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# Transnational Entrepreneurs as Agents of International Innovation Linkages

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## EXECUTIVE SUMMARY

Improving technological innovation, particularly the transfer of technology to commercial performance, is a serious and widely recognized challenge facing Canada today. Among the various barriers to innovation is the lack of availability of people capable of carrying out innovation activities ranging from the creation of knowledge to the utilization of knowledge in the marketplace. As a partial remedy, Canada has adopted an immigration policy designed to attract internationally educated professionals (IEPs) to help build the country's technology sectors. At present, it appears this objective has not been entirely successful. Many IEPs are moving toward two unplanned paths because they are unable to enter a profession for which they were trained, or to take a position in which their qualifications can be fully utilized. The first is into the retail and service sector, in which the skills of IEPs are largely unused or under-used. The second is the return to their countries of origin where they can pursue entrepreneurial opportunities by utilizing their skills, which are likely to have been enhanced through the IEPs' experience in Canada.

In the latter case, which is the focus of the current research, the concern is based on the assumption that reverse migration will cause "brain loss" or "brain drain," the phenomenon in which countries lose their brightest and best educated people to other countries that offer a more attractive economic and political environment. This phenomenon is historically associated with poor, immigrant-sending countries. While some authors have observed benefits arising from such transnational migration, such as bilateral trade and investment, no one has convincingly suggested a genuine "brain circulation" whereby both Canada and the countries of origin benefit from such transnational migration in terms of their national innovation performance. Thus, many continue to believe that Canada is losing the global "war" for talent.

The basic premise underlying the current research is that, increasingly in scale and scope, contemporary entrepreneurial activities carried out by the migrating IEPs enhance innovation activities in both the destination and source countries. This suggests that IEPs' cross-border activities offer opportunities for a healthy circulation of knowledge. Our research focuses on the *innovation linkages* established and maintained by migrating Chinese IEPs who concurrently engage in business in Canada and China, but keep Canada as home base. Through extensive fieldwork, we have identified a significant segment of internationally educated Chinese transnational entrepreneurs (CTEs) within the Chinese community in Canada. The CTEs' experiences suggest that innovation often has an incremental nature and is comprised of various interconnected elements. In a globalized economy, the system of innovation likely functions at a supra-national level and is embedded in cross-border value chains. With such understanding, we discuss the specific roles of CTEs in linking Canada and China in innovation activities, and use several cases to illustrate our main arguments. The report concludes with suggestions to enable Canada to take better advantage of the transnational entrepreneur sustained innovation through global value chains.

Our key findings include the following:

*I. There exists a distinct transnational segment alongside the settled and returned segments among the Chinese immigrants in Canada.*

They carry key characteristics that distinguish them from the classic middlemen traders who engage in traditional business activities such as trade, service and travel, and from the recent returnee entrepreneurs, that is those who have returned to their home countries entirely. The characteristics of Canada-based CTEs, compared to those based outside Canada, include:

- Greater likelihood of multinational experience.
- Professionally more established.
- More deeply embedded in the host country, i.e., Canada.
- A stronger desire to engage Canada in their cross-border entrepreneurial endeavours.

*II. CTEs have followed different mechanisms in linking Canada and China in innovation activities.*

Depending on factors such as industry, resource stock of the CTE, and the nature of innovation, a Canada-based CTE may choose to engage China in a variety of ways. Canada can reap broad benefits from such cross-border activities, including:

- Taking advantage of innovative ideas and original research from China.
- Accessing global knowledge and talent pools.
- Enabling production possibilities necessary for viable knowledge transformation.
- Enhancing ability to sell technology-embedded products in Canada and elsewhere.

*III. CTEs face significant challenges in conducting cross-border innovation activities, including:*

- Uncertainty with respect to regulatory frameworks concerning intellectual property rights, taxation, etc. within and across countries.
- Difficulty with respect to sources of such necessities as financing, human capital and social networking to a greater degree than a non-immigrant entrepreneur would experience.
- Absence of civil and community trust and support.

*IV. The opportunities and challenges identified in this research have significant policy implications.*

Using transnational entrepreneurs as international innovation linkages is a bold proposition, requiring some fundamental changes in orientation, chiefly to aim consciously at innovation benefits from participation in the global supply chain and to promote transnational entrepreneurship (TE) as an alternative way for immigrants to contribute to the Canadian economy. Several actions, immediate or in the longer term, are recommended, including:

- Establishing a Canada-based innovation and entrepreneurship platform targeted at TEs.
- Engaging TEs' countries of origin in the coordination of migration-mediated cross-border innovation activities.
- Researching and developing frameworks for international innovation collaboration with regard to issues such as taxation, intellectual property rights and citizenship.

## INTRODUCTION

It has long been recognized that Canada trails other industrialized countries in innovation (Evans 1994) the ultimate driver of national competitiveness and prosperity. According to a recent Conference Board report, Canada is ranked 14th out of 17 major industrialized countries in terms of innovation (Conference Board 2007). Efforts are being made by think-tanks and policy makers to identify the inherent weaknesses within Canada's innovation system in an attempt to improve this situation. A consistent message that emerges from these efforts is that Canada lacks the *people* necessary for innovation activities – we lack individuals capable of making the connection between scientific ideas and the eventual marketplace, including engineers, technicians, and entrepreneurs (Industry Canada 2006).

For some time, Canada's immigration policy has made it a key objective to attract internationally educated professionals to develop and enhance Canada's technology sectors (Hay 1984). For various reasons, the above objective has not been fulfilled. There is a compelling body of evidence indicating that a large proportion of IEPs have not been integrated into Canada's general labour market. Two outcomes have been observed. First, many IEPs have settled in sectors and/or positions in which their professional skills are not required, such as retail and service. Second, an increasing number of IEPs have been found to have returned to their countries of origin. Under both circumstances, knowledge and expertise are either wasted or lost to Canada, and the goal of increased capacity as stated in the policy remains unfulfilled.

In consequence, the task of expanding Canada's technology sectors, a key aim of the country's economic policy, continues to lack necessary resources for growth. In recent years, government efforts have been enhanced to reverse the first trend. For example, numerous bridging programs have been developed to facilitate immigrants' participation in the general labour market, particularly in regulated professional fields. On the other hand, little has been done to mitigate the second trend. In fact, returned immigrants have sometimes been identified as disloyal opportunists. The repatriation of IEPs is said to cause "brain drain," which is historically associated with under-developed countries with high emigration levels. While the phenomenon of a "Canadian diaspora" is anticipated to result in certain benefits for Canada (Zhang 2007), to date, no substantive evidence exists connecting this trend with the country's innovation performance. Among the countries experiencing significant repatriation of diaspora professionals, China has caused the most concern as the country has recently become the number one source of immigrants to Canada (Szonyi 2003).

Is the concern that Canada is losing the global war for talent as brain drain valid? First, it is recognized that the "repatriation" of skilled immigrants may be an irreversible movement in a globalizing world, having more to do with economic development in the IEPs' birth countries than with Canada's policies. Second, an increasing portion of reverse migrants have adopted transnational living (instead of repatriation or resettlement), that is, simultaneously engaging in both Canada and China. Third and most importantly, the business activities of IEPs while "border-crossing" can help create a healthy circulation of knowledge that will benefit Canada as well as China.

The objective of the current study is to assess the evidence for the assumptions described above, to examine how migrating CTEs can act as agents of innovation linkages through border-crossing entrepreneurial activities, and subsequently to suggest ways in which Canada could more effectively benefit from this migration-embodied knowledge exchange to enhance innovation in Canada. We achieve this by identifying the innovation challenges facing Canada and describing the profiles of transnational entrepreneurs who have engaged in cross-border innovation and examine the vital link between Canada's innovative activities and transnational

entrepreneurship. Information gathered from 42 in-depth interviews (most involving CTEs residing in Canada) and focus group discussions involving over 50 participants enhance our understanding of innovation from the process, system, and agent perspectives. We analyze representative cases as examples of best practices for cross-border innovation. Our focus is on potential cross-fertilization of technical knowledge above and beyond the general business mores recognized in recent literature. Based on the findings, we look into the public policy implications for Canada with regard to CTE-mediated cross-border innovation.

## CONCEPTUAL FRAMEWORK

### UNDERSTANDING INNOVATION

To understand how TEs can help link Canada and China in innovation, we need a fresh and comprehensive approach to innovation, which involves: viewing innovation as a process; considering entrepreneurs as agents of innovation; appreciating incremental and cumulative innovation; and looking at innovation from the perspective of the global supply chain.

*Innovation as Process*. The Conference Board of Canada (2004) defines innovation as a process through which economic or social value is extracted from knowledge – through the *creation*, *diffusion* and *transformation* of knowledge – to produce new or significantly improved products or processes that are put to use by society. As a process, innovation is defined in terms of sequential stages and/or modular or interconnected activities, rather than its end-product as materialized in a technology or product (Gertler 2007). Table 1 describes the various activities included in each of the four innovation dimensions.

Table 1: Innovation Activities

| Knowledge Creation | Knowledge Diffusion | Knowledge Transformation | Knowledge Utilization |
|---|---|---|---|
| Researching<br>Inventing<br>Designing | Mentoring<br>Networking<br>Collaborating<br>Training<br>Publishing | Prototyping<br>Testing<br>Customizing<br>Producing<br>Assembling | Selling<br>Buying<br>Installing<br>Operating |

Source: The Conference Board of Canada (2004)

Perceiving innovation as a process is crucial since it suggests that the tasks leading to a complete innovation can be and often are divided among separate entities. In contemporary technology fields such as IT, the trend has been toward fragmentation; it has become increasingly rare for a single firm, even one as resourceful as Microsoft, to develop an entirely new “product” in-house. As a result, knowledge sharing and research collaborations linking different entities have become the norm (Noyce 1982).

*Entrepreneurs as Agents of Innovation*. Historically, it is business firms that have been considered the main agents of innovation as they are likely to implement new ideas and introduce them into the marketplace. However, as argued by Schumpeter (1926) many decades previously, large firms may end up blocking innovation initiatives and it is the individual

entrepreneurs who serve as agents of technological change and innovation. Even within and between established firms, individuals play a role in knowledge creation and transmission, especially with regard to tacit knowledge that is humanly embodied (Mason et al. 2004). The fragmentation in the technology fields certainly enhances the ability of individual entrepreneurs to develop innovation tasks through to eventual marketplace success.

*Incremental and Cumulative Innovation*. A factor "empowering" individual entrepreneurs in the innovation game is the fact that innovation is not limited to the costly "breakthrough" developments. Instead, innovation is predominantly incremental or cumulative (Hargadon 2003). For instance, most "innovations" in the IT field are niche-focused, involving an extension or adaptation of an existing technology to improve a system, or a new service integrating various pieces of available technologies. Thus, innovation is rare under the traditional definition, even in large corporations in Canada. For example, in the pharmaceutical industry, only a small number of very large multinational corporations (MNCs) have been engaged in the basic R&D leading to the breakthrough of new drugs; most firms are concerned with the incremental improvement of extant innovations. Indeed, imitative and cumulative innovations are possible and arguably responsible for the increased development and competitiveness of countries such as Japan. Hence an appropriate question facing innovation-hungry countries such as Canada is: what factors account for the capability to incorporate, combine, and integrate prior knowledge? (Murray and O'Mahony 2007)

*Innovation in Global Value Chain*. The above question is usually addressed in a national context. In this regard, the "small diamond" problem [1]has long been recognized as a fundamental deficiency within our national innovation system (Industry Canada 2006). On the demand side, small market size makes it more difficult for Canadian corporations than their U.S. counterparts to pursue commercialization. It has been widely recognized that the shortage of people capable of carrying out innovation from R&D through to commercialization is certainly a major supply-related problem within our national innovation system. A critical review of the various proposals for resolving these problems, however, clearly indicates that an essential reason for the failure of various initiatives is that the thinking remains rooted in a national perspective and therefore fails to reflect how innovation works in an era of increased globalization. Although the global value chain is now an accepted concept, few people have associated it with national innovation performance. However, evidence has recently emerged suggesting that engaging in global supply chains not only enables the reduction of costs, but more importantly the access to skills and innovation opportunities (Core 2008). This is a key reason why international engagement and productivity/competitiveness are interconnected (Conference Board of Canada 2008).

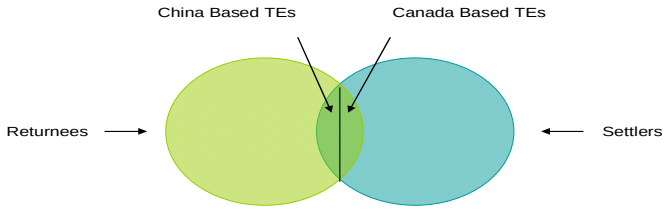
## UNDERSTANDING TRANSNATIONAL ENTREPRENEURS

*TE Segments and Home Base*. Transnational entrepreneurship (TE) is recognized as an alternative mode of immigrants' economic adaptation (Portes et al. 2002). As part of the immigrant entrepreneurial sector, TE is contrasted with conventionally-perceived ethnic entrepreneurship, often associated with terminology such as "enclave" or "ethnic economy" (Light 2004). While ethnic entrepreneurs are constrained geographically and resource-wide to a co-ethnic community in a host country, TEs are those immigrants physically and/or virtually engaged in two or more locations, often including their country of origin, in entrepreneurial pursuits (Drori et al. 2006). Citing prominent examples of Indians and Chinese in Silicon Valley, however, much of the recent literature has actually focused on a unique portion of the transnational community - returnee entrepreneurs, i.e., skilled migrants who have returned and

created business ventures in their country of origin. Although returnee entrepreneurs may maintain ties with the adopted country, the fact that they have repatriated to the original country has significant implications. Figure 1 positions the two TE groups in relation to other segments of the immigrant entrepreneurial sector.

*Settlers* are entrepreneurs who have emigrated from China and conducted business within Canada. There is a huge body of literature on this segment of Chinese immigrant entrepreneurs, often under the theme of ethnic enclave when their business is geographically bonded in a co-ethnic neighbourhood or ethnic economy, that is, any business that is either owned, supervised, or staffed by ethnic minority group members regardless of locational clustering (Light 2004). While reverse migration took place almost as early as international migration, *returnees* refer to the group of Chinese immigrants who have returned to China after the country launched the two-fold economic transformation (i.e., market-oriented reform and open-door policy) in the 1980s (Lin 2006).

**Figure 1. Canada-base TEs and the Rest of Immigrant Entrepreneurial Sector**




Taking advantage of emerging market opportunities in China and equipped with advanced knowledge and skills through Western education and training, returnee entrepreneurs have been an engine for innovation in their motherland while creating wealth for themselves. Transnational entrepreneurship is a more contemporary phenomenon in responding to accelerated globalization and favourable policy environments across nation-states. Different from the returnee entrepreneurs, transnational entrepreneurs simultaneously engage in two or more locations, often including their country of origin, in pursuing entrepreneurial opportunities (Drori et al. 2006). However, we have made a distinction between *China based CTEs* versus *Canada based CTEs* and attached significance to a transnational migrant's home base. Research suggests that individual identity is always associated with the nation-state. Home for a transnational professional may be mobile, but a chosen location remains meaningful since it indicates the focal point for emotional relationships at the time (Nowicka 2007). From a business perspective, the choice of home location is usually based on where the substantive activities occur and from which key resources are drawn. Most importantly, home implies commitment.

*Opportunities for Brain Circulations*. The global war for talent is based on a gain-loss assumption: "brain gain" for one country means "brain drain" for another. In modern times, no country has benefited more from immigration in developing its innovation capabilities than the United States (Florida 2004). On the other hand, immigrant-sending countries have suffered

from loss of capacity, decline in average-per-worker income, and unrecoverable investment in education (Ozden and Schiff 2005). However, other forces at work lead to “brain gain” to source countries when skilled immigrants return home (Meyer and Brown 1999). As shown in the case of returnee entrepreneurs, China has recently witnessed a boom in its various technology sectors in which Western-trained returnees have played a significant role (Lin 2006). From a historical perspective, the emigration-repatriation cycle creates a possibility for “brain circulation” whereby both receiving and source countries have benefited from skilled migration at different points of time.

However, it seems completely different to suggest that transnational entrepreneurs contribute to Canada’s innovation performance by engaging China in their cross-border activities. In earlier discussion, we have suggested that an increasing number of migrating Chinese adopt a transnational way of enterprising and that Canada based CTEs are likely to act in the interest of Canada. But we still have to answer another key question: How can Canada benefit from engaging China in terms of innovation given the lower level of technological development in China? Starting with the case of Taiwan, Saxenian (2002) believes that brain circulation has increasingly benefited both the U.S. and China, but the latter case has yet to be substantiated. The emerging literature on transnational entrepreneurship suggests the two general trends that make it possible for immigrant hosting countries, generally the more developed countries, to benefit from genuine brain circulation as well. First, as evidenced in the PC industry, there is a trend toward a more fragmented industrial structure organized around networks of specialized producers (Bresnahan 2007) and, as a result, opportunities emerge for peripheral regions to participate in the value chain of innovation (Saxenian 2006). Second, the divide in the global economy has increasingly been replaced by partnerships in certain parts of the world, where emerging market economies have accelerated their efforts to catch up. With regard to innovation, several relatively new science-based technologies have provided opportunities for countries such as China (Niosi and Reid 2007). According to a Canadian executive who recently visited China, “In many ways, China is actually ahead of the curve as far as commitment and research” (OCRI 2008).

## CHINESE TRANSNATIONAL ENTREPRENEURS

Who are the CTEs who serve as agents of innovation linkages between Canada and China? In addressing this question with our findings, we begin by profiling the human capital factors brought in by the CTEs when they first entered Canada, considering the debate over brain drain versus brain gain. We then present the conditions under which the Chinese professionals have turned to transnational entrepreneurship. Finally, we discuss the meaning of choosing Canada as home base.

### Human Capital at Entry

The census data suggest that immigrants as a whole have a higher level of education than the general population in Canada (Statistics Canada 2008). Among the 30 Canada-based CTEs interviewed, all have completed their undergraduate studies in China, most (87 per cent) have graduate-level or other professional degrees, or have worked in post-doctoral positions. Many of them have had substantial education in more than one country (87 per cent), and all of them have work experience in both China and Canada.

Table 2: CTEs' Profiling: Human Capital (N=30)

| Item | Category | Number and Percent |
|---|---|---|
| Level of Education | University Degree<br>Master's Degree<br>Doctoral Degree<br>Professional Degree | 4 (13)<br>12 (40)<br>10 (33)<br>4 (13) |
| Country of Education | China only<br>China and Canada<br>China and Europe<br>China and USA<br>China, Canada and Other | 4 (13)<br>14 (47)<br>5 (17)<br>4 (13)<br>3 (10) |
| Country of Work Experience | China and Canada<br>China and USA<br>China and Europe<br>China, Canada and Other | 14 (47)<br>6 (20)<br>5 (17)<br>5 (17) |

As can be seen, some CTEs bring with them education and work experience from countries beyond China and Canada, such as the U.S. and European countries (53%). Several interviewees had already comfortably settled in the U.S. but made the "ultimate choice" to live in Canada for reasons such as family, lifestyle preference, and social security. In some cases, the CTEs had started or even completed a substantial research work prior to their landing in Canada, which later materialized as a Canada-patented innovation.

In addition to education and work experience, the CTEs also brought in with them entrepreneurial spirit/acumen through work and/or venture experience. This quality is a critical, if not the most critical, element in the innovation process. Several of our interviewees operated successful businesses before they moved to Canada. Some of these CTEs have brought their savings and made substantial financial investment in Canada when they came. Unlike student-visa immigrants, they chose Canada for additional opportunities, often with concrete venture ideas.

Table 3: CTEs' Profiling: Industry Sectors (N=30)

| Sector | Number | Percent |
|---|---|---|
| Architecture | 1 | 3.3 |
| Agriculture | 2 | 6.7 |
| Bio/Medical Science | 4 | 13.3 |
| Education | 2 | 6.7 |
| Environment/Energy | 4 | 13.3 |
| Engineering | 2 | 6.7 |
| Information System | 13 | 43.3 |
| Material Science | 2 | 6.7 |
| Total | 30 | 100 |

The CTEs have been involved in a variety of industries, including architecture, agriculture, bio/medical science, education, environment and clean energy, engineering, material science, and information technology/system (IT/S). These are the industries wherein Canada and China are likely to find complementary strengths. The largest CTEs group is found in IT/S (43%); as mentioned earlier, the IT/S sector probably offers the best opportunities for entrepreneurship because its fragmented industrial structure. Table 3 summarizes the profile of industry sectors.

Reasons for Homeland Business Engagement

The reasons/conditions for CTEs' engagement with China can be easily summarized into a set of "push" and "pull" factors. On the push side, it could be prompted when they encounter barriers associated with "glass-ceiling" and racial discrimination, both at individual and institutional levels. This difficulty with the general labour market is common to all segments of immigrant entrepreneurship, including the classic enclave economy, which push immigrants into co-ethnic community without much contact with the mainstream society. Another factor, which is more salient with CTEs is a feeling that their career development is stalling, where they do not see their future match their vision and ability, and they in turn decide that a personal business venture would be the most appropriate next step in their professional growth. Obviously, this "plateau effect" occurs only when a person is employed. In our sample, 90% of the CTEs held a job in the general labour market before they turned to transnational entrepreneurship.

The most influential pull factor is the emerging economy in China. Not all CTEs possess cutting edge technology, but all have identified some kind of gap between the two countries. The gap may not necessarily be technological but rather related to market structure. In one case, a CTE has developed an innovative piece of software with the potential to challenge the market leader in North America. The entrepreneur, however, is now considering returning to China to avoid head-on competition with the U.S. companies. A powerful force *directly* pulling the CTEs toward the Chinese market is the various efforts by the Chinese government to lure diaspora professionals back "home". This affects many of our interview participants. For example, about half of our interviewees have participated in the "China Venture Tours" organized by a Chinese science park designated for Western returnees and several of them consequently decided to set up a business in the park. Finally, CTEs also expressed being pulled by the social capital (e.g., personal ties) in China. CTEs tend to believe that opportunities are embedded in the social structure. According to one CTE, social connections are one of the three things that would enable a successful venture in China, the other two being technology and money. Thus, when a Chinese immigrant in Canada holds substantial social connections in China, s/he is likely to considering taking advantage of them when launching a business venture. According to one CTE, before knew what kind of business his new venture would be in, he had already determined that it should involve China.

When Canada is Home

While the two groups of CTEs, Canada based versus China based, share many similarities, still there are important differences between the two groups and the most significant feature distinguishing them is the level of embeddedness in Canada. Compared to their Canada based counterparts, China based CTEs tend to have shorter tenure in Canada, their work experience tends to be limited, and their social ties in Canada tend to be weaker. According to our fieldwork, calling Canada home is significant. When Canada is the home base, a CTE is more likely to consider him/herself a Canadian. Importantly, a Canada based CTE is more likely to involve Canada in their business activities. This is especially significant in light of Canada's

small market size, and therefore relatively limited business opportunities. For a China based CTE –and even more so for a returnee, these could be logical reasons for ignoring Canada; however, for a CTE configuring their business in such a way that Canada could be engaged, the connection often provides an incentive. One of the interviewees told us that on average, he spent about five months in China, five months in Canada, and two months in the US for business. At the time of the interview, most of his business was in China, so his time in Canada was more like vacation. As he put it "[Canada's] business opportunities are limited and market is small, so I have to explore elsewhere. However, I have never given up the idea [of doing business with Canada]. Each time I came home [Canada], I say to myself – there's got to be something worth doing. I am getting there."

The experience of Canada based CTEs reflected the complexity of the decision between staying in Canada or returning to China. They have given other reasons why they have not "broken away" from Canada to re-settle in China. As mentioned earlier, they tend to have spent longer periods of time in Canada, which is probably the most significant factor in favour of staying in Canada. As many of the interview participants mentioned, the more time they have spent in Canada, the harder it is for them to leave. In turn, longer tenure in Canada often implies older age and older CTEs are more likely to be too deeply rooted in Canada to leave permanently. Older people also tend to have grown children, another factor contributing to transnational living. It is more difficult to move older children because they have acculturated to Canada. On the other hand, having older children makes it easier for a parent to be away for a relatively longer period of time. Finally, our interviews suggest that all Canada based CTEs have developed positive feelings and a deeper attachment to Canada for reasons such as a more favourable immigration policy and the multicultural environment. For almost half of our interview participants, Canada was not the first stop after emigrating out of China. However, it is only in Canada where they have felt at home because of its more open immigration policies.

CTEs are businesspersons and as such, their decision to stay in Canada tends to be rational as much as emotional. Those who have chosen Canada as their primary residence are likely to have set up their business' head office in Canada. A main reason for such a choice is staying close to the source of technology, a key component of their transnational business. This is particularly true for CTEs in a niche sector that does not involve much manufacturing activity. It is important to realize that the conventional notion of low-cost R&D can be misleading. We found that one of the advantages of Canada is its proximity to advanced technology hubs and the much stronger research infrastructure in North America. As the interviews reveal, one higher paid researcher in Canada can be more valuable than several low-paid researchers in China even though the total cost is the same.

## CTEs AS CROSS-BORDER INNOVATION LINKAGES

This section summarizes and analyzes the various ways Canada based CTEs contribute to innovation performance in Canada as well as in China by serving as a viable cross-country linkage. We use the earlier-described Conference Board model (Table 1) to frame our findings and draw on several real-life examples[2] (in the boxes) to illustrate our arguments and reflect the insights from the CTEs.

### Knowledge Creation

Canada's immigration policy has to be appraised bearing in mind the value of attracting IEPs as a source of inputs in knowledge creation. All CTEs interviewed received a university education

in China and many of them obtained their terminal degrees outside Canada. Thus Canada is able to benefit from other countries' investment in human capital at a minimum cost. These IEPs may bring with them nascent ideas and sometimes have part of the R&D already completed prior to their arrival in Canada. Although the overall technology level in China remains lower, this does not mean that China is behind Canada in every technological field. Previous research shows that increased fragmentation of industry structure (e.g., in the IT industry) offers niche opportunities for China to participate in innovation. Indeed, we found several cases in which the CTEs have developing leading-edge IT or software products independently. Since a huge investment (e.g., in equipment) is not necessary and individual entrepreneurs can handle the R&D process up to the completion of beta testing without relying on outside resources.

In Dr. Sun's case (see Box 1), the Chinese scientists landed in the Canadian soils with a clear purpose of commercializing a cutting-edge technology resulting from several years of development undertaken in China. When Dr. Sun signed the contract with the Canadian firm, the technology was taking shape and almost ready for field test. As a result, the Canadian firm was able to quickly complete the innovation cycle with limited resource contributions. It is important to note that the story was still unfolding at the time of our field work. The CTEs were in a process to develop the secondary-generation of the technology by taking advantage of generous research support from the Chinese government and research institutions. The intention is to bring the technology back to Canada, since one of the team members has kept Canada as home.

We are reminded by the CTEs that scientific ideas are not necessarily the most important element in innovation. In many cases, what is essential is the ability to identify market opportunities and subsequently to formulate a marketable technological concept. In this regard, CTEs tend to have advantage because of their transnational experience and networks. According to Mr. Deng (see Box 5), at the time he started developing his product idea, four other Chinese immigrants as he knew were looking at the same market with similar idea of engaging China! Mr. Deng was not trained in engineering, but came up with a new design that fits well with the Canadian market yet is cost effective with a combination of Canadian and Chinese inputs. The story suggests that entrepreneurship, including entrepreneurial learning and resilience, is a crucial ability to inform and actuate research in the creation of usable knowledge.

**Box 1: Innovation Escalation through Migration**

Dr. Sun and his two Chinese scientist friends graduated with PhDs in material sciences from a prestigious Chinese university. After presenting their research paper on new materials for use in construction at an international conference, they were offered a contract by a major Canadian mining firm with a sole objective of turning the basic search into commercial technology. As one of these scientists secured the contract with the firm, all three emigrated to Canada in the early 1990s.

Dr. Sun and his friends brought with them a scientific idea based on substantial research they had undertaken in China. With the financial resources, research infrastructure, and operational scale of the Canadian firm, they eventually completed the R&D work, the first generation technology was born and patented by the firm. New materials based on the technology were used in the Canadian mining industry and perceived as having the potential for further development and wider commercial application. At the completion of the research, the contract with the Chinese scientist was terminated.

Dr. Sun and his friends were initially happy because their idea could be eventually realized in the real world. But they soon realized that when the contract was completed, the contracted scientist was out of job – and the job yielded only minimum wage if the R&D contract was converted to salary, given his enormous time commitment and the support provided by the other two without pay. They were increasingly frustrated as they were not rewarded in accordance with the value generated by the technology they had developed and they were completely alienated from the final product and the company to which they provided the technology and knowledge. Now the three of them were also facing the fact that they had to work on jobs that had nothing to do with their training and experience.

On New Year's Eve 2000, the three Chinese scholars met at Niagara to look at their options. They were clear that they could not continue to contribute to the technological development in their trained field. Returning to China seemed a viable option due to the emerging market opportunities there. "We were watching the Niagara Falls falling down with its immense power, recalling our dreams and feeling it's time to return home for the new millennium." After the decision to return to China to realize their dreams, the three friends spent ten months of strategizing and preparation, then left for China.

Taking advantage of the Chinese government's policy of attracting overseas scholars and offering research support, one of the three scholars joined the faculty of a prestigious university while the other two launched a business affiliated with the university. The research was recognized as cutting edge and internationally marketable and was in turn funded by a major Chinese national research grant. The "second generation technology," as it was called by the three Chinese scientists, was born in the Chinese university's lab. This new technology is revolutionary for using the residuals from the steel industry to make building materials stronger, more economic and environmental friendly.

Today, Dr. Sun and one of his friends have returned to Canada and reunited with their families. These scientists-turned-entrepreneurs have good reason to bring the second generation technology to Canada while eyeing global markets.

Knowledge Diffusion

With their distinct ability to draw resources from both host and home countries, CTEs have engaged China in various collaborative activities in knowledge sharing and dissemination. Through partnerships with local entities, CTEs are often able to participate in and even lead research projects funded by the Chinese government agencies. In a sense, China could be subsidizing Canadian innovations through the CTEs. However, it is more often that the benefits are mutual. For example, one CTE was aware of a particular technology on the Chinese government's priority funding list and subsequently helped linked a Chinese university and a Canadian university with similar research interests in a joint development project. Importantly, the CTE helped both parties realize that the collaboration was not a pure academic exercise, but aimed at commercialization of resultant technology.

**Box 2: Think Globally, Act Globally**

Like many CTEs we have interviewed who were educated in multiple countries, Dr. Zhao graduated in China and got his PhD from a prestigious US university. He migrated to Canada as a post-doctoral student in computer science and later was hired as a tenured track professor. Unlike many others who have settled into a purely academic life of teaching and publishing, this professor determined to put his doctoral thesis to commercial use.

After several years of development work in Canada, the technology based on his research started taking shape. As soon as the first prototype of his new system was born in the university lab, Dr. Zhao felt the pressure to make a choice between an academic career and entrepreneurial pursuits. Soon, a major Canadian company offered to purchase his products in quantity. At the university, he continued to develop the technology, but found that he was spending all his efforts on the commercialization of the technology. He eventually resigned from the tenured professorship to focus his energy on his new venture.

Dr. Zhao emphasized that his venture was designed to be a global company and it is truly so. Today, the company's products are sold all over the world. The sales to China are only minimal at the moment, since the demand from the Chinese market is not sophisticated enough for his high-tech products. In addition to the company's core R&D activities in Canada, the company has developed a sizable R&D centre in China for two main reasons and purposes. First, the centre is now responsible for much of the company's ongoing research and testing, taking advantage of China's large pool of IT talent. Second, the centre serves as a "human resource reservoir" for the company's future business in China through training and collaborative projects with local universities.

Currently, Canada is and will remain a small market, but will continue to play the central role in administration and product design. The US is the company's largest market, but Dr. Zhao does not think moving his headquarters to the US is a consideration. In addition to his residence in Toronto, he believes that Canada offers equal access to the latest information and technology as well as a more desirable environment for his high-skilled employees. According to Dr. Zhao, the company's sound market performance can be attributed to its cutting-edge technology and a unique management system that combines conventional Western management tools and "Oriental wisdom".

Note that the service of the CTE did not stop here: he would work with both research teams through the entire R&D process till completion in the marketplace. He could play such a role because of his mobility and entrepreneurial capabilities that are normally lacking in a research institution. When engaging Chinese universities in such collaborations, the CTEs also gain access to abundant supplies of talent in graduate students and sometimes raw materials for R&D services that would be extremely expensive in Canada. Many CTEs mentioned the recent change in the Chinese government's economic development agenda that shows a strong commitment to innovation. This implies unprecedented R&D investment and a commensurate increase in intellectual property protection.

Currently, his IT products are sold all over the world but the sales to China are very small. Still, the company has established a wholly owned subsidiary with a sizable R&D centre in China. What is the logic for making such a huge investment? According to Dr. Zhao, the China centre is now responsible for much of the company's ongoing research and testing tasks. In the long run, it is needed to serves as a "human resource reservoir" for the company's business expansion in China. It may be interesting to know that Canada is and will remain a small market whereas the United States is the largest source of sales and profits to the company. However, Dr. Zhao did not see the need to move his headquarters and key operations – R&D as well as marketing to U.S. given the geographic proximity between the two countries. His transnational experience tells him that Canada offers certain advantages over the U.S. with regards to natural and human environments.

Knowledge Transformation

A significant factor limiting Canada's commercialization of technology innovation is the lack of capital required to go to market and or to scale up (Conference Board 2005). For example, entrepreneurial firms have limited access to venture capital. As a result, many Canadian inventions have been put on the shelf, and innovative firms have left or been bought by resource-rich U.S. firms. By engaging China, the CTEs have found a solution with which Canada can reap the benefits of innovation originated in Canada. In pharmaceutical industry, for example, the development stage is more labour intensive and constitutes about 70% of the total cost of R&D. Recently, a team of CTEs has developed a complex mechanism to commercialize Canada drug inventions in China. The CTEs would identify promising inventions that however are faced with financial challenges in further development activities, including but not limited to clinical trials. Through carefully designed IP arrangements and consulted with both Canadian and Chinese regulations, the CTEs would bring the inventions to China for further development, much of which is labour intensive. The benefits from engaging China, according to the CTEs, not only come from lower labour costs, the sheer number of patients available for such development activities, but also the generous resource commitment from eager collaborators in China.

While more and more people have grown comfortable with offshore manufacturing, the CTEs believed that no many have considered efficient manufacturing as an integral part of innovation capability. Taking advantage of China's low-cost manufacturing, the CTEs are able to economically convert Canadian technologies into marketable products. When the products are shipped back to Canada, Canadian consumers are able to enjoy the benefits of Canadian innovation at a lower cost and without paying the price of pollution. The case of Dr. Hay's Canadian-based pharmaceutical company may help us understand these points (see Box 3).

It is not unusual that a Canadian firm does not have all the technological components needed for a complete, innovative market offering. Under such circumstances, the firm may take an open source approach (Chesbrough 2003) and derive innovation benefits by strategically participating in global value chain. When China is involved in the value chain, which has increasingly been the case in recent years, CTEs can play a pivotal role. Through their intimate knowledge about China, these entrepreneurs help identify components and products as entry-stage or middle-stage inputs for a Canadian firm. Subsequently, they may be asked to negotiate with and engage the Chinese firms in the value chain given their language and cultural skills. The technologies embodied in the Chinese inputs may be only intermediate, but yet appropriate and internally unavailable to the Canadian firm. Interestingly, the CTEs' bringing capability is not necessarily limited to China, but may be readily expansible to a third country (e.g., the U.S. or

**Box 3: Commercialization across Borders**

Dr. Hay has an undergraduate degree from China, received further education in the US, and then graduated in Canada with a PhD in Medical Sciences. After graduation he started working in an entrepreneurial pharmaceutical firm in Canada as the R&D director. The company grew from 18 employees to over 10,000 during the nine years he was working for the company. As the firm grew to become one of the largest Canadian pharmaceutical companies, it opened up China markets. Dr. Hay served as the chief scientist keeping watch on many pharmaceutical firms in China for commercialization opportunities, but was never offered any share of the company.

Dr. Hay felt that he could manage his own company and take leadership and ownership. He resigned from the Canadian company and established his own Canadian-based company with operations in China. Using the business model from his experience with his former company, he searched the world for cutting-edge pharmaceutical drugs and developed new processes and/or formulas. Dr. Hay knew "new drugs come to the market in a rush and flaws are unavoidable."

Based on such research, his company's products were manufactured in China, and then in international markets, including pharmaceutical firms in Canada. China is the key element in the entire value chain. Only by using its low-cost structure in R&D and manufacturing does the technology become commercially viable. With his established pharmaceutical firm in China and his connection with Canadian firms, Dr. Hay bought raw formula drugs and sold them to Canadian companies, including his former employer. From the raw formula, this Canadian company made the final drugs and packaged and sold them to Canadian customers.

Dr. Hay believes that he has brought a low-cost product back to Canada and helped Canadian companies increase their profits. Also, he feels that Canadian consumers benefit by gaining access to low-cost drugs. Ultimately, the Canadian government benefits because of cost savings on health care as well as tax revenues from the business. Additionally, Dr. Hay said he was also aware that the pharmaceutical industry was a polluting industry no matter what technology is used. He said that Canada also benefits from an environmental point of view, "as we are 'exporting' pollution to China - for good or bad." Dr. Hay is considering building an R&D centre in Canada "if price is right." "Canada is the smallest market, but it is the number one in consideration -- because my home is in Toronto."

Europe) where she or he used to study or work prior to settling in Canada. Such transnational experience has resulted in inter-cultural competence as well as useful networks at both personal and professional levels (Saxenian 2006). Note that the "Chinese inputs" have raised the competitiveness of the final products in all our cases involving clean technologies. According to Dr. Liu (see Box 4), the success in today's business environment requires effective integration into the global value chain and the person with the best ability to lead such integration is one who himself has successfully integrated into respective environments.

**Box 4: Innovation Value Chain**

In 2004, a new venture in Ontario was facing a key challenge as its developers were about to take advantage of a favourable policy environment for clean, renewable energy in Canada. Technologies and associated intermediate products were scattered across the world and as such an integration capability was required to develop commercially viable products in this promising market. The founders of the new venture were focusing on China, given its supply of basic materials for the products and its status as the leading country for environmental products. They realized that they needed a partner who could help establish linkages in China.

In a social setting, the president of the company was attracted by the brilliant Chinese Dr. Liu. Dr. Liu was an MD in Preventive Medicine from China, also with degrees from the US and an MBA and MHS in Canada. He had joined a China/US epidemiology study on leukemia and benzene exposure. At the time they met, Dr. Liu was the chief conservation officer of a Canadian utility company. The president immediately approached Dr. Liu and invited him to join the new venture as VP of business development and offered him a shareholding in the company. Dr. Liu became the only foreign-born senior manager in this major Canadian corporation.

Dr. Liu helped set up and then led the Chinese business unit as the first module of the value chain. With appropriate technologies locally available, the Chinese extracted and processed the raw materials which were then shipped to Canada. In the second module, the company utilized the technology widely used in Canada to further refine the materials. The next module involved transformation of the material into circuit panels in Germany. Not only have the Germans the best technologies for the process, but the German government heavily subsidizes manufacturing of such green products. The panels were then shipped back to China for final assembly and customization as China has the knowledge and skills to do this most efficiently. The finished products are sold in China and Europe, as well as being shipped back to Canada.

Knowledge Utilization

The use of knowledge is the ultimate value-reaping component of innovation, but the small population/market is widely recognized as a major barrier to technology commercialization in Canada (Conference Board 2005). However, the CTEs believed that such a condition should not stop Canada from commercialization successfully. One way to overcome this limitation is to make commercialization an integral part of global value chain participation. In many market sectors, China may help to create a “critical mass” market for technologies developed in Canada. According to Mr. Deng (see Box 5), China now offers a more flexible regulatory environment and a societal culture that is more conducive of commercializing new technologies. It is much faster for a new product to go to market in China. While a returnee entrepreneur could satisfactorily settle in the Chinese market, a CTE might well use China as a test market that offers feedback to a new product, a supplementary market that contributes to the economy of scale, or a complementary market where a differentiated version of the new product is sold. For example, a CTE may help pharmaceutical firms to derive additional profits from a patented drug by developing a local version since the efficacy of 30% of all drugs is believed to be effected by

ethnicity. Wherever the products are sold, the CTE-mediated *Canadian firms* collect the benefits of technological innovation.

**Box 5: Open Source Innovation**

This case is about a solar energy invention. With a Chinese bachelor's degree and a US MBA, Mr. Deng came to Canada looking for entrepreneurial opportunities. Having tried various sectors, he believed that renewable energy would be the next big thing. After conducting serious research on the Canadian market, Mr. Deng concluded that what he needed was not a pure Canadian technology but to draw on different sources from around the world, including China and the US. The abundant supply of inexpensive fossil fuel energy at the time made the development of renewable energy technology unattractive. As a result commercially viable technology was unavailable.

Looking for alternative sources, he went to China, a country that was in need of energy supplies and therefore witnessing increasingly intense development efforts in the field of renewable energy. However, he soon found out that the kind of technology/product for Canada was not readily available in China either. With this realization, an innovation endeavour began in his garage. Yet, it was never meant to be a conventional process of new product development. In developing the product, the CTE brought his design to China and worked with scientists at a major Chinese university, who were responsible for the original technology that inspired the CTE. The testing and prototyping were done in both China and Canada before a factory in China was contracted to manufacture the products. Today, this innovative product is a market leader in Canada and is also sold in China and other parts of the world.

Mr. Deng, now the president of an environmental company focusing on solar energy, argues that the time of self-sufficiency has passed. The old thinking is zero-sum; the new thinking is win-win. Mr. Deng's company markets its products in China, but draws on technologies from various sources across the world. It translates the best technology into the low-cost products because of globalization. "Old" thinking divides "backward" countries from "advanced" countries. Today, it is difficult to think that way. He believes that we need each other; it's simply a division of labour. "In our supply chain," Mr. Deng said, "it is hard to say who is the head and who is the tail. It's amazing that many Canadians still say 'How could we learn anything from China!' How? In our [solar energy] business, China is the largest consumer and producer. With that kind of competition, it'd be strange if it didn't pay attention to technology development."

According to our findings, the products based on Canadian innovation are often sold to other international markets as well. CTEs are always aware of the limitations of the Canadian market and therefore tend to keep in mind the entire North America as well as other developed markets when designing a new product. The CTEs are effective in identifying those markets where Canadian technologies are competitive. For example, both Dr. Hay (see Box 3) and Mr. Deng (see Box 5) were able to sell their products into the Japanese markets after China and Canada. One success factor was their familiarity with these markets that are in close proximity with China. As already discussed earlier, the CTEs are also effective in helping identify countries that offer inputs necessary for enhancing Canada's competitive position in a certain area. They

certainly rejected the notion that only selling is good for Canada. According to Dr. Liu (see Box 4), *integration* is now the "name of the game". Not only it is necessary to buy from China, but it is also difficult to tell "who is head and who is tail" anymore.

Table 4 summarizes the benefits for Canada from CTEs' cross-border innovation activities by engaging China through CTEs. It should be noted that the current report is written from a Canadian perspective, but the cross-border innovation activities carried out by the CTEs have clearly provided mutual benefits to both China and Canada.

Table 4: Canada's Benefits from Innovation Linkage with China

| **Innovation Benefits to Canada** | **Engaging China through CTEs** |
|---|---|
| • Access to original innovative ideas | • IEPs migrating in Canada |
| • Continuing supply of talents | • Collaborating with Chinese research institutions |
| • Lowering research and development costs | • CTEs participating in R&D projects subsidized by Chinese government |
| • Access to complementary technology | • Inclusion of Chinese partners in supply chain |
| • Opportunity to develop new or improved products | • China as new markets |
| • Development of cutting edge technology | • CTEs leading major research projects across Canada and China |
| • Making innovation viable | • Low cost customization and manufacturing in China |
| • Enabling commercialization | • Substantially enlarged markets through China |

Barriers to Border-Crossing Innovation

*Orientation*. What might be done to more fully reap the innovation benefits through transnational entrepreneurship? To answer this question, most interview participants were quick to point out the need for a change in people's orientation. Many believed that the Canadian government and mainstream corporations are slow to recognize the reality of what is in effect a "supranational" innovation system. Many CTEs believed that Canada continues to maintain an old fashioned mentality that prevents it from understanding what globalization could offer as far as innovation is concerned. This mentality is reflected in its overtly cautious attitude toward trade and investment with China. To a large extent, this attitude is due to their fear of losing the existing stock of knowledge. However, the value of knowledge can be realized only when it is applied in actual production and what Canada lacks are such production possibilities. The lack of openness to China also reflects an outdated belief that China remains in a backward state and is not considered as a promising and innovative venue where Canada could gain access to complimentary knowledge. Another needed orientation change is at the societal and community level. Many CTEs are saddened by the misunderstanding and even suspicions over their transnational activities. They wondered why they have to limit their business in Canada to be considered a contributor.

*Resources*. The resource-access challenges are two-fold. First, CTEs often face difficulty in obtaining **financial capital**, probably the most crucial factor for launching a transnational venture. Evidence shows that there is an increasing supply of money in China, waiting for golden investment opportunities. This is one of main facilitators for the booming returnee entrepreneurial sector in China. However, Canada-based CTEs would opt for financing from mainstream sources in Canada because they do not want their business tied to the Chinese market. One option is to approach "angel money" among the Chinese community, which has become increasingly available thanks to the growing number of wealthy, business-type immigrants from the Mainland. However, CTEs tend to hesitate to take this approach when they intend to run a "contemporary" business outside the enclave trap. The problem is that it is rarely possible for a Chinese to secure finance through conventional means. For example, with an exciting new technology and venture idea in hand, one of our interviewees, has exhausted all existing funding sources for innovation, SME's, etc. with no positive results. He is currently wondering if he will have to set up a business in China for purpose of financing. In light of the type of technology he has and its market potential, he certainly prefers to register his new venture in Canada. Probing the reasons behind these difficulties leads us to look at **social capital**, the resource considered as particularly critical for a new venture's launch phase. According to Michael, he knew where to go but simply did not know people who could guide him into the door. Part of the problem lay with his communication difficulties – his English was not good enough to give an impressive presentation, say, to a potential investor.

*Institutions*. Michael realized the existence of technology incubators such as the Mars. However, he needed help over and above what was normally offered in these institutions. Formal bilateral agreements on science & technology collaborations exist and new initiatives such as the International Science and Technology Partnership Canada Inc. (ISTP) [3] are developing. But the institutional arrangements have neither the intent nor the capacity to facilitate "people-to-people" exchange including those among transnational entrepreneurs. The CTEs understand this and actually have no expectation of such service from the government. Instead, they are looking for a **policy environment** that favours and supports transnational activities pertaining to technology and knowledge flows. Particularly, the CTEs mentioned an urgent need for policies guiding trans-border intellectual property issues. "We are Canadians, but we are timid from time to time without a clear framework," they said.

## POLICY IMPLICATIONS

This study has made a case for incorporating transnational entrepreneurship as a second component of the government agenda for advancing immigrant economic participation in the context of innovation. Recent research efforts have been devoted to understanding transnational communities and their contributions to Canada (Zhang 2007). Contemporary Chinese transnational entrepreneurs, unlike classic ethnic businesses in Chinatowns, have become a dynamic force in the interconnected economies between Canada and China (Chen and Wellman 2007). However, when advocating a more favourable policy environment for entrepreneurship embedded in the transnational community, previous research tends to focus on trade and investment by immigrants, but has said little about immigrant contributions to Canada in terms of innovation or knowledge, giving an impression that "brain circulation," as used in the emerging literature on transnationalism, refers only to the repatriation of IEPs to their country of birth. This creates the impression that instead of gaining from transnational migration, Canada is at the losing end and the opportunity of using IEPs to advance its own technology sectors has been wasted. The current study suggests that transnational entrepreneurs can and do help Canada's innovation performance. It identified several patterns of cross-border innovation and analyzed their specific implications for Canada. The findings

shed fresh light on the transnational community and highlight the need for policy initiatives to enable Canada to take better advantage of the entrepreneurs as agents of innovation linkages across countries. Between Canada and China, a valuable but time sensitive opportunity exists for the governments to change a paradigm and to work on collaboration in innovation.

Enhancing Innovation through TE-Mediated Global Supply Chain

Canada should make innovation benefits an explicit goal in participating in global supply chain and use TEs as linkages with international partners in this endeavour. We should not allow our attention to formal organizations, either large or small in the general labour market, to overshadow the need for attention we should place on TEs. We should realize that low-cost manufacturing is no longer the only reason for Canada to interact with China, and enterprising highly-skilled Chinese immigrants could help reap a variety of benefits for Canada and enhance its innovation performance. However, the approach needed from the Canadian government is different from that toward formal organizations: TEs are private, migrate constantly, and are too numerous for specifically targeted contact. As a result, the government should direct its effort toward a conducive environment for the TEs, including instilling trust in the transnational community, providing clarity concerning intellectual property and other cross-border issues as well as offering incentives in the areas such as taxation and citizenship. Further research should be conducted to reveal the specific industry sectors where TEs are most effective in facilitating mutually beneficial international innovation so that tailored policy initiatives may be implemented.

Immigrant Participation through Transnational Entrepreneurship

The evidence has shown two characteristics of new immigrants compared to the general population in Canada: higher levels of education and stronger tendencies toward entrepreneurship. To take advantage of IEPs, current government initiatives are focused on bridging, that is, enhancing immigrant professionals' competence for integration into the Canadian labour market. However, as identified throughout the paper, there are various "push" and "pull" factors that make the transnational migration of IEPs unstoppable. The important new perspective, as evidenced in our study, is that transnational entrepreneurial activities in the technology sector can contribute to Canada's innovation performance significantly. The main question arising from the current study is – how best can Canada as a nation (i.e., government, institutions, and communities) facilitate IEP-enabled cross-border innovation activities?

A dramatic transformation has to occur at the government level. As mentioned earlier, current effort is primarily directed at the integration model, aiming to facilitate IEPs' employment in mainstream Canadian firms. Clearly, the government needs to re-allocate some of its resources and devote some effort to the advancement of transnational entrepreneurship in the technology field. For institutions and community organizations that have managed and conducted various bridging programs, this transformation is likely to require a different skill set, if not entirely separate programs. At a more fundamental level, conventional thinking about immigrant economic participation has to be challenged to go beyond the current outdated integration model. Canadian firms can learn from the CTEs in adopting an open cumulative approach toward innovation. To source appropriate technological inputs across countries, much greater advantage must be take of the talent from the transnational community. Communities that view transnational lifestyles with uneasiness need to be persuaded of the potential advantage that these lifestyles present in the globalized economy.. A more understanding and appreciative

attitude toward transnational IEPs and their families would help them deepen their roots in Canada, and encourage an even greater contribution to Canada's innovation activity.

Toward an Innovation & Entrepreneurship Platform

> *"Based on our estimates, if we were to conduct R&D in Toronto, our costs could be lower than that in India. Within our network, the number of Chinese immigrants in the IT field has exceeded 3,000. Give us some help and we can create a Fortune 500 company right here in Toronto."* ----- A CTE & president of a Toronto based IT company.

We recommend establishing an *Innovation & Entrepreneurial Platform* for Internationally Educated Professionals (IEPIEP). Its mandate would be distinct from both existing incubators and the newly established ISTP. Like a conventional incubator, IEPIEP would aim at creating a policy environment wherein individuals are supported by a pool of public and private resources in their entrepreneurial pursuits. Unlike conventional incubators, however, it would focus on IEPs with aid and support for their special needs. Most importantly, IEPIEP would ensure that a new venture is established in Canada so that Canadian involvement can be maximized. Its daily operations share similarities with existing transnational business incubators such as IntEnt in Netherlands (Riddle et al. 2008). The key difference is IEPIEP's emphasis on Canada as the focal point of the strategy whereas others centres around the new ventures in TEs' country of origin. Finally, IEPIEP could become an innovative venue for inward foreign investments, including those brought in through the Immigrant Investor Program and the Entrepreneur Program. Currently, it is no secret that a large portion of the incoming capital through the Program has not been put to productive use. For example, the number of Chinese immigrants in the investor and entrepreneur categories has been on the rise but a key challenge is to find viable business opportunities for their investment money. One of the suggestions from our fieldwork participants is to help match this type of investment money with innovation projects within the immigrant community. Thus, the idea of IEPIEP should not create a substantial financial burden on the government.

With culturally and linguistically competent staff, IEPIEP would provide the following services to IEPs:

- A central website dedicated to Technological Entrepreneurship by IEPs;
- Information for IEPs regarding entrepreneurial opportunities involving Canada and their countries of origin;
- Consultations concerning resources available in Canada and elsewhere;
- Facilitation of partnerships with Canadian and/or international partners;
- Channelling of risk capital, both Canadian and overseas to enable commercialization
- Other services available at conventional incubators.

On the surface, IEPIEP would be an antithesis to those incubators in a source country designed to attract migrating professionals back home. Whether and to what extent, then, could we see common ground and therefore collaboration possibilities between source and destination countries?

Government-Level Coordination: Making Mission Possible

Our findings suggest that transnational entrepreneurship could be used as a channel for science & technology (S&T) collaboration between Canada and immigrants' home countries. China is one of only four countries with which Canada currently has a formal S&T collaboration agreement. S&T takes two major forms: first, there are government-sponsored joint projects in targeted areas such as agriculture, energy, environmental protection, and bio-technology; second, there is collaboration involving established firms, often facilitated by government agencies with ISTP as a more recent example. However, all current programs have limitations. What we are recommending is an *entrepreneurial solution* to bilateral collaboration in innovation. Our findings suggest that transnational entrepreneurs are most effective in sectors where one or more of the following is observed: commercialization requires scale economy, R&D is conducted as modular process, sources of original creation are distributed internationally, and the nature of innovation tends to be incremental.

Clearly, we are facing issues which cut across national boundaries and which cannot be addressed adequately by either country alone. For example, the *Innovation & Entrepreneurship Platform*, as discussed earlier, would really be most effective if both governments are involved. The problem is that immigration has been considered as (1) an individual act, limiting the extent of government intervention, and (2) as a national concern, constraining bilateral coordination. As a result, governments get involved only when they have to in unfortunate circumstances such as cross-border crimes. Recently, the Canadian government and community organizations have initiated programs such as settlement workshops in China to orient would-be immigrants and facilitate a smoother landing in Canada. We need to be more proactive and not limit our thinking solely to problem solving. Here is an opportunity to foster strategic partnerships with win-win initiatives such as building national innovation capability. There is agreement that Canada should join the Asia-Pacific supply chain as an active partner (Asia Pacific Foundation 2006). Because innovation is an integral part of this regional partnership, then IEPs-turned-transnational entrepreneurs could play an important role in cross-border innovation. Governments of both countries would then be more likely to appreciate the benefits of the growing transnational community and develop policies for its benefit and that of the policy making countries.

## CONCLUSIONS

Canada's immigration policy is designed to attract IEPs to enhance its innovation performance. The current focus is to integrate this group into the general labour market where they can work in their trained professions or in positions matching their qualifications. However, due to structural discrepancies across the economies of China and Canada, the goal of economic participation by IEPs has inherent limitations. Instead, we show that there exists a distinct *transnational* segment alongside the *settled* and *returned* segments among Chinese immigrants in Canada. These professionals-turned-CTEs carry key characteristics that distinguish them from the classic middlemen traders who engage in traditional business activities such as trade, service and travel, and recent returnees whose entrepreneurial business is limited to the Chinese market. In keeping Canada as their primary residence, many CTEs have engaged Canada in their cross-border entrepreneurial endeavours. Transnational entrepreneurial activities by IEPs often contain an innovation or knowledge component although their cross-border innovation activities are sustained in different patterns, conditioned by economic, political and individual factors. The research demonstrates that transnational entrepreneurship provides a positive pathway through which IEPs could contribute to Canada's innovation activities.

In this report, we have presented evidence of such contributions by identifying different patterns of cross-border innovation activities in which Chinese CTEs engage both Canada and China in the creation, diffusion, transformation and utilization of new knowledge. Serving as agents of innovation, these CTEs have effectively linked Canada to China and other parts of the global supply chain with innovation and knowledge flows being an integral component. Definite economic and social benefits are also reaped by Canada where the CTEs have built a home. Bearing the stigma of disloyal opportunists, however, the CTEs have to overcome multiple barriers across geographic, political and social boundaries. Yet, in the complex context involving both countries (ie., Canada's demographic trends, China's role as a major source country of immigrants, and the complementary support between Canada and China's innovation infrastructure), CTE-carried cross-border innovation activities are expanding at an accelerated pace with or without government-enabled intervention.

Envisioning a higher level of strategic partnership between the two countries, we offer several policy implications for Canada to engage CTEs more effectively in the creation of a win-win situation concerning national innovation performance and the integration of IEPs. Canadian governments, industries and communities can do more to take advantage of the development of CTEs to enhance Canada's innovation performance. Bilateral collaboration in the facilitation of CTE-mediated cross-border innovation activities should become a key component in the Canada-China strategic partnership. An immediate, crucial step toward bilateral collaboration is the establishment of a Canada-based innovation and entrepreneurship platform targeted at CTEs. Compared to some 190 commercialization-assistance programs currently made available by the provincial and federal governments (Conference Board 2005), the proposed Platform would be unique and very cost-efficient. The Canadian government should also engage foreign governments, in this case the Chinese government, to develop programs that facilitate transnational entrepreneurship in technology-intensive activities.

## APPENDICES

*I. Research Methodology*

The project was carried out in the GTA (Canada) and Beijing (China), the major destinations of immigrant professionals to Canada and returned professionals in China, respectively. The project was led by the International Research Institute at Ryerson University. It triangulated three methods: in-depth interviews, focus group discussions, and case studies. A total of 42 people were interviewed, including 30 CTEs residing in Canada, 5 CTEs living in China, and 7 government officials who were familiar with the subject matter. We also conducted four focus groups with IEPs-turned-CTEs, each with 10-14 people. Based on the findings from our initial fieldwork, including information emerging from the interviews and focus group discussions, we then identified 6 representative CTEs for in-depth case studies to gain a deeper understanding of their innovation activities in the context of transnational migration. All interviews and focus group discussions were conducted in Chinese. Although most CTEs were fluent in both Chinese and English, they preferred using Chinese to communicate. All interviews and focus group discussions were tape-recorded, transcribed and translated into English. Three graduate research assistants with bilingual abilities were trained and assisted in recording, transcribing, and translating the interviews and focus group discussions. The Chinese-English translations were then double checked by the researchers.

*II. Description of Team*

*Dr. H. Xiaohua Lin* was trained in political science, economics, sociology, and business administration. His research falls in the intersection of international business and immigrant entrepreneurship. A former Economist at the Bank of China (Beijing) and Director of International Business Assistance at the Centre for International Trade Development (Stillwater), Lin is currently a Professor of International Management & Entrepreneurship and Director of the International Research Institute at the Ted Rogers School of Management, Ryerson University.

*Dr. Jian Guan*, trained in philosophy, anthropology and sociology, has worked at the Chinese Academy of Social Sciences as a Researcher and taught at several universities across North America. She is currently a Research Associate at the Diversity Institute and International Research Institute at Ryerson and the Program Coordinator of Ryerson's Gateway for Internationally-Educated Professionals. Guan conducts and coordinates several research projects on immigrant settlement and socio-economic integration.

*Professor Mary Jo Nicholson* is a leader in legal education for business students in Canada. She wrote the only Canadian textbook for business students on the legal and regulatory aspects of international business, *Legal Aspects of International Business; a Canadian Perspective,* now available in a 2nd edition. Professor Nicholson's research interests include NAFTA, particularly dispute settlement, cross border data transfer and privacy, attitudes towards contracts in China, as well as the legal and ethical aspects of corporate social responsibility.

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**NOTES**

[1] Porter (1990) used "diamond" to describe four conditions shaping a country's industrial innovativeness and competitiveness, i.e., demand situation, factor conditions, supporting infrastructures, and corporate strategy & rivalries. Applying this framework to Canada, most people believed that this country suffers from a small diamond problem due to its limited market size, inadequate supply of skilled workers, lack of competition, and insufficient supporting industries.

[2] All names are changed to protect privacy.

[3] ISTP is a recent government initiative toward better innovation performance in Canada. First, ISTP is targeted at ALL Canadians but IEPIEP is designated to IEPs. Second, ISTP's role is limited to the management of bilateral funding for selected R&D collaboration projects while IEPIEP attempts at "small interventions" with much wider scope. Third, ISTP focuses on commercialization whereas IEPIEP looks after the whole range of innovation activities.