become irrelevant when new WTO rules become effective, and quality control and logistics services may shift to the Mainland. Following the removal of quotas during the early part of 2005, Hong Kong's re-exporting of apparel has grown very rapidly, in spite of a spectacular rise in China's direct exports and a decline in domestic apparel exports from Hong Kong (Hong Kong's apparel..., 2005). The key point is that most textile and apparel exports from the PRD—whether passing through Hong Kong or not—are derived from production and marketing chains operated with Hong Kong capital.

(Figure 4 here)

The relocation and expansion of producer networks from Hong Kong to the Pearl River Delta has supported the development of important producer services in Hong Kong in areas such as financial services, insurance, communications, and logistics. The relationship between Hong Kong and southern China is often described as “*qian dian hou chang*” (Hong Kong as the shop in front and China as the factory to the rear). As a consequence, these transformations have resulted in an ever-growing, knowledge-based business sector whose primary activities are enhanced by innovation and research. The innovative character of these Hong Kong-based services

is not adequately reflected in the available R&D statistics. The producer services offered by Hong Kong firms have been constantly improved in terms of quality, reliability, and the development of innovative solutions during the last two decades. Despite the relatively high cost of qualified labor, Hong Kong-based firms in logistics, telecommunications, and finance have remained competitive in the region. Trans-national service firms make up a substantial portion of the services sector, and these firms have often brought the latest technological advances to Hong Kong. But service firms increasingly originate in Hong Kong and such firms have been adopting IT-based systems aggressively as their products and service delivery have benefited from the resulting innovation.

One firm that has gained considerable fame on the basis of its high level of competitiveness in innovative services is Li & Fung, a Hong Kong trading company established in Canton in 1906 with sales amounting to US\$4.2 billion in 2001. Li & Fung was among the manufacturers that practiced organizational modes supporting networking, sub-contracting relationships, and the international search for markets before World War II. Today, Li & Fung has developed a specialized role as the orchestrator of loosely coupled supply chain processes for a range of consumer products requiring labor-intensive manufacturing. Supplying well-known clients like Levi Strauss, Reebok, and Disney, the firm uses a broad network of more than 7,500 suppliers in Asia and other continents to meet specific product needs. This positions it to handle the total chain of production and delivery of products to end customers—often packaged and marked with a price to be put directly on the shelf. This efficiency is achieved with the assistance of a hybrid organization that includes a highly advanced and sophisticated electronic trading system linking 5,000 people supervising the manufacturing process and various clients globally. The firm has also developed a

number of customized extranets for major clients such as Coca-Cola (Brown et al, 2002).

At the same time, Li & Fung utilizes more traditional networks of personal contacts and supervision for ensuring quality assessment and on-time deliveries. This extensive network of human resources co-exists with its information technology infrastructure to handle detailed design, production scheduling, logistics, final assembly, and customer relations. A dedicated team is engaged in extremely knowledge-intensive 'disintegration' and optimization of supply chains, carrying out the design and planning of distributed manufacturing and coordination of the vast network. But few of these activities require formal R&D, and innovation is integrated into the development of new business processes and products. It is the specialized expertise in supply chain management that provides Li & Fung with its unique competitiveness in global markets.

In addition to producer services and specialized support for global production chain management undertaken by Hong Kong-based firms, the territory has maintained and expanded its role as a regional financial centre. Notably, Hong Kong has become an important venue for raising financial resources such as venture capital or equity (Florida and Kenney, 1988). Statistics released in 2002 reveal that Hong Kong had developed into the largest venture capital center in Asia, managing 30 percent of the total capital pool in the region. The industry had about US\$50 billion in funds under management by Hong Kong venture capital firms, administered by over 660 professional venture capital managers across about 200 funds, the second highest number after Japan. Hong Kong's venture capital industry is highly export oriented. In 2000, 91 percent of the funds under management by venture capital firms came from outside Hong Kong, the majority from outside Asia. Fully 87 percent of these

funds were serving companies outside of Hong Kong, although the bulk went to companies in the region, particularly in China (Hong Kong Trade Development Council, 2002).

As a financial services hub, Hong Kong offers free-flowing capital and information, an independent judiciary system resting on the rule of law and backed by an uncorrupted government, a very simple and straightforward tax law, and world class transportation and information technology infrastructure (Carney and Gedajlovic, 2000). The environment also benefits from an abundant supply of various professionals in the legal, accounting, finance, and consultancy fields, enabling venture capitalists to benefit from a clustering effect. Perhaps even more essential to venture capital firms and other actors involved in financing innovation is the possibility of utilizing the high liquidity of the Hong Kong Stock Exchange, which has a market capitalization of US\$470 billion. Profits can therefore be earned by sales of equity shares through initial public offerings (IPOs). In an attempt to further promote this aspect of Hong Kong's status as a financial service hub, the Growth Enterprise Market (GEM), established in November 1999, provides a new fundraising channel for emerging growth companies backed by a mature market and regulatory infrastructure. Over 150 companies are listed on the GEM, making up a total market capitalization of about US\$8 billion.

Although R&D and innovation has been increasing over the past several years, innovative activities are undertaken least by small enterprises. Hong Kong small and medium sized enterprises (SME) are defined as non-manufacturing enterprises with fewer than 50 employees and manufacturing enterprises with fewer than 100 employees. In September 2004, there were about 282,000 SMEs in Hong Kong. They accounted for over 98 percent of the total number of enterprises. With the

government's effort to raise awareness of the importance of innovation among all Hong Kong firms, as well as its recent innovation-promoting initiatives, the percentage of SMEs undertaking innovative activities in 2002 has increased as compared with 2001 (HKSAR 2002, 'Report on 2002 Annual Survey of Innovation Activities in the Business Sector,' p.38). This increase was a result of two features: less under-reporting of R&D and also an increase in actual R&D activity as a result of government assistance. As Hong Kong firms face limits to profit-maximization through cost-reduction, they increasingly view innovation and R&D as a driver of future profits. Combined with the government incentives, business R&D expenditures in Hong Kong's SMEs have begun to rise over the past few years. While the number (and percentage) of large firms undertaking innovative activities dropped in 2002, their innovation expenditure continued to constitute over half of all innovation expenditure among businesses in Hong Kong (see Table 2).¹

(Table 2 here)

The establishment of The Hong Kong Science and Technology Parks Corporation (HKSTPC) is an important expression of the ambition to increase R&D spending in small firms. The HKSTPC aims to establish a flagship technology infrastructure to provide a comprehensive range of services that cater to the needs of the high technology industry at various stages, ranging from nurturing technology start-ups through the incubation program to providing facilities and services in the

¹ Technological innovations include all products (goods and services) and processes (production, delivery) that are technologically new or significant technological improvements over older products and processes. The products or processes must have already been implemented (that is, introduced to the market or put in practice within a company). The innovation need not be new or significant to a firm's market (merely new or significant within a firm is sufficient).

Science Park for applied R&D activities to providing land in industrial estates for production.

A noteworthy asset to Hong Kong's innovation system is its relatively dynamic higher education sector related to innovation. University research in Hong Kong is higher in quality than that of its neighbors in the region (as indicated by research output), although recently proposed budget cuts have yet to affect this part of the system. Increasing interaction with industry (in terms of technology and research transfer) marks an important policy-initiated trend in this area. In this respect, the Applied Science and Technology Research Institute (ASTRI), established in 2000 to perform high quality R&D for transfer to industry and to act as a spawning ground for technology entrepreneurs, has begun to make inroads. As of the end March 2004, the ASTRI had carried out 22 R&D projects in four technology areas at a total cost of HK\$179 million (HKSAR, Innovation and Technology Commission, 2004, p. 6).

5. Concluding Remarks

In the ongoing transformation of Hong Kong's innovation system, it is important to remember two easily overlooked points. First, China's innovation system is also undergoing extensive changes with its de facto move from a socialist to a market-oriented economy. Therefore, while it is analytically justifiable for the purposes of scope and concentration to take as our departure Hong Kong's innovation system, changes north of the border have recast the situation in new ways that require further assessment. The conjecture offered here is that Hong Kong's innovation system is expanding in association with developments in China's innovation system—particularly the emerging role of the PRD as a center of innovative developments in

the region. In this respect, one possible fruitful avenue of analysis would lie in studying the co-evolution of the two systems of innovation to examine how they complement one another.

Leading on from this point is the second issue: that relating to the vastness of China and heterogeneity among regions. China's population of 1.3 billion people is an often touted statistic to describe its enormity. However, in addition to the number of people is its land area, of roughly 9.5 million sq. km, just a shade less than the area of the United States. Finally, there is the disparity in incomes between the coastal regions and the hinterland. Each of these rudimentary measures provides a sense of the challenges of analyzing China as a single homogenous unit. A more fruitful avenue of analysis would be to conceptualize Hong Kong's role, not in regard to China as a singular monolith, but rather in regard to Guangdong province in particular, and more specifically the Pearl River Delta region. Therefore, understanding Hong Kong's emerging role in the region as an innovation hub, in which capacity it spearheads the development of new value-added services and provides technological and organizational support for innovation in Guangdong, will reveal important opportunities and challenges and encourage better-informed policy making. Furthermore, such a conceptualization would yield itself to fruitful analyses *between* the various regions in China such as Guangdong (including Hong Kong), Shanghai and Beijing.

An optimistic viewpoint would see the innovation systems in Hong Kong and Guangdong as fundamentally complementary, and thus project a process of co-evolution that would strengthen the specialized competencies in each system ultimately merging into an integrated and effective whole. In this scenario, Hong Kong would continue to provide a window to facilitate interrelationships between

Guangdong province and the international economy while serving as a base for high value-added inputs in the design, production, and distribution of products and services. At the same time, scientific and technological resources in Hong Kong—or those linked directly to Hong Kong—would provide strategic advantages to local firms and transnational corporations entering the Chinese market, particularly the Southern China market. In other words, Hong Kong would become a successful innovation hub for, and spearhead innovative and economic development in, Guangdong province.

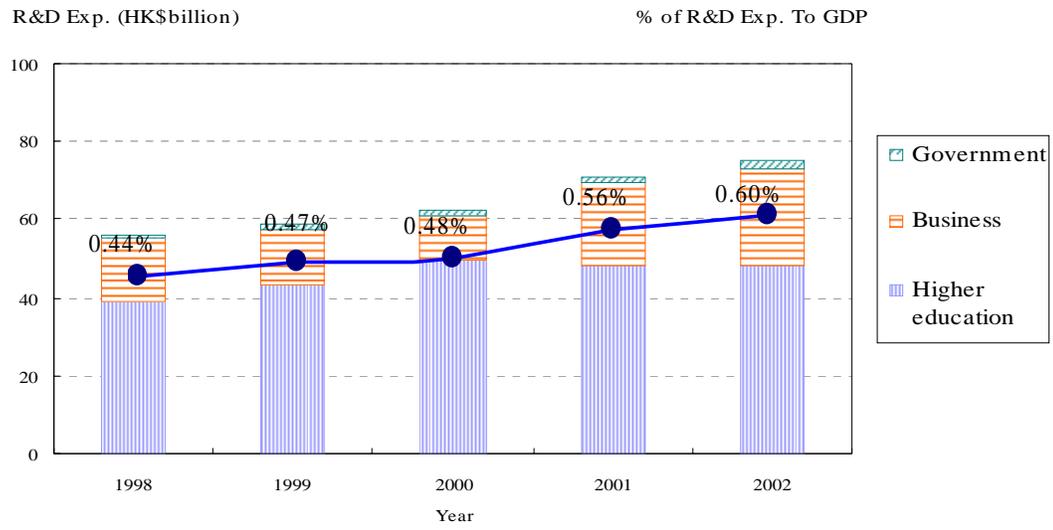
A more pessimistic scenario would envisage more direct competition between regions in Hong Kong and various regions in the Mainland,—each seeking to develop mutually independent systems of innovation and to attract transnational corporate R&D at each other's expense. In that case, local governments on both sides would have far more to do, including establishing expensive, heavily subsidized infrastructure projects or organizations that served specifically to develop new industries without significant inter-linkages to other parts of the wider 'national' innovation system in China. This scenario could reduce the benefits of complementarities between Hong Kong and the Pearl River Delta, but it could also undermine the potential cooperation between organizations in Hong Kong and those from Shanghai and the greater Yangtze River Delta region.

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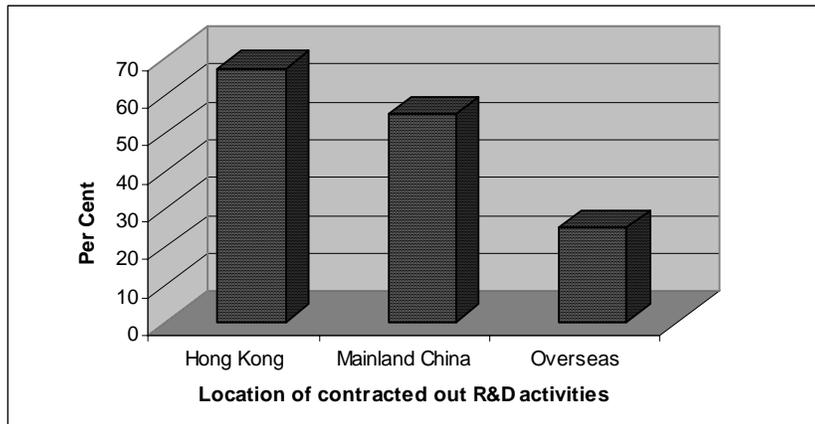
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Figure 1: Hong Kong R&D expenditures, 1998-2002



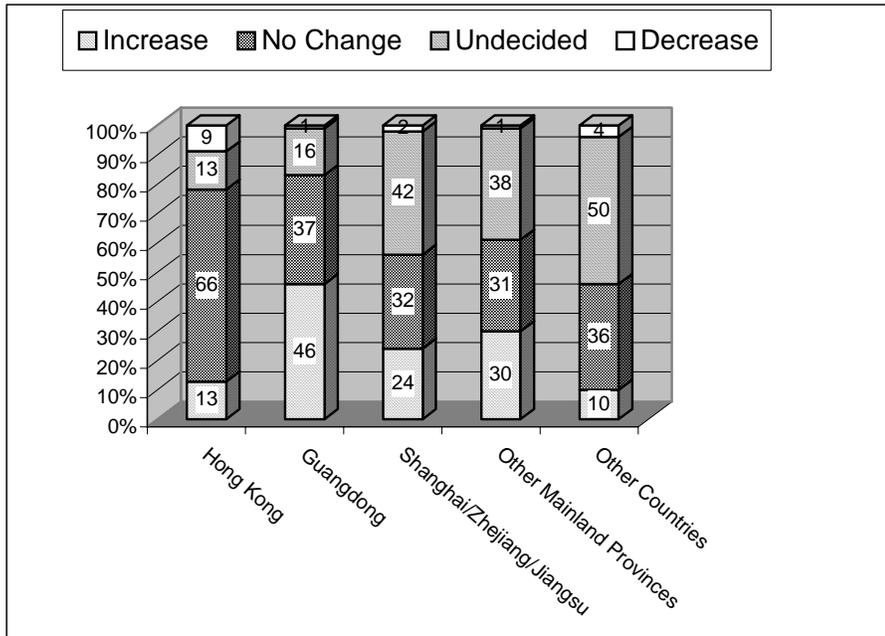
Source: Leung (2005), p. 8.

Figure 2: Pattern of Contracting Out R&D by Hong Kong Firms, 2002



Source: Federation of Hong Kong Industries. 2003. *Made in PRD: The Changing Face of HK Manufacturers*, p. 46

Figure 3: R&D Manpower Planning over the Next 1-2 Years for Hong Kong Firms, as of 2002



Source: Federation of Hong Kong Industries. 2003. *Made in PRD: The Changing Face of HK Manufacturers*, p. 51

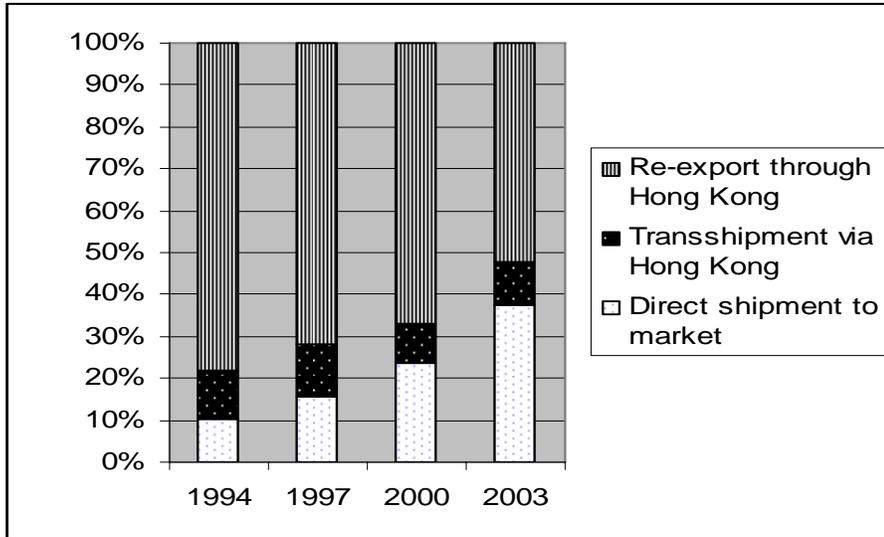
Table 1: Research and Development (R&D) Expenditures and Personnel in
Hong Kong, Guangdong and Beijing, 2001

	<i>Hong Kong (HK\$100 million)</i>	<i>Guangdong (RMB100 million)</i>	<i>Beijing (RMB100 million)</i>
Total R&D Expenditure	70.76	137.43	171.17
- As % of GDP (in region)	0.55%	1.29%	6.02%
Expenditure by:			
- Scientific Research Institutions	1.47#	5.18	91.04
- Higher Education	48.47	4.65	20.86
- Large & Medium Enterprises	20.83*	89.60	21.10
Total FTE of R&D Personnel	7,365	79,052	96,255
FTE of R&D Personnel in:			
- Scientific Research Institutions	280#	4,209	43,982
- Higher Education	3,791	9,949	18,171
- Large & Medium Enterprises	3,294	43,279	12,277

Government * Business

Source: Based on Table 4.2 in Federation of Hong Kong Industries. 2003. *Made in PRD: The Changing Face of HK Manufacturers*, p. 54

Figure 4: Shipment Methods for Exports of Goods Made in China by Hong Kong Companies



Source: Hong Kong Trade Development Council, *Reaching Out, Not Hollowing Out: Hong Kong*

Industry and Trade Development Trends Under Globalization. December 2004, p. 15

Table 2: Key Statistics on innovation activities in the business sector 2001 & 2002

<u>Size of Establishment</u>	<u>Year</u>	<u>Total Number of Establishments</u>	<u>Number of Establishments having undertaken innovation activities^a</u>	<u>Innovation Expenditure (HK\$ million)^b</u>
Large	2001	5781	771 (13.3%)	3602.8 (53.4%)
	2002	5083	662 (13.0%)	4858.1 (55.0%)
Medium	2001	32 591	2647 (8.1%)	1987.2 (29.5%)
	2002	28 040	3974 (14.2%)	2562.1 (29.0%)
Small	2001	234 315	7448 (3.2%)	1156.4 (17.1%)
	2002	232 325	11 877 (5.1%)	1415.1 (16.0%)
Total	2001	272 688	10 866 (4.0%)	6746.4 (100.0%)
	2002	265 449	16 513 (6.2%)	8853.3 (100.0%)

^a Innovation activities include product innovation, process innovation, ongoing innovation activities and abandoned activities.

Figures in brackets represent the per centages to total no. of establishments

^b Figures in brackets represent the per centages to total innovation expenditure

Source: Adapted from, 'Report on 2002 Annual Survey of Innovation Activities in the Business Sector,' p.38.