Hong Kong Innovation Project

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Hong Kong and the Pearl River Delta:

Science and Technology Cooperation

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Science and technology, and innovation in particular, have become a critical concern of policy makers and politicians. Throughout Asia, there has been a concerted effort, through national and sub-national policies to improve technological capabilities and to create an environment of technological entrepreneurship. These policies, of course, differ by location, but there is a degree of convergence as all of the economies in the region expand financial and institutional support for small and medium sized enterprises; foster university-industry linkages and promote university start-ups; and build cooperative agreements between state labs and private industry.

The paradox is that as innovation becomes an increasing focus of national (or sub-national) policy, the process itself is becoming increasingly globalized. High technology companies and major research universities have become un-tethered, searching for customers, ideas, and talent in markets around the world. High technology companies in particular have become less "national" as they have become more global. In many industrial sectors, it is increasingly difficult to disentangle the separate national components of the value chain. The semiconductor, PC, and cell phone industries, to name just a few, involve production networks that span the mainland, Taiwan, Hong Kong, Korea, Japan, and the United States.

How the Hong Kong Special Administrative Region (HKSAR) interacts with this larger global system of innovation, what value it adds and what benefits it can leverage, is in many ways determined by its relationship with the Chinese mainland, and with the Pearl River Delta (PRD) in particular. Hong Kong does have links to other centers of research and development—especially the United States, Taiwan, and Japan—but getting

the science and technology relationship with the Pearl River Delta right is critical to Hong Kong's future.

There is already a dense web of policies, institutions, business relationships, and personal networks that tie Hong Kong and the PRD together in the areas of science, technology, and innovation, and the trend is toward even closer integration. Opportunities for joint research and development, educational exchange, business alliances, and collaborative innovation are all growing.

There is also seems to be a widespread consensus that the economic context for Hong Kong is rapidly changing. For at least the last twenty years, the relationship could be summarized as "front shop, back factory" (*qian dian hou chang*), or the location of production in the PRD and important services, such as financial services, marketing, design, insurance, communications and logistics in HKSAR. But the PRD, while still China's manufacturing center, faces increased competition from other places in the mainland, including the Yangtze River region and the Beijing-Tianjin corridor as well as other regions in Asia such as the Singapore-Malaysia-Indonesia triangle. Most important, the PRD is no longer content to be the back factory. The region has committed to moving up the value chain, spending more on R&D, upgrading manufacturing capabilities and creating clusters of universities, R&D institutes, and start-up firms in such places as Science Park in Shenzhen, Songshan Lake in Dongguan, and Bio-Island in Guangzhou.

While there is a shared diagnosis of the situation, it is difficult to escape the impression that there is no shared, coherent vision of what the ultimate objective is—of what Hong Kong should be doing about the changing economic environment. Given the

widespread view that Hong Kong's historical success has been based in a market driven, laissez faire approach to economic development, it is not surprising that science policy does not have a great deal of institutional or public support. Some argue that the government's inability, or unwillingness, to pursue a more coherent innovation policy reflects the public's general lack of interest; others reverse the causality, seeing government's failure to forcefully argue for the need for innovation policy as being in part behind public apathy. These critics worry that Hong Kong's traditional "hands-off" approach is fundamentally incompatible with what needs to be done to build a knowledge economy in the HKSAR.

Some of this uncertainty about how to respond to new challenges emerges from larger political or ideological debates about Hong Kong's future—how close should the relationship be between Hong Kong and the Pearl River Delta, and how hard should Hong Kong work to maintain some sense of separateness from the mainland? Should the stress be on "One Country" or on "Two Systems"? There are those who fear that Hong Kong is not integrating with the mainland fast enough, and will soon be marginalized by both the rapid growth in China and the loss of Hong Kong's role as the only door into China. The ambitious development strategy outlined in Guangdong's 11th Five Year Plan, for example, provoked a great deal of soul searching in the HKSAR, and former Chief Secretary for Administration Rafael Hui Si-yan created a small storm when he warned that Hong Kong could be left on the sidelines.

In December 2008, the National Development and Reform Commission announced an even more ambitious plan for the Pearl River Delta, *The Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020).* The plan

will not only would provide HK $5.68 billion for the construction of a bridge linking Hong Kong, Macau and Zhuhai, but also sets the goal of shifting the Delta from a low-cost manufacturing base to a locale for high-end manufacturing, modern services, and finance. The region will develop a:

> strategic orientation toward high-end development, build a new stronghold for independent innovation, forge a number of advanced manufacturing bases that rank high among their world counterparts in both scale and quality, foster a batch of internationally competitive world-class enterprises and brands, develop a system of service industries to match Hong Kong as an international financial center, and develop into an international center for shipping, logistics, trade, conferences and exhibition, tourism, and innovation that has a different positioning from Hong Kong and Macao.

Manufacturing powered by high-technology, according to the plan, will generate at least 30 percent of the region's total industrial output by 2020. In the end, Guangdong "will pursue convergence with Hong Kong and Macau in terms of urban planning, rail transit networks, information networks, energy base networks and urban water supply."

While many will be pleased with this new impetus to integration, , for some the prospect of this convergence of the HKSAR and the PRD is the issue. . The journalist Philip Bowring argues that it is Hong Kong's uniqueness that in fact makes it competitive, and so integration should proceed slowly; Hong Kong "has a struggle on its hands to retain an identity which allows it to follow policies to help sustain its position as one of

the world's richest cities, which necessarily means revisiting pressures to force the pace of integration with a still much poorer mainland."[1]

In many ways, the HKSAR is archetypal of the interactions between globalization and regionalization—the SAR embodies and benefits from both the distribution of production, technology, and capital across global borders as well as the forces of interdependence that tightly tie economic regions together as units of competition. With the current financial crisis, it is highly possible that the world will move in a more regional direction, not a global one—Europe, North America, and Asia will turn inward and raise trade barriers against each other. If this is the future, then it is likely that the HKSAR will become even more dependent on the PRD and the People's Republic of China.

There is an opposing argument to be made, however. There can be real economic and political benefits to be leveraged from Hong Kong keeping close economic ties to the rest of the world. The question, for the HKSAR and China, is what degree of autonomy is useful to both sides?

In addition to these larger questions, there are more structural, problems of coordination between two different political systems and multiple actors, and of finding complementarities among several economies all at different levels of development with different comparative advantages. There are many actors involved spread across several legal jurisdictions and all are not pursuing the same interests at the same time. Even when actors agree on common goals, implementation remains difficult. Perhaps more worrying for the people of Hong Kong, some of the reporting on the twelve year plan for the PRD suggests that the HKSAR had a limited role in the planning process. "Only if the

government proactively participates in relevant plans, can Hong Kong make full use of its advantages and achieve a win-win effect with mainland," suggested an editorial in *Ming Pao*. "If it plays no role in the planning process and does not participate actively, the outcome will be 'being planned [by the mainland].'" [2]

There are specific policies that can be adopted to address the issue of coordination. But before these policies are tackled, the larger political issues need to be addressed— issues that need to be discussed beyond the narrow range of innovation policy. One of the biggest barriers to improved S&T coordination, for example, is, as Eric Thun also notes in his paper [chapter], policy makers continue to try and distinguish between Hong Kong and Pearl River Delta companies. Yet it no longer makes much sense to distinguish firms based on ownership—mainland firms can list on the Hong Kong stock market, Hong Kong firms no longer need to have a front office in the HKSAR. In addition, Hong Kong's positioning as a service center or as a platform for intellectual property depends in large part on the quality of the manufacturing in the Pearl River Delta. Or as a Dongguan official put it: "We tell our counterparts in Hong Kong: You are not helping Dongguan, you are helping your own companies, and you are helping yourself."

There are some seemingly simply policy solutions to this problem. But for Hong Kong to really move forward as an innovation hub, it may be necessary to have greater integration with the PRD. Exploiting all the opportunities offered by the mainland may require the HKSAR to sacrifice a degree of its autonomy. In effect, the globalization-regionalization conundrum must be addressed head on. But this is as much a political decision as it is a policy one.

The Current State of HKSAR and PRD S&T Relations

There already is a dense web of policies, consultative mechanisms, institutions, and personal networks that tie Hong Kong to the Pearl River Delta in the areas of science, technology, and innovation. Since January 2006 and the third phase of the Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA), all Hong Kong goods can be exported duty-free to China. CEPA also includes preferential access to the mainland for Hong Kong services companies, including patent and trademark agencies and those offering information technology services. Still many argue that CEPA's most important contribution has not been the tariff reduction, but instead the relaxation of travel restrictions on mainland travelers visiting Hong Kong. Mainland Chinese visitors jumped from 3.79 million in 2000 to 13.6 million 2006, spurring a recovery in the retail and tourism sectors

Two recent policy initiatives address the question of collaborative R&D and innovation directly. The Guangdong - Hong Kong Technology Cooperation Funding Scheme (TCFS) supports collaborative research. All proposals must demonstrate an element of Guangdong-Hong Kong cooperation. Universities, research institutes, trade and industry associations, professional bodies, and local companies can all apply for funding under three research schemes—*Platform*, which includes publicly-funded R&D institutes and trade associations; *Collaborating*, which is private companies with local publicly-funded research institutes; and *Company*, which is private companies without publicly-funded research institutes.

The applications are solicited and vetted either by one of the five research centers established in 2006 (automobile, nanotechnology and new material, information technology and communications, logistics, and textiles), or by the Innovation and Technology Commission (ITC). As of July 2008, twenty-six research and development projects were approved, with total funding amounting to around HK$120 million.

In February of 2009, as part of the TCFS, HKSAR and Shenzhen announced they would jointly fund eight applied research and development projects. The Hong Kong government will contribute HK $36.44 million to R&D projects in electric vehicles, battery technologies, RFID applications, and energy and green technologies.[3]

The Shenzhen/Hong Kong Innovation Circle is a broad framework for increasing collaboration. Initiative for the plan, at least according to one report, came from the Shenzhen government. A 2006 Shenzhen government document called innovation a strategic goal and subsequently Shenzhen officials pressed the Hong Kong Trade Development Council, Hong Kong Science and Technology Park, Chinese University of Hong Kong and the Hong Kong University of Science and Technology for support. The first major project under the Innovation Circle umbrella, announced in May 2008, is a joint project of Shenzhen, Hong Kong Science and Technology Park, and DuPont to establish a Solar Energy R&D Support Center.

The Innovation and Technology Commission is involved in several cooperation mechanisms including: the Mainland/Hong Kong Science and Technology Cooperation Committee, the Pan-PRD Joint Conference on Regional Cooperation in Science and Technology, the Guangdong/Hong Kong Expert Group on Cooperation in Innovation and Technology, and the Steering Group on Shenzhen/Hong Kong Co-operation in

Innovation and Technology. The Hong Kong/Guangdong Expert Group on Co-operation in Informatization serves a similar consultative role, though the topics tend to be of a more applied nature and include the use of RFID in logistics and radio spectrum management as well as joint development in interoperability of open source software, next generation networks; and wireless and mobile technology

Institutions

Dotting the landscape are a number of institutions that link the two regions together. The PKU-HKUST Shenzhen-Hong Kong Institution was established in August 1999 as a joint venture of the Shenzhen Municipal Government, Peking University (PKU) and the Hong Kong University of Science and Technology (HKUST). It is located in the Shenzhen Hi-tech Industrial Park and acts as incubator for high-tech professionals in the Shenzhen-Hong Kong bay area. Through its 2005-2020 Strategic Plan, HKUST also plans to develop R&D and spin-off activities in five areas—nano, biotechnology, electronics, wireless, and sustainable development—in Shenzhen.

The Nansha IT Park is a project of Hong Kong University of Science and Technology, Fok Ying Tung Foundation, and the Guangzhou government designed to foster high tech industries in the region. In September 2008, HKUST opened a new graduate school in the park. In addition, located in the Shenzhen High-tech Industrial Park, the Shenzhen-Hong Kong Productivity Foundation supports Hong Kong industries operating in Shenzhen.

The Hong Kong Productivity Council supports Hong Kong enterprises operating in the Pearl River Delta (PRD) through three subsidiaries in Guangzhou, Shenzhen and Dongguan. These three subsidiaries provide training, business consultancy and IT industry support services. Opened in 2007, the Shenzhen Hong Kong Productivity Foundation is focused on product innovation, especially in the areas environmental technology, electronics and automotive technology, and software and digital entertainment.

People

Parallel to these institutional frameworks, frequent personal contacts and meetings occur throughout the region. Members of science bureaus in Dongguan, Zhuhai, and Shenzhen all spoke of numerous contacts with members of the ITC. Conversely, the ITC reports collaborative arrangements with the Mainland in different levels, including the Ministry of Science and Technology, the Ministry of Information Industry, Guangdong Provincial Department of Science and Technology, the Shenzhen Municipal Government and various provinces in the pan-PRD region.

The Nansha Science and Technology Forum brings policy makers, scientific experts, and business leaders together to discuss the region's technological, social, and economic development. Professional associations throughout the region, including the Internet Professional Association and the Chinese Software Professionals Association, hold networking meetings, conferences on special topics, and business plan competitions.

Joint academic research and publications are also critical. HKUST aids Shenzhen enterprises seeking to upgrade manufacturing capabilities, has established with Huawei, joint R&D center, and undertakes projects under the National Basic Research Program (also known as the 973 Program, organized by the Chinese Ministry of Science and Technology. For scholars on the mainland, Hong Kong academics ranked third in 2000 as coauthors on research papers (339 joint papers with Chinese scientists as first author), after the United States (587) and Japan (566).[4]

Most important, the HKSAR is connected to the PRD through inter and intra firm connections. The mainland is major source for and destination of Hong Kong high technology products. In 2007, 61 percent of all IT equipment exports were to the mainland; slightly more than 70 percent of IT equipment re-exports from Hong Kong are originally from the mainland. For telecom equipment, 38 percent of exports were to the mainland; re-exports from the mainland make close to 80 percent of re-exports from Hong Kong.[5]

These connections tend to fall under the traditional "front office, back factory" division of labor. Component design and application, quality control, project management services and logistics support, software development and systems integration, and marketing and licensing all occur in the HKSAR. Labor-intensive manufacturing processes are carried out in the PRD, as is, increasingly some research and development. Vtech for example moved manufacturing to Dongguan, and R&D to Shenzhen, after the company decided it was too difficult to find engineers in HKSAR: "fewer and fewer people in HK can do this."—they could do something else and so they left, and engineers in Shenzhen were about half the cost. Product management, the

development of a roadmap for the company, and interface with customers remained in Hong Kong, and VTECH expected this division of labor to stay this way.

Tightening the link

The central organizing principle for future cooperation, for many on both sides of the border, is that Hong Kong will act as R&D and service center as well as IP platform for the mainland. As mainland companies move up value chain, they will need help acquiring market intelligence and the rights to use technology products from abroad as well as developing branding and marketing strategies and it is in these spaces where Hong Kong will play a role. Most studies seem to support at least the structural basis for this relationship, as the PRD is said to lack service companies.[6] S&T officials in Dongguan said, "When we think about cooperation with HKSAR we think of services as well as the city's orientation toward the West."

Yet despite the widespread acceptance of this division, there are some doubts about how effectively the cooperation is developing. The same Dongguan officials who told me of Hong Kong's importance as a service center, also stressed that this role was not technology oriented, but in the realm of finance and marketing. Some question whether Hong Kong has or will ever have the R&D capabilities needed to play an active role in the PRD's upgrading. Several of the studies in this volume, especially Mowery and Wong, suggest that HKSAR universities are not keeping pace with the increasing applied R&D capabilities of mainland universities. Yeh and Xu come to a particularly pessimistic conclusion: "Because of its own low technological level, HK's role in supporting the PRD's high tech development is minimal, if not totally impossible."[7]

At the same time, there is anecdotal evidence that building Hong Kong as an intellectual property platform may not be easy as multinational companies could find their own ways to work around the problem of the lack of IP protection on the mainland, cutting the HKSAR out of the equation. As a manager at STMicroelectronics told Douglas Fuller, the company, after setting up a design center in Shenzhen, went to Shanghai rather than Hong Kong. This suggests that while IP protection is better in HK and the HKSTP offers better services for IC design, it may not matter much for firms that have operated successfully in the mainland. They may have developed their own best practices—dividing processes into component parts, keeping the most valuable IP at home—that make Hong Kong less attractive.

Despite the wide range of interactions occurring between the PRD and the HKSAR, much of the cooperation is seen as not fully utilized, to be in its early stages, or not effective. Or in the words of one Shenzhen S&T official: "The scale is not large enough. Cooperation is broad but not deep." The challenges fall into three categories: leadership, coordination, and competition.

Leadership

There is a perception in China that no one in HKSAR government "owns" the issue of technological cooperation and so there is no one on the Hong Kong side to push things through when good ideas are brought up. As one S&T official in Dongguan put it: "The ITC is interested in many of the things we suggest but the problem is no one listens to them. They have to get leaders above interested."

Some on the mainland suggested that this lack of leadership came from the desire to protect "One Country, Two Systems" making the HKSAR very slow and very conservative. As noted above, there is, at least in some corners, a sense that Hong Kong played a very passive role in the development of the NRDC's plan for the reform and development of the PRD. In the realm of science and technology, the default response to any new policy initiative, according to one Dongguan official, is "We cannot do this."

The lack of leadership on the Hong Kong side means no one is prepared to address the most pressing issue: the mismatch between what PRD companies want (or at least what PRD officials say companies want) and what the HKSAR can or will provide in the way of investment. The prohibition on Hong Kong money being spent outside the 1000 sq km area of HKSAR, or in the phrase that came up multiple times in interviews: "money can't cross the river," maybe the biggest barrier to deeper cooperation. The issue here, as in Eric Thun's chapter, is policy is now focused on ownership—nominally Hong Kong or mainland firms—not on improving the competitiveness of the HKSAR and PRD together.

Coordination

This problem of leadership is compounded by the every-day problems of working across two systems and dealing with different educational systems as well as tax, labor, and visa laws. The planning timeframe is different, with the HKSAR producing new budgets and policies every year and the PRD engaging in five and twelve year plans, although Hong Kong has moved to do some longer term planning with its "Hong Kong's 2030 Vision and Strategy." In addition, not surprisingly, neither the Hong Kong nor the

Pearl River Delta side speaks with one voice; they each have their own coordination problems.

There is a redundancy in the plans for science and technology in each of the PRD provinces. Each of the provinces pursues its own interest, with a great deal of overlap in large-scale projects and basic research. According to Lu Jianbao, "each provincial policy possess strong regional protectionism, which obstructs the exchange among factors of technology innovation, the usage of resources to a great degree, and does not benefit the smooth operation of the region's innovation system."[8]

For much of this decade, it did not seem likely that Beijing was willing or able to resolve these coordination problems. At least until December 2008, there was no evidence that Hong Kong and its innovative capabilities weighed heavily in the thinking of decision makers, policy analysts, or entrepreneurs in Beijing. It was only in 2007 that the Ministry of Science and Technology (MOST) agreed to accept applications from Hong Kong universities and research institutions to set up State Key Laboratories in Hong Kong. The program, which began on the mainland in 1984, engages local universities and research institutions in the key national technology programs. ITC, along with the Research Grants Council, is now reviewing 17 applications with results to be announced in 2008.

The National Development and Reform Commission, in addition, has many programs to upgrade SMEs, including active programs in the PRD, but none of these programs include activities for Hong Kong or cooperation with Hong Kong. According to an interview conducted by Douglas Fuller, NDRC officials did not seem to think this line of cooperation would be explored much in the future either.

The NRDC's plan may signal a change. The guidelines explicitly mention the creation of a "a new regional layout of innovation along the Guangzhou-Shenzhen-Hong Kong axis" through the deepening of the science and technology cooperation among Guangdong, Hong Kong and Macao, establishing zones for joint innovation, and strengthening. It also states that Beijing will encourage Guangdong, Macao, and Hong Kong to increase their consultation and to formulate regional cooperation plans.

Competition

Finally, there is a clear element of economic competition between the HKSAR and the PRD. Today, many of the cities in Pearl River Delta are thinking of moving into areas that are, or could be, Hong Kong's competitive advantage. The NRDC's twelve year plan speaks of the Pearl River Delta developing modern service industries, logistics, information services, and science and technology services, with" in-depth cooperation with Hong Kong and Macao.".

The question is whether their ambitions will come at the expense of Hong Kong. Several of the chapters of this report [book] suggest better exploiting one of Hong Kong's clearest competitive advantages, especially vis a vis the mainland: its excellent universities. The NRDC's plan sets the goal of Guangzhou, Shenzhen, and Zhuhai establishing "cooperative higher education institutions with 3 to 5 famous foreign universities, and the region will develop 1 to 2 universities that are first class in China and enjoy a leading status in the world."

Writing about Shenzhen, Bowring argues that momentum lies to the north: "Shenzhen has set its sights on becoming an 'international city.' This is supposed to be achieved by strengthening so-called 'cooperation' with Hong Kong in the very areas where Hong Kong now excels, finance and logistics. Given the political dynamics, Shenzhen would be more likely to absorb Hong Kong than vice versa."[9]

Shenzhen is also aggressively moving to develop its indigenous capabilities and develop S&T products. There is a clear desire to change the industrial nature of Shenzhen, to move from "processed in Shenzhen" to "made in" and eventually "designed in" Shenzhen. In the 11th Five Year Plan, total spending on R&D will total 100 billion RMB with the government share at 10 percent. In 2006, Shenzhen spent 3.4 per cent of its gross domestic product on research programs—the highest percentage in China—and the city trails only Beijing and Jiangsu in absolute spending. "Our spending on technology research is now second only to our education spending. We are very serious about it," said Zhang Lailin, deputy director of the Shenzhen Trade Development Bureau.[10] One local official put it even more bluntly: "Shenzhen has to invest in R&D or it will die."

During interviews in Shenzhen, it was easy to note an explicit critique of Hong Kong for not being as aggressive as Taiwan and Singapore about pursing technological innovation through industrial policy, as well as a somewhat lecturing tone of what Shenzhen had accomplished while the HKSAR had stood still. In fact, several interviewees explained that people in Hong Kong did not really understand what was happening in their backyard, either because they still looked down on the mainland, or because they were "too close." Hong Kong businessmen make the trip in a day and so,

according to one Dongguan official, "are not integrated into local business community. The Taiwanese are much better at this."

Policy Agenda

Given these difficulties in leadership, coordination, and cooperation, policy action is suggested in five areas: platforms, resources, borders, institutions and leadership, and diversification. As noted at the beginning of this chapter, however, the success of many of these actions will be determined by a larger, inherently more political decision to treat the PRD and HKSAR as one economic entity—to view new technological capabilities located in the Pearl River Delta as critical to Hong Kong's competitiveness.

Common platforms

Policies focused on supporting specific technologies are unlikely to be as successful as those focused on the development of common platforms. These policies avoid many of the typical shortcomings of "pick the winner" industrial policy, and play to the natural division of labor between HKSAR and PRD. There has been some movement toward the creation of common accreditation and educational standards. United International College, situated in Zhuhai and jointly founded by Beijing Normal University and Hong Kong Baptist University, is the first full-scale cooperation in higher education between the Mainland and Hong Kong. The goal is to develop a new model of liberal arts education for the mainland, but more needs to be done systemically to bring

Hong Kong and mainland university systems into greater sync at the same time as Hong Kong universities move to four-year degrees by 2012.

The most obvious area of cooperation is the development of new technology standards. ASTRI is already involved in the development involved in a joint project on developing standards for home networking and applications as well as high-speed wireless, and there are various discussions by the business and professional associations on RFID and other technologies. The Guangdong-Hong Kong RFID Industry Cooperation Memorandum was signed in June 2007.

The challenge for Hong Kong, both at the association and individual firm level, is how to participate in the development of new Chinese standards without isolating itself from international standards and global markets. In some instances, and in the case of WAPI (WLAN Authentication and Privacy Infrastructure, a competitor to WiFi) in particular, Chinese standards have been exclusionary, developed without international participation, and viewed by many multinationals as a tool to force technology transfer.

In addition, Hong Kong already operates as an IPR platform—it attracts MNCs that want to operate in the mainland but fear the high level of IPR theft. It can further leverage this competitive advantage, especially with a concerted effort to reach out to smaller firms that want to do business in China but that do not have confidence to enter the market on their own, providing a one stop clearing house of best practices, trusted partners, and due diligence. In addition to hosting a website that provides advice to companies wanting to export to China (www.export.gov/china), the U.S. Department of Commerce, in cooperation with the American Bar Association, the National Association of Manufacturers, and the American Chamber of Commerce in China, runs the China

Intellectual Property Rights Advisory Program, which offers free consultation on IPR issues to American small and medium-sized enterprises. Hong Kong could offer a similar service.

As with standards policy, there are possible pitfalls ahead. There could be a tension between protecting Hong Kong's reputation as a location with a strong IPR regime and its increasing collaboration with mainland firms, who may not be the most protective of foreign IPR. Hong Kong officials, as well as its business association, will have to closely monitor the state of Hong Kong's international reputation.

Finally, there should be a central directory of all the S&T cooperation occurring between the two regions. In 2007, the Hong Kong and Shenzhen governments set up a website to promote the sharing of the equipment, labs and professors at technological institutes. This could be expanded to include the entire region and would serve as a clearing house for all projects, which might help identify potential areas of future cooperation and prevent redundancy.

Resources

Regulations preventing "money from crossing river" should be reconsidered in light of the link between the technological capability of the HKSAR and the manufacturing quality of firms operating in the PRD, no matter what the ownership. Currently, the government is considering relaxing the geographical restrictions on the University-Industry Collaboration Program, which supports commercial R&D projects undertaken by private companies in collaboration with local universities. In addition, a

PRD component could be added to other ITC funding programs—Small Entrepreneur Research Assistance Program could include mainland partners, for example.

Hong Kong officials could also be more assertive about pushing for the inclusion of local universities and research institutes into mainland funding programs. As mentioned earlier, it was only very recently that money from the 973 program began going to HK institutes, and, as Joe Wong's chapter notes, although biotech labs at HKU have received "key state lab" recognition from the mainland, they have yet to receive any money from the PRC government. Similarly, Douglas Fuller notes Hong Kong received essentially no support or funding from the central government for IC development plans.

Borders

There remain some geographic barriers to cooperation, with numerous interviews mentioning the need to improve the flow of people and visa processes for people from PRD coming into HKSAR, and vice versa. The visa process for mainland engineers and scientists needs to be rationalized. Also, as mentioned by David Mowery, there is a need to open HK universities to greater undergraduate enrollment from the mainland.

Institutions and Leadership

Many of the issues of coordination—as well as addressing the perception that the HKSAR is essentially reacting to the development plans of Shenzhen—might be resolved by a more vocal and public trumpeting of the goal of S&T collaboration. It may be required to strengthen role of ITC to fulfill this role, or possibly to shift the responsibility

for HKSAR-PRD S&T cooperation up to the secretary in order to give it a higher profile and greater bureaucratic power. At the very least, there need to be clear and consistent statements at top—from Chief Executive and others—of the importance of innovation to Hong Kong's future, and of collaborative innovation in particular.

At the very least the HKSAR needs to seize the initiative on the issue. This means not allowing the "Shenzhen/Hong Kong Innovation Circle" to be defined primarily by talking and plan making, a fate that seems to have befallen many of the other collaborative projects that preceded it. The Solar Energy R&D Support Center is a good start, and it needs to be followed with additional projects.

Diversification

S&T connections with the Pearl River Delta are clearly the most important, but Hong Kong also has to strengthen ties with other centers of innovation. In fact, the more tightly linked to the rest of the world Hong Kong is, the more valuable it is to the PRD; the more closely tied to the PRD, the more attractive Hong Kong is to the rest of the world. The local universities, HKSTP and the research institutes need to strengthen cooperation with Taiwan, Southeast Asia, Japan, Korea, and India. The government should also hold a HKSAR-ASEAN Technology Summit (HKSAR-India etc), designed to provide an opportunity for R&D institutions, academia, industries and government of ASEAN countries and HKSAR to interface.

Hong Kong will also want to leverage more informal networks and try to attract young technology entrepreneurs from India, Southeast Asia, Europe and United States through subsidized space at Cyberport and HKSTP or other benefits and by make it easier for scientists and engineer from the countries to get visas. As Douglas Fuller notes, few Hong Kong engineers in Silicon Valley have been lured back because of "the lack of an existing viable tech sector, lack of venture capital, and limited government support give few incentives to return. The HKSAR may also consider assisting in the development of an equivalent of TiE (The Indus Entrepreneurs) for Hong Kong entrepreneurs located around the world.

Conclusion

The task ahead for Hong Kong is not an easy one. Coordination between the HKSAR and the PRD is bound to be complicated given the multitude of actors and interests involved. Moreover, especially in the shadow of the NRDC twelve year plan, Hong Kong will have to work hard to fight the impression that it is no longer in the driver's seat, that the initiative and energy for regional development lies in the Pearl River Delta.

The difficulty for Hong Kong is more than a coordination problem. Instead, it is the larger question of how much autonomy is good for Hong Kong and for the mainland. There seems little doubt that Hong Kong's economic future is tied to the PRD. If Hong Kong truly wants to develop its own innovative capabilities, than it will have to rely on the resources and talent of the PRD. Closer collaboration will be critical. Still, a

relatively autonomous Hong Kong—one that acts as a filter between the PRC and the rest of the world, that retains a strong independent financial capability, and builds on its position as a regional center of educational excellence—could be a major source of strength for China. Creating that autonomy, however, is not a policy process as much as it is a political one.

POLICY SUGGESTIONS

1. Greater progress toward common accreditation and educational standards

2. Improved cooperation in the area of technology standards

3. Improve IPR service (creating an IPR advisory program) to foreign SMEs looking to operate on mainland

4. Create a central directory of all S&T cooperation between HKSAR and PRD

5. Relaxing the geographical restrictions on the University-Industry Collaboration Program. Add a PRD component to other ITC funding programs—Small Entrepreneur Research Assistance Program could include mainland partners, for example. However, the standard of reciprocity proposed by Thun in his second recommendation (Report No. 8) should be maintained.

6. Greater involvement of Hong Kong labs in PRC S&T programs

7. Rationalization of visa process for mainland engineers and scientists

8. Open HK universities to greater enrollment from the mainland

9. Clear and consistent statements at top—from Chief Executive and others—of the importance of innovation to Hong Kong's future, and of collaborative innovation in particular.

10. Diversify: The government should hold a HKSAR-ASEAN Technology Summit (HKSAR-India etc), designed to provide an opportunity for R&D institutions, academia, industries and government of ASEAN countries and HKSAR to interface.

11. Leverage more informal networks and try to attract young technology entrepreneurs from India, Southeast Asia, Europe and United States

[1] Philip Bowring, "At Risk: Hong Kong's Identity – and Prosperity," Hong Kong Journal, Winter 2008, available at: http://www.hkjournal.org/archive/2008_winter/3.htm

[2] See for example, 規劃過程無角色只會被規劃 港府須積極參與涉港的規劃. 明報. 1 月 2 日

[3] George Leopold, "China Announces R&D Projects," EE Times, February 6, 2009.

[4] Wu Yishan et al, "China Scientific and Technical Papers and Citations (CSTPC): History, impact and outlook," *Scientometrics*, Vol. 60, No. 3 (2004) 385.397

[5] TDC Research, Shenzhen-Hong Kong Technology Industry Cooperation 2007

[6] See for example, 陆剑宝, "泛珠三角经济的技术创新体系建设研究," 珠江经济. 2006 年 6 月.

[7] Anthony Yeh and Jiang Xu, "Turning of the Dragon Head: Changing Role of Hong Kong in the Regional Development of the PRD," in Anthony G. O. Yeh, editor, *Developing a Competitive PRD in South China Under One Country-Two Systems* (Hong Kong: Hong Kong Press. 2006), 63-96.

[8] 陆剑宝, "泛珠三角经济的技术创新体系建设研究," 珠江经济. 2006 年 6 月.

[9] Phillip Bowring, "Two threats to Hong Kong," *International Herald Tribune*, July 16, 2008

[10] Quoted in Chow Chung-yan, "$2HK billion boost for delta technology," *South China Morning Post*, October 14, 2006.