Asia-Pacific
Economic Cooperation

UNITED NATIONS

Best Practices in Investment for Development

Case Studies in FDI

How to Integrate FDI in the Skills Development Process:

Lessons from Canada and Singapore

June 2010

APEC Project CTI 04/2008A

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APEC#209-CT-01.8

Note

As the focal point in the United Nations system for investment within its mandate on trade and development, and building on three and a half decades of experience in this area, UNCTAD, through the Division on Investment and Enterprise (DIAE), promotes understanding of key issues related to foreign direct investment (FDI) and enterprise development. DIAE also assists developing countries in enhancing their productive capacities and international competitiveness through the integrated treatment of investment and enterprise development.

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The following symbols have been used in the tables:

Two dots (..) indicate that data are not available or not separately reported. Rows in tables have been omitted in those cases where no data are available for any of the elements in the row.

A dash (-) indicates that the item is equal to zero or its value is negligible.

A blank in a table indicates that the item is not applicable.

A slash (/) between dates representing years – for example, 2004/05, indicates a financial year.

Use of a dash (–) between dates representing years – for example 2004–2005 signifies the full period involved, including the beginning and end years.

Reference to the "dollars" ($) means United States dollars, unless otherwise indicated.

Annual rates of growth or change, unless otherwise stated, refer to annual compound rates.

Details and percentages in tables do not necessarily add to totals because of rounding.

Preface

The *Investment Advisory Series* provides practical advice and case studies of best policy practice for attracting and benefiting from foreign direct investment (FDI), in line with national development strategies. The series draws on the experiences gained in, and lessons learned through, UNCTAD's capacity-building and institution-building work in developing countries and countries with economies in transition.

Series A deals with issues related to investment promotion and facilitation and to the work of investment promotion agencies (IPAs) and other institutions that promote FDI and provide information and services to investors. The publications are intended to be pragmatic, with a how-to focus, and they include toolkits and handbooks. The prime target audience for series A is practitioners in the field of investment promotion and facilitation, mainly in IPAs.

Series B focuses on case studies of best practices in policy and strategic matters related to FDI and development arising from existing and emerging challenges. The primary target audience for series B is policymakers in the field of investment. Other target audiences include civil society, the private sector and international organizations. Series B was launched in response to a call at the 2007 Heiligendamm G-8 Summit for UNCTAD and other international organizations to undertake case studies in making FDI work for development. It analyses practices adopted in selected countries in which investment has contributed to development, with the aim of disseminating best practice experiences to developing countries and countries with economies in transition. The analysis forms the basis of a new technical assistance work programme aimed at helping countries to adopt and adapt best practices in the area of investment policies.

For Series B, UNCTAD's approach is to undertake case studies of a pair of developed and developing or transitional economies that exhibit elements of best practices in a selected issue. Country selection follows a standard methodology, based primarily on the significant presence of FDI and resulting positive outcomes.

The *Investment Advisory Series* is prepared by a team of UNCTAD staff and consultants in the Investment Policies Branch, under the guidance of James Zhan. This study of the Series B was prepared by Vincent McMahon, Meyer Burstein and Hui Weng Tat. Fact-finding missions were undertaken in Canada and Singapore in January and February 2009. The report was finalized by Ioanna Liouka and Cam Vidler. Contributions and comments were received from Chantal Dupasquier, Quentin Dupriez, Kalman Kalotay, Massimo Meloni and Joerg Weber. The report has also benefited from views of current and former government officials, the domestic and foreign private sector and academics. Financial support was received from the Asia-Pacific Economic Cooperation forum (APEC) under the APEC-UNCTAD Joint Capacity Building Project for Addressing Knowledge Gaps in the Use of Foreign Direct Investment. The programme has also received financial support from the Government of Germany.

Geneva, June 2010

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Abbreviations

ASEAN	Association of South East Asian Nations
CIC	Citizenship and Immigration Canada
CPTE	Council for Professional and Technical Education
DFAIT	Department of Foreign Affairs and International Trade (Canada)
EDB	Economic Development Board
FDI	foreign direct investment
FIPAs	Federal Foreign Investment and Protection Agreements
FIRA	Foreign Investment Review Act
GDP	gross domestic product
HRSDC	Human Resources and Skills Development Canada
ITE	Institute of Technical Education
LIUP	Local Industry Upgrading Programme
LMO	Labour Market Opinion
MaRS	Medical and Related Sciences
MOE	Ministry of Education (Singapore)
MTI	Ministry of Trade and Industry (Singapore)
NAFTA	North America Free Trade Agreement
NES	National Education System
NMC	National Manpower Council
NTUC	National Trade Union Congress (Singapore)
OECD	Organization for Economic Co-operation and Development
PAP	People's Action Party
PNP	Provincial Nomination Programme
R&D	research and development
SDF	Skills Development Fund (Singapore)
SME	small and medium enterprise
TNC	transnational corporation
WTO	World Trade Organization

I. Introduction

Improving the national skill set is an important policy objective for both developed and developing countries. The level of skills in the local population –a nation's human capital – is a key determinant of economic development and growth. At the same time, globalization has made human capital and skills development even more important. The reduction in trade barriers and the surge in global trade, FDI and the TNC activities have resulted in the need for workers and businesses to be competitive on a global rather than domestic scale.

TNCs, being on average more productive and technology-intensive than domestic firms, tend to bring positive impacts on the local economy, also in the form of skills development. Effectively, TNC activity and skills upgrading have a complementary relationship as they tend to reinforce each other (UNCTAD, 2002). On the one hand, enhanced human capital and skills increase incoming FDI by making the investment climate more attractive to investors. On the other hand, FDI can be exploited as a vehicle for promoting and enhancing human capital formation.

The complementarities between FDI and human capital development can initiate a virtuous circle where host countries experience a continuous inflow of FDI by increasingly attracting higher value-added TNCs, while at the same time upgrading the skill levels of pre-existing TNCs and domestic enterprises (figure I.1). In this sense, FDI inflows create a potential for knowledge and skills spillovers to the local labour force. At the same time, the host country's level of human capital determines how much FDI can be attracted and whether local firms are able to absorb the potential benefits associated to spillovers. While the FDI and skills virtuous circle indicates that more FDI can enhance skills which in turn attract more FDI, each iteration results in higher value-added FDI and better skills. In other words, the virtuous circle is upward sloping.

The positive impact of FDI inflows on skills enhancement is however not automatic. If the local economy is to benefit from the TNC activities, government policies must be designed and implemented so as to impact skills. Against this background, the purpose of this study is to consider the importance of skills as a determinant of TNC activities, and more importantly the policies that can be used for the local economy to benefit most vis-à-vis skills development from these activities.

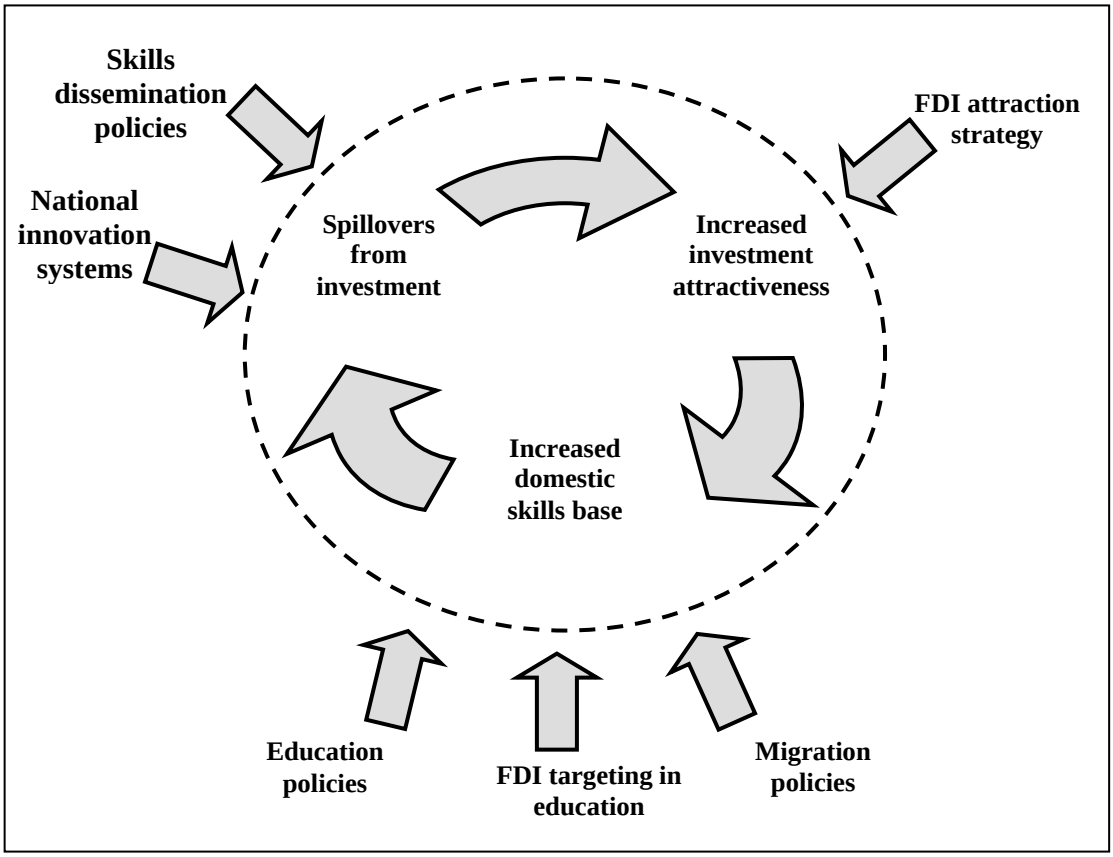
The conceptual framework of the study

Different sets of policies can be instrumental in initiating and fostering the upward sloping FDI and skills circle. *First*, for the FDI and skills virtuous circle to take place, attracting FDI is a key precondition. While foreign investors need to see a relatively open stance towards FDI and a favourable business climate in general, more targeted FDI attraction policies are important to attract the desired types and levels of foreign investment. *Second*, foreign investors require policies that provide sufficient access to skilled labour. Domestic education policies and efforts to directly involve FDI in education can have an immediate impact on the domestic skills base by ensuring the sufficiency and quality of skills required in the economy. At the same time, migration policies can complement the national skills base and ensure that foreign investors have access to skills that may be missing domestically. *Third*, in order to maximize spillovers from TNC activities and to sustain the FDI-skills virtuous circle, appropriate government policies are necessary. Skills and dissemination policies as well as policies supportive of the national innovation system are vital to this end.

The above policy elements need to be carefully designed and sequenced for the FDI-skills circle to set off and function effectively. Inadequate attention given in specific policy

areas may result in discontinuations and interruptions of the upward sloping cycle and lead to unsatisfactory or even unintended outcomes.

Figure I.1: FDI and skills: the virtuous circle



FDI attraction strategy

As explained above, attracting foreign investors through a favourable business climate is critical for the FDI-skills virtuous circle to take place. This needs however to be complemented by investment promotion policies and investment incentives which are important elements of a successful FDI attraction strategy. For example, fiscal and financial incentives are common policy instruments used to attract higher levels and better quality FDI. Furthermore, when gaps exist between investors' demand for skilled workers and their availability in the host country, investment incentives can be an effective tool to attracting the appropriate levels and types of FDI.

Each iteration on the FDI-skills circle (figure I.1) which leads to a more skilled workforce eventually contributes to improving the general investment attractiveness of a country. In this sense, the development of a stronger domestic skills base increases investors' interest in the country through two main channels: 1) it is easier for investors to satisfy their needs in terms of human capital: and 2) increased skill levels lead to improved productivity and raise per capita incomes in the domestic economy.

Education policies

UNCTAD (1999, p.42) suggests that "[t]he upgrading of the general skill level and the provision of high-level specialized technical manpower is something that host countries need to do themselves". In this regard, the primary responsibility for skills development in a

country rests with the national education system, which relies on public investment. Training local workers can be costly for foreign investors, who must make the additional investments instead of relying on available state-sponsored human capital.

Education policies aim to upgrade the domestic skills base through promoting skills needed in the local economy. Countries can better identify their skill shortages, continuously evaluate human resource development policies in light of their skill needs and set the required targets for the education system. Education policies aim to develop a universal elementary, secondary and tertiary education system, and ensure that education, research infrastructure and curricula keep up with the requirements of contemporary knowledge-intensive industries. In addition, education policies include specialized efforts to encourage technical training.

While education policies directly impact on the domestic skills base, they also serve two other important functions: *First*, they promote FDI attraction as TNCs are more likely to locate in areas with pre-existing highly trained human capital (Noorbakhsh et al., 2001). Attracting FDI in skill-intensive industries presupposes that firms have access to skilled workers. *Second*, education policies ensure that the absorptive capacity of the local workforce is enhanced to a level that can subsequently absorb spillovers from exposure to higher TNC knowledge, practice and technology. This significantly increases the likelihood that FDI-related skill transfers will materialize and that dissemination policies will produce considerable benefits for the domestic economy. Local economies will only benefit from FDI if there is a minimum level of human capital (Borensztein et al., 1998). Consequently, when entering knowledge and technology are "too sophisticated" for the local economy, skill spillover benefits are more limited.

FDI targeting in education

While public investment in education remains the most important driver in building human capital, private investment and FDI can also make a significant contribution. In this regard, the expertise and knowledge of foreign investors can be used to improve domestic education and research infrastructure through participation in management and funding efforts. Proactive policies to attract FDI in higher education and vocational training could be beneficial for bringing about higher quality in universities and technical schools. Related benefits could include access to knowledge and know-how, improved training and exposure to multiculturalism, spillover effects, and improved capacity for R&D. The direct contribution of FDI in education can be particularly important in developing countries.

Openness to FDI in education usually goes hand in hand with a careful evaluation of a country's educational needs. Foreign investors can complement in areas where local needs cannot be covered by domestic efforts in a direct manner. Proactive targeting of foreign educational institutions has proved useful in many countries, such as China, Malaysia, Singapore and Viet Nam. The direct involvement of FDI has led to the adoption of international standards in tertiary education, and the creation of high-quality specialized professional and technical training institutes.

Migration policies

Migration policies can be useful tools to reduce the skills gap in a given country by allowing the entry of foreign workers. These policies include programmes that allow domestic and foreign companies to directly recruit foreign talent, procedures for visas, temporary work permits, as well as more permanent work and residence permits. However, achieving the right balance between the needs of investors to have the necessary staff and the national interest in terms of job protection, training and advancement for citizens is not an easy task. While opening up a country to foreigners, migration policies can also be used to ensure that labour entry is facilitated when specific local skills are in short supply or unavailable. The policies

can also facilitate the integration into the domestic labour market as they can lead to cross-fertilization of skills through the diverse educational backgrounds of foreign workers. The potential benefits of such migration policies could be important for all countries, including those with excellent education systems.

Dissemination policies

Dissemination policies are used to encourage skill spillovers from FDI. The mechanisms determining these spillovers include the "distribution of technology licences… vertical linkages… 'copying' of technology introduced by foreign investors… impact of FDI on host country market structure, especially competitiveness… labour training… [and] performance of research and development (R&D) by TNC affiliates in the host country" (Blomström et al., 2000).

Policies designed to promote the diffusion of foreign skills to the local economy may include active schemes for direct training of local workers by foreign affiliates. The acquired skills can then be disseminated to the rest of the economy through job turnover and labour mobility. In this regard, incentives can be provided for foreign affiliates to undertake on-the-job training and retraining by sharing the financial burden or offering other concessions. Such concessions include allowing foreign employees as long as locals are being trained, or providing supplementary income tax deductions for personnel training expenses. Policies that promote skills and technology transfers by foreign investors to local suppliers and competitors are also critical to the skills dissemination process. Vertical and horizontal linkages are important mechanisms for such transfers which can be promoted through active government policies and linkages programmes. Other policies, such as encouraging technology transfer to local partners, sourcing inputs locally, and/or local participation at senior management functions can also facilitate the skills dissemination process.

National innovation systems

A good understanding of the national innovation system can help policymakers identify leverage points for enhancing local human capital. National innovation systems combine policies to enhance the innovative capacity of firms and also improve networking among the different actors and institutions in the system, including firms, research centres, laboratories, universities, relevant ministries, etc. Interactions among companies are important mechanisms through which skills and technology transfers can materialize in the context of a national innovation system. These interactions can take various forms including: joint research activities, other technical collaborations, connections among companies, universities and public research institutes, diffusion of knowledge and technology to companies and personnel mobility.

In this context, innovation systems stand at the intersection between innovation policy and inward investment promotion. On the one hand, the role of innovation policy is to improve the investment climate for R&D by identifying and acting upon the strengths and weaknesses of the national innovation system. Innovation policies may include fiscal and financial incentives to corporate R&D, enhancement of the research infrastructure, promotion of collaboration and linkages, improvement of the intellectual property rights, human capital development and attraction of foreign talent. On the other hand, the role of inward investment promotion is to improve the image of the country as an R&D location and to provide targeted services to both potential and existing foreign investors in R&D.

The cases of Canada and Singapore

Against this background, the objective of this study is to: explain how the FDI - skills virtuous circle can take place; identify policies to promote it; and ensure that skills are

enhanced at each stage. The required policies will depend on a particular country's level of development and the characteristics of the domestic economy. For instance, a country at an early stage of development may have less to offer to skilled economic migrants (in terms of housing for example), and may not have the necessary skills base to attract skill-intensive FDI, even with incentives. The primary focus for such a country would be to improve its national education infrastructure. At the same time, the country should adopt a strategy to attract FDI that is consistent with its skills base but with the plan to enhance it directly through training and migration, and indirectly through the impact of FDI. A developed country with a strong domestic skills base will generally be in a better position to attract skill-intensive FDI. Yet, that country would probably still need, to maximize the impact of FDI, to identify appropriate mechanisms to integrate and align the FDI inflows with its domestic skills development efforts.

In explaining how FDI can be integrated in the skills development process, this study identifies empirical regularities, policy experiences and best practices from the two countries -- Canada and Singapore. Both countries consistently rank high in terms of human resource development[1] and have incorporated FDI into their respective skill development processes. The analysis of Canada, focusing on recent episodes, presents the approach of a developed country to enhance skills and, in particular, the relationship between its extensive immigration programme and FDI attraction. Singapore, on the other hand, is examined primarily during 1970s and 1980s to understand how it used FDI to help transition from an economy competing based on labour costs to one that is more skill-intensive.

These case studies are complementary and do not intend to compare or contrast the two countries. The focus is rather on identifying policy implications to maximizing the contribution of FDI to the skill development process in two very different contexts.

[1] According to Global Competitiveness Report, The World Economic Forum, 2000; and IMD Competitiveness Ranking

II. The case of Canada

There is general awareness of a link between FDI and the skills development process in Canada. A 2004 discussion paper by Industry Canada argues that location decisions regarding FDI, R&D and highly educated workers are jointly determined and that "… success at attracting one resource draws more of each".[2] They characterise this as "a new stage in the evolution of industrial policy" and place considerable emphasis on agglomeration economics and their important role in attracting both further investment and highly educated workers, thereby establishing 'virtuous circles' in which the entry of one factor promotes the other fuelling a continuous cycle. A set of policies and programmes can be observed in Canada that has helped perpetuate the virtuous circle of FDI and skills

A. Increasing investment attractiveness

Since liberalizing its foreign investment regime in the early 1980s, various levels of government in Canada have been actively seeking FDI, especially in sectors that promote skill development, high-paying employment, innovation and exports. The Department of Foreign Affairs and International Trade (DFAIT) is responsible for fostering the expansion of Canada's commercial relations abroad, including FDI promotion and developing partnerships with other federal and provincial stakeholders. Its Invest in Canada Bureau is charged with creating "a modern, systematic and more targeted FDI strategy that directly communicates to investors the value propositions that Canadian locations offer" (Invest in Canada Bureau, 2008) and has a focus on projects that boost the domestic production of high-value goods and services, promote skilled and high-paying employment, contribute to product and process innovation, and expand international markets and the global reach of Canada-based companies. The marketing approach employed by DFAIT, among others, emphasizes the availability of a skilled multicultural labour force, accessible via the education system or through immigration channels.

The Invest in Canada Bureau participates in important international trade fairs and commercial events; working with private sector partners who are seen as credible by the business community; and runs advertising campaigns in selected markets. The Bureau also operates a more targeted programme that focuses on particular corporations and TNCs. This programme identifies targets through successive levels of analysis – at a sectoral or industry level; a country level; and at a firm level. The Bureau has identified fifteen industry sectors characterized by high productivity and high growth (specific skill sets were not targeted in the exercise). These included aerospace and defence manufacturing, pharmaceuticals and biotechnology, business and financial services, environmental technologies and information and communications technologies. It then selected 20 country targets in the Americas, Europe and the Asia-Pacific region. Within these countries, specific firms were identified that could potentially be induced to expand their operations into Canada. Though not the stated objective, firms attracted in these sectors are more skill-oriented than others, and thus have the potential to both take advantage and add to Canada's pool of skilled labour.

Investment promotion methods vary between provinces, based on differing priorities at the sub-national level. Ontario is by far the largest recipient of external investments. Its FDI promotional activities target medium-sized companies engaged in high-value work (e.g. software development) and seek to capitalize on talent niches, such as the technology triangle around the University of Waterloo. Increasingly, the Province's promotional efforts are becoming sophisticated and data driven. Within the Ministry of Economic Development and Trade, a strategic intelligence unit works with sector-specific industry groups to develop pro-active promotional approaches. These focus on specific industries and, within them,

[2] Industry Canada. January 2004. Making Canada the Destination of Choice for Internationally Mobile Resources; Discussion Paper No. 14, Research Publications Programme.

individual firms that are identified with the help of banks, Ontario's international trade secretariats, corporate lawyers and industry insiders. Contact with the firms is established via human resource departments, senior executives and lawyers. Every aspect of a potential investment is examined so the Ministry can formulate a compelling case for the FDI to be made in Ontario, including infrastructure requirements, industry linkages, personnel requirements, transport needs, training opportunities with universities and so forth.

Both the federal and provincial governments attach considerable importance to cooperation in their foreign operations. Provincial economic officers are frequently located with their federal counterparts in Canadian consulates abroad and provincial missions participate in and support federal promotional efforts. Notwithstanding inter-provincial rivalry, it is generally recognized that 'brand Canada' carries a stronger cachet than provincial brands.

In terms of investment incentives, Canada generally does not have fiscal or other concessions specifically targeted at FDI. However, FDI often utilizes general investment incentives otherwise available in the country. For example, special tax subsidies, which receive both federal and provincial support, apply to research and development. Although federal investment incentives are typically applied uniformly to domestic and foreign companies, subsidies are sometimes used to attract and increase the local impact of certain large-scale projects, although these are usually negotiated at the provincial level. For example, Canada and Investissement Québec contributed USD $260 million and USD $88 million, respectively, to induce Canadian-owned Bombardier to build its new C-series family of aircraft in Mirabel, just north of Montreal. With respect to foreign investments, Pratt and Whitney recently obtained a $142 million supplement from Quebec to build a new plant. The grant is tied to local hiring and training, involving some 7,000 jobs in Canada, mainly in Quebec, which directly links the skilling the workforce to the FDI.

B. Enhancing the domestic skills base

Education

Canada's high-level skills base is primarily due to its historically sophisticated education and training infrastructure. In terms of international rankings, Canada stands out among industrialized countries as having one of the best elementary and secondary education systems. University completion rates in Canada are above the OECD average (Canadian Education Statistics Council, 2009a). As of 2007, 25 per cent of Canadians aged 25 to 64 held a tertiary type-A degree (including bachelor's and master's education) or an advanced research degree (such as PhD). Students have been increasingly going into graduate studies as well, with an increase of enrolments by 5 per cent annually from 2001 to 2007, compared to annual growth of only 3 per cent for undergraduate enrolments (Canadian Education Statistics Council, 2009b).

Canada's elementary and secondary education system is predominantly public, and is one of the only systems in the OECD to be nearly exclusively administered at the sub-national level. Despite this decentralized approach, the provincial and territorial school systems are similar in terms of the number of years of education. However, there are important regional differences with respect to curriculum, assessment and accountability policies.

Canada's system of tertiary education began to expand rapidly in the post-World War II period (Skolnik, 1997). During the 1950s, 1960s and 1970s the provinces formulated their needs and plans with the aid of government-appointed commissions, and used the growing economy and tax base to finance an expansion of student capacity, both by investing in existing institutions and by creating or accrediting others. Even the federal government, which had not played a major role in education prior, contributed to this trend by funding the rapidly

growing system following the recommendations of the 1951 Massey Commission. Besides universities, this period also saw the expansion of community colleges (which typically offer two-year diplomas that are more applied in nature) and other non-university post-secondary education institutions. Due to this expansion, and because the baby boom generation was reaching adulthood, full-time university enrolment rates rose from under 5 per cent of Canadians between the ages of 18 and 24 in the early 1950s, to 12 per cent by the end of the 1960s, and reached more than 20 per cent by the end of the 20th century (Warren, 2000).

One of the latest policy trends, undertaken in several provinces, is to link tertiary education institutions with public and private-sector research initiatives. The Province of Ontario has been actively fostering "regional innovation networks", an example of which is the Medical and Related Sciences (MaRS) initiative in Toronto (box II.1). This initiative, which involves a range of government, health, educational and business stakeholders, supports entrepreneurial activities and the commercialization of research by offering office space to both domestic and foreign companies. The success of the initiative has been attributed in part to Ontario's ability to attract and to welcome top scientists from around the world, as well as the close proximity of MaRS to the University of Toronto, Canada's largest research university.

Box II.1: Medical and Related Sciences – Ontario

The Ontario Investment and Trade group was one of the sponsors of the Medical and Related Sciences (MaRS) project, an ambitious attempt to create synergies by bringing scientific and technological know-how together, under one roof, with investment capital firms. The resulting convergence centre – consisting of three buildings in downtown Toronto - houses publicly-funded research, small-to-medium sized technology companies, venture capital businesses, an "incubator" that provides office and research facilities to start up enterprises and on-site access to large, co-located pharmaceutical companies. The Centre is designed to promote innovation and to strengthen support for commercialisation in the field of bio-technology and medical and related technologies. The principal research engines for the MaRS venture are Toronto's universities, major hospitals and technology centres. The focus in the bio-technology area has been on the commercialisation of basic research.

Ontario is implementing a commercialisation framework based on a system of "regional innovation networks." These are multi-stakeholder, regional development organizations supported by Ontario and by other levels of government and aimed at promoting innovation.

Source: Interview notes, Ontario Government, Toronto Regional Research Alliance report and assorted public reports.

Migration policies

Aside from the country's domestic education system, Canada relies on entry of high-skilled migrants to boost its skills base. The rising levels of immigration to Canada coincided with the liberalization of foreign investment that began in the early 1980s. The relaxation of migrant entry controls was, to a degree, motivated by an understanding that migration programme expansion, as 'hidden wiring', would work with, and probably stimulate, FDI, productivity and growth. By ensuring that its migrant entry processes add to the domestic stock of skills or provide foreign investors with access to foreign skills when unavailable locally, Canada has improved its attractiveness as a destination for FDI, especially in skill-intensive sectors of the economy. Canada's relatively open immigration stance has been particularly important for securing major investments by companies like Microsoft and Tata Consultancy Services. Further support for this position comes from the Canadian Council of Chief Executives, whose March 2009 bulletin singles out the importance of the immigration programme for Canada's competitiveness. The Conference Board similarly linked immigration (particularly recent changes emphasizing programme responsiveness to industry needs and temporary workers) to enhanced competitiveness and to a more attractive investment environment.

Canada has a complex system for managing the entry of skills both because responsibility is shared between the Federal Government and the provinces and because Canada's large-scale immigration and temporary entry programmes have evolved with time resulting in sophisticated selection mechanisms. Although immigration is a shared jurisdiction, in practice, it has been largely federally controlled, with Citizenship and Immigration Canada (CIC) historically administering both migration levels and selection criteria through the federal entry programme. However, the provinces are increasingly playing a role as well. While Quebec has traditionally had extensive powers over selection and integration, due to concerns about preserving culture and language, other provinces now have immigration agreements with the federal government setting out mutual obligations and powers. The rising role of the provinces can be seen in the increased use of the Provincial Nominee Programme (PNP), the prioritization of certain regional destinations in federal entry criteria, as well as targeted promotional efforts.

Canada's immigration programme is distinguished, apart from its size and composition, by its emphasis on economic migration, and skilled workers in particular. New permanent residents in the economic migrant category have made up a rising share of total entries, from 30 per cent in 1984 to 60 per cent in 2008 (Citizenship and Immigration Canada). The number of economic migrants arriving annually rose from 26,000 to 149,072, respectively.[3] Skilled workers have made up the vast majority of migrants in this stream. Applicants are screened on the basis of their education, skills, age, language ability, business experience and other qualifications, prior to being admitted into the country. The underlying selection philosophy is to choose individuals on the basis of their human capital with the aim of promoting economic success, prosperity and labour market mobility. The resulting flow tends to be professional and highly educated, more so than the native-born population.

The flow of both students and temporary workers has also been substantial. Between 1999 and 2008, the number of students entering the country per year rose from 58,000 to 80,000, while the number of temporary workers rose from 107,000 to 193,000 (Citizenship and Immigration Canada). This increase is all the more important because of a fundamental shift that is currently underway in both programmes with a view to facilitating and encouraging the transition from temporary to permanent status. This is seen as a means for better supporting employer and investment interests as well as improving integration outcomes. The shift in 'philosophy' is evident in a greater ability of temporary entrants to attain permanent status while in Canada, the proliferation of nominee programmes and a stronger institutional focus involving innovations such as creation of 'temporary foreign worker units' in major cities.

The general migration programme, as well as more particular programmes, offers foreign companies or individuals making investments in Canada the opportunity to directly sponsor foreign workers. Business and investment in Canada, including FDI, is highly reliant on the immigration system to access foreign skills that may not be locally present (box II.2). Oftentimes, foreign workers arriving in Canada through this method settle in the country permanently. Translation of these workers into permanent residents is especially beneficial to the economy, since they combine their foreign-acquired human capital with Canadian work experience.

Within the general immigration entry process, there are relatively generous provisions for companies to sponsor skilled foreign workers, both in the permanent and temporary streams. The high value attached to job offers when assessing permanent immigration

[3] This figure, however, also includes the spouses and children of economic migrants, and therefore overestimates the contribution of migration to skills formation. For example, in 2008, over 61,000 of total economic migrants were spouses and dependents of the principal applicant.

applications allows for a response to skill shortages, while protecting against unchecked entry. Similarly, temporary work permits, with the possibility of extension, are available to foreign workers with job offers from Canadian employers. Human Resources and Skills Development Canada (HRSDC) screens employer job offers for both permanent and temporary workers in the immigration stream. In the permanent stream, it assesses whether the job offer is genuine and constitutes full-time, continuing employment. In the temporary stream, its primary interest is in protecting the job market for Canadians and ensuring compliance with health and safety regulations. The requirement to screen job offers does not apply to persons entering Canada under the NAFTA provisions or those entering under Provincial Nomination Programmes (PNPs).

The North American Free Trade Agreement (NAFTA) contains important provisions governing the migration of non-permanent migrants between Canada, Mexico and the United States.[4] Insofar as FDI is concerned, there is a relatively free flow of labour across the border for professionals with a degree or similar credentials that fit within a list of prescribed occupations, and have an offer of employment from a Canadian enterprise. In addition, intra-company transferees are allowed to enter Canada temporarily to receive training or skills upgrading, or to familiarise themselves with corporate business practices. Typically, the trainees will fall into the category of managers, executives and technical experts.

Box II.2: Biotechnology Industry - British Columbia

British Columbia is the seventh largest biotech cluster in North America and the fastest growing biotech sector in Canada. In the nineties, Vancouver was ranked third in North America in terms of the number of new companies that were created. It is home to over 90 bio-technical companies. Over 60 per cent of British Columbia's companies focus on bio-pharmaceuticals and biomedical applications in cancer, inflammatory diseases, cardiovascular health, infectious diseases and drug delivery. The presence of foreign firms in the sector has been growing quickly in recent years. From 1996 to 2003, the proportion of total biotechnology firms owned by foreign companies in Vancouver rose from under 10 per cent to nearly 30 per cent.

An important part of the success of this industry has been the existence of a strong medical infrastructure. For example, Canadian medical institutions are part of a coordinated network enabling researchers to undertake genetic research. The growth of the Vancouver biotech sector has also been tied closely to the University of British Columbia (UBC) which has had a history of successful technology transfer involving UBC's University-Industry Liaison Office. The Liaison Office has spun off numerous companies in coordination with the Faculty of Medicine which has also played an active role.

Despite the role of education and research infrastructure in making the industry attractive to foreign investors, Canada's liberal migration regime is increasingly a determining factor. Biotechnology is a highly skill-intensive industry, and providing a steady supply of qualified workers is posing a problem. A recent case study, based on structured interviews with HR managers, scientific officers, executives and members of the industry association, concludes that while the University of British Columbia and Simon Fraser University turn out excellent students, they lack experience and knowledge of international markets and practices which are necessary for local firms to thrive in the global marketplace. Furthermore, local firms often lack the capacity to provide training.

While larger firms with more capacity to train staff might be expected to avoid these constraints, the study finds that up to ninety per cent of the executive and professional staff in these firms came from abroad. The reasons given for this are that the foreign born have essential skill sets not available domestically, including experience raising capital and working through the international approval processes for bio-tech products, as well as possession of unique scientific knowledge. Respondents in the case study advance the view that the labour pool for biotech was global and internationally competitive and that foreign hires generated domestic employment by stabilising the domestic industry.

[4] There is no data on the NAFTA-related migrant flows and the use of this provision by foreign companies, as persons are free to cross the border without special documentation.

Respondents also argued that there was a need to create a larger pool of trained executives and scientists in order to help small and medium-sized firms develop, since they often have limited capacity to recruit internationally. Firms identify the positive contribution that NAFTA arrangements and the Provincial Nominee Programme makes to facilitating entry, but felt that both HRSDC and CIC needed to adopt a more relaxed stance towards the entry of foreign workers.

Source: Richardson, 2006 and Hennessy, 2008.

At the provincial level, the use of the Provincial Nominee Programmes (PNPs) - which endow provinces with limited selection powers over migrants - has proliferated rapidly in recent years, rising from only 151 entries (principal applicants) in 1999 to 8,343 in 2008 (Citizenship and Immigration Canada). PNPs allow provinces to nominate skilled foreign workers and business migrants for accelerated entry under the federal migration system. These programmes have been used to support foreign investors and business migrants who require senior managers, professionals and other experts but who cannot bring them in by other means or cannot otherwise access them quickly (box II.3). While the provinces determine the economic selection, the federal government remains responsible for health and security checks.

The primary focus of these programmes has been economic and demographic. On the economic front, the focus has been on creating a more responsive, agile and targeted response to provincial employers and potential investors needing foreign workers. In particular, the programmes have been used to target certain strategic sectors, not always highly skilled industries, often associated with economic development and sustainability objectives. In terms of demographic objectives, in a number of jurisdictions, the PNP programme has been used to promote population growth in isolated regions. This is managed by controlling eligible occupations (e.g. self-employed farmers in New Brunswick and Saskatchewan and primary occupations in British Columbia), by lowering processing charges for employers in Ontario outside Toronto, and by working with local employer and civil society groups in small to medium-sized communities in Manitoba.

Box II.3: Ontario's Provincial Nominee Programme

Opportunities Ontario offers skilled worker entry arrangements for established Ontario employers, as well as for new investments, including FDI. Existing businesses can nominate a foreign worker for a permanent and full-time skilled occupation, on the condition that they have been actively in business for at least three years; and have a minimum of $500,000 to $1,000,000 in gross revenues and a minimum of three to five employees, depending on location in the province. Employers are limited to one foreign worker position for every three to five full-time employees, depending on location. Within 60 days of having the desired position pre-approved by Opportunities Ontario, the foreign worker must submit a separate application.

For new investments in the province that are over $3,000,000 and create at least five permanent, full-time jobs for Canadian citizens or permanent residents, investors can request a nomination for a foreign skilled worker. The investor is limited to one foreign worker for the first five net local jobs created, but can apply for one foreign worker for each additional net local job created. Thus, for example, for an investment creating a total of 50 jobs, 23 of them could be filled by foreign workers. This programme also applies to potential business immigrants or investors looking to be nominated for permanent residence in Ontario, although they are, in addition, required to prove that they will play a long-term management and ownership role in the business.

Source: http://www.ontarioimmigration.ca/English/PNPabout.asp

C. Disseminating FDI-related skills

While foreign firms in Canada exhibit higher levels of productivity than their domestic counter-parts, this gap has been narrowing, suggesting some potentially positives spillover effects from FDI to the Canadian economy (Rao and Tang, 2000). Investment Partnerships Canada (a partnership between DFAIT and Industry Canada) identifies positive contributions of FDI to domestic human capital formation.[5] The importance of technology transfers and on-the-job training in maximizing skill-related spillovers from FDI has been emphasized by researchers in HRSDC. According to the Conference Board of Canada, the country's leading non-profit research institute, FDI makes its strongest contributions to skills upgrading through the pressure it puts on supplier firms to make greater use of technology and up-skill their workers. An additional benefit pointed to is the disproportionately high number of senior foreign executives in major companies, many of which had long-since left the company that had sponsored their initial entry. Researchers in HRSDC agree that high-profile foreign companies often have an advantage when it comes to attracting worldwide talent. When these types of individuals settle in Canada permanently or become employed by domestic firms, their human capital is absorbed by the Canadian economy.

Aerospace Industry - Quebec

The aeronautical and aerospace industry in Canada, primarily located in Quebec, and the Montreal area in particular, is an important sector with significant FDI involvement (box II.4). The attraction of the industry to foreign investors is based on a combination of factors that provide a strong skills base to exploit, including sophisticated training institutions to train the local workforce, liberal entry policies for foreign skills, and the presence of a cluster of firms specializing in various aspects of the production process.

Box II.4: Aerospace Industry – Quebec

Some 60 per cent of Canada's aerospace production takes place in Quebec; Montreal is one of the world's hubs for aerospace manufacturing, bringing in revenues of some $10 billion dollars; seventy per cent of Canadian Research & Development expenditure in aeronautics is conducted in Metropolitan Montreal. Some 260 companies, including major domestic and foreign corporations, such as Bombardier, Rolls Royce, Pratt and Whitney, Bell Helicopter, CMC Electronics and CAE (military simulators), employ roughly 48,000 workers. These consist of 20,000 skilled tradespeople, 10,000 technicians, 12,000 engineers and 6,000 administrative personnel.

Investments in the aeronautics industry are actively courted by both provincial and federal governments and significant investments have been made by the province in training and education capacity in conjunction with the private sector. Notwithstanding these investments, until the slowdown induced by the current recession, educational institutions were having difficulty keeping up with industry growth.

Source: Interview notes, Quebec Government, and International Investment Newsletter, June 2005.

Montreal has perhaps the most sophisticated set of training institutions in North America aimed at turning out technical workers for the aeronautical and aerospace sector. Included in this is the National Aerotechnical School at the Collège Eduard Montpetit, the Montreal Aerospace Trade School, the École Polytechnique de Montréal, the École de technologie supérieure, the Université de Sherbrooke and a graduate programme in aerospace engineering offered jointly by six universities. More recently, the Integrated Aerospace Institute was created, which that houses three levels of education – secondary, college and

[5] Investment Partnerships Canada. "Role of Foreign Direct Investment in Canada." http://www.greatertoronto.org/documents/ROLEofForeignDirectInvestmentinCanada.pdf

university – in a single building, locating professors and students in close proximity to major, foreign and domestically owned, aerospace companies.

When the indigenous skill base cannot keep up with the industry's demands, firms often rely on the migration system to access foreign skilled workers, both by selecting workers coming in through the general economic migration programme, or by taking advantage of arrangements that allow companies to directly sponsor the entry of foreign skilled workers. Officials from the Ministère de l'Immigration et des Communautés culturelles emphasize the importance of having a sophisticated skill entry programme for inducing FDI in the province. For example, their view is that Rolls Royce chose Montreal as an investment location, partly due to the availability of trained workers, of which large numbers are foreign–born engineers.

Once foreign aerospace and aeronautical firms have settled in the Montreal area, several mechanisms can be identified by which these firms contribute to building the local skills base. One of the most apparent is the cooperation of these firms with local educational and research institutions, which provide not only training for current staff, but also ensure that future skill development is tailored to the needs of the industry, resulting in higher levels of technical expertise and specialization in the local workforce. For example, Pratt & Whitney currently offers an in-company MBA in concert with the University of Montreal's École des Hautes Études Commerciales. The Integrated Aerospace Institute, in order to ensure the continued relevance of the curriculum, relies heavily on input from a consultative committee composed of representatives from the largest companies in the region, as well as the Quebec education ministry, the Department of National Defence and the Space Agency. Similarly, the Consortium de recherche et d'innovation en aérospatiale au Québec brings together representatives of the major prime contractors in the Québec aerospace industry as well as the eight engineering schools to encourage collaborative and pre-competitive research. By relying on firms in the industry, many of which are foreign, to integrate their insights into local educational and research institutions, their presence is leveraged to improve the skills of the local workforce.

Another driver of local skills upgrading comes about through the competitive and cooperative interactions between foreign firms, on the one hand, and local competitors and suppliers on the other. By entering the market and adding to the mass of existing firms in the aerospace cluster, foreign firms introduce sophisticated technology and process innovation, which often disseminates rapidly by raising the incentives of local competing firms to "modernize". With respect to local suppliers, there is evidence that foreign firms often play a mentoring role and engage in collaborative projects that can improve the local firm's human capital. For example, Rolls Royce, which has a large facility in Montreal devoted to air plane engine repair, overhaul, assembly, and research and development on power generation, has put in place a programme that seeks to integrate small, local businesses into the company's supply base. Rolls Royce operates an extensive supplier training programme consisting of elaborate guidance notes and on-line training modules for how to interact with Rolls Royce and ensure consistent, high quality transactions.

JR Simplot - Manitoba

The case of JR Simplot, which invested in a major agribusiness project in Manitoba, demonstrates the effectiveness of careful government FDI facilitation efforts (box II.5). High-level government coordination was important in order to bring together the departments involved in the various steps of the investment process, and to assess the appropriateness of the investment to the locality.

Even more important to securing the investment, however, were the liberal entry arrangements allowing Simplot to access foreign workers with skills unavailable locally.

Significant flows of managerial, professional and technical staff came into Manitoba under the NAFTA provisions. These were supplemented by temporary work authorisations that were used to secure quick entry, pending conversion to longer-term permanent migration status. To address the expanded agricultural requirements, migrant low-skill workers were brought in from Mexico and El Salvador along with their families because of the social issues associated with long separations and the fact that this stabilized the intake.

In terms of disseminating skills to the local economy, JR Simplot's investment resulted in an expansion of local training programmes. The management of the investment required developing a comprehensive human resource plan, which included providing funding for training of the indigenous population following consultation with local Aboriginal leaders. Active on-reserve promotion was also undertaken. The training was conducted by the local community college. An interesting aspect of the Canadian experience is its diversity arising from its sheer geographic footprint and provincial, cultural differences, and a repeated theme in the interviews was the scope for using FDI to meet specific regional and social objectives.

More generally, the skilling of indigenous populations is particularly relevant for the resource sector, where there is a high level of indigenous ownership over land and extraction rights. Corporate groups have worked successfully in areas where Aboriginal groups held title with Aboriginal bands assuming majority ownership positions. Many resource operations are also remote so that there it is difficult to recruit and retain trained workers from elsewhere. FDI in these circumstances has been associated with active outreach practices aimed at transferring skills, including the business skills associated with starting up small firms, tendering proposals and winning contracts.

Box II.5: JR Simplot - Manitoba

Manitoba offers a resource rich, diverse economy covering agribusiness, primary industry and manufacturing. It facilitated the investment of the J R Simplot potato processing plant at Portage La Prairie in 2003. The new facility required an investment of $120 million and employed 230 people in its initial phase. It introduced a number of technological innovations including being the first potato processing plant in Canada to use an environmentally friendly biogas recovery and reuse system to radically decrease greenhouse gas emissions as well as reducing fuel costs. This occurred in a community of some 12,000 people.

The entire exercise was coordinated by a Community Economic Development Committee of the Manitoba Cabinet which brought together the key people needed to secure the investment and make it work. In order to secure the Simplot project, the province undertook a 'whole-of-town' assessment around facilities and infrastructure, including housing and education, to ensure there was the local capacity to deal with the increased economic and social demands associated with the investment.

The management of the investment required developing a comprehensive human resource plan. An important part of this plan involved providing funding for training of the indigenous population following consultation with local Aboriginal leaders. Active on-reserve promotion was also undertaken. The training was conducted by the local community college.

Source: Interview notes – former Manitoba Government official; assorted public documents

III. The case of Singapore

Singapore represents a very successful model of FDI-related skills development. While FDI attraction in the country can be linked to several factors, the Government was explicitly focused on the FDI-skills link. Tracing through its different stages of development, Singapore exemplifies a tight "coupling" between economic development strategies and skills development policies. The country's human capital development policies were continuously modified to provide the skills necessary for each phase of economic development.

In the early 1960s, as Singapore was faced with an urgent need to generate sufficient jobs for the large number of unemployed workers, industrialization as a development strategy was seen as the only recourse for the country's immediate problems. Under the United Nations Programme of Technical Assistance, the UN team of experts in development economics led by Dr Albert Winsemius (who was the founding father of the Dutch post-war industrialization programme) conceived a report on 'A Proposed Industrialisation Programme for the State of Singapore' which became the basis for the country's First Development Plan from 1960 to 1964, extended to 1965 (Low et al., 1993). The Winsemius report emphasized development along two parallel paths: *first*, restructuring the economy from entrepôt trade to manufacturing, and, *second*, human resource development. The economically feasible industries identified were shipbuilding and repair, metal engineering, chemical and electrical equipment and appliances. The textile industry was one of the earliest industries in which skills were readily available and start-up costs were relatively low. During this import-substitution industrialization period (1959-1965), the national imperative was to have a standardized education system that not only provided the education required for economic development, but one that also aimed to ensure that ethnic roots and values were not eroded through the focus on basic literacy and technology requirements.

The import-substitution phase of Singapore's economic development was followed by an export-oriented industrialization phase during 1966-1973. The Government's strategy changed in 1968 to one of rapid industrialization through attracting FDI for export-oriented and labour-intensive manufacturing. Under this new development strategy, attracting FDI became the Government's principal focus. Key imperative was the need to meet demands for technically trained manpower to service these foreign investments. In the third phase of Singapore's economic development (1973-1984), the export-oriented strategy moved into higher value-added and more technologically advanced products that required both general and specialized skills, in relation to the industries that were growing as a result of FDI. In 1979, the Government initiated a major restructuring of the economy into one which is higher value added, high technology and more capital intensive. While the Government had first concentrated on the provision of primary and secondary education (in the 1960s and 1970s) to lay the foundation for skills upgrading, from 1980 onwards, it sought to improve the quality of primary and secondary education to further strengthen its skills base, while attention to tertiary education only picked up from the 1980s.

A. Increasing investment attractiveness

Apart from general promotion measures, aimed at attracting foreign investment, the Singapore Government played a key role in providing incentives to foreign investors to invest in skills development in a way that benefited both foreign companies and the home-country workers. These incentives and other promotional efforts were part of a concentrated proactive approach that encompassed targeting investment in particular skill-intensive industries.

To begin with, tax incentives played an important part in encouraging FDI and its expansion in the country. The EDB was given the authority to grant incentives, the most important of which was pioneer status. This allowed for a tax break of up to 10 years, which

was negotiated in the light of what the FDI was likely to offer Singapore. As Singapore developed economically, the range of tax breaks available and the government instrumentalities that could offer them diversified. Yet the EDB functioned effectively as a one-stop centre for investors by working closely with all government ministries, and also linked to other government bodies. The impact of these tax incentives was so pervasive that the average tax rate for companies was only around 8 per cent compared to the nominal flat rate of 17 per cent. However, the focus was on growing total revenues which the Government believed would be more successfully achieved by an expanded tax base rather than protecting the average tax return. Also, the offered loans and tax incentives were essentially a form of risk sharing, since they became unavailable once profit was made.

Apart from key financial incentives, the EDB, acting as a single point of entry and communication, took a wide view of managing investments, including assisting potential investors with accommodation and schooling. The relationship did not end with the investment, but acted as an important ongoing diagnostic tool, while further opportunities were explored, after the investment took place, for the size and complexity of the investment to be extended.

As early as the 1970, the Singapore government began to phase out incentives for labour-intensive industries and focused recruiting on more skill- and knowledge-intensive industries. This involved an active targeting approach, whereby particular TNCs were selected based on their potential contributions to the Singaporean economy, also in terms of skills enhancement. The Singaporean Government saw a clear strategic link between FDI attraction and skills targeting. While tax and other concessions were critical in encouraging the initial investment of TNCs, the Government's targeted approach involved selecting particular companies that would bring in higher value-adding activities and the associated skills. The EDB explicitly focused on promoting human capital, through attracting FDI in skill- and knowledge-intensive areas. The case of Sunstrand (box III.1) exemplifies well how FDI attraction in Singapore beared a clear relation to skills targeting and skills enhancement. The Singapore Government used a combination of tax and grant incentives to convince Sunstrand to locate in Singapore and bring in new skills to build the country’s aerospace industry.

The case of STMicroelectronics also features many of the characteristics that have made the attraction of skill-building FDI in Singapore successful. The industry was targeted as part of Singapore's plan to move up the value-added path, but there was also considerable innovation in meeting the establishment needs of the company through a whole-of-government, one-stop shop, promotional and support effort. STMicroelectronics regarded EDB's promotional efforts to be impressive, non-bureaucratic and pro-business. Apart from the general tax incentives and tax holidays that formed part of the company's initial investment decision, the guaranteed access to the use of skilled professionals and semi-skilled and managerial staff was also an important promotional device. In addition, the Singapore Government provided training support, including action by the EDB for local training institutions to supply the company's needs. In responding to this demand, EDB was providing for the expansion of the skills base of the economy (see box III.2).

Box III.1: The case of Sunstrand

Sunstrand is a high-tech aerospace components and systems company with headquarters in Illinois, US. It sold high-tech machine tools to Boeing, generators and fuel pumps to commercial and military aircraft makers, industrial compressors to infrastructure development companies and, at the lower-end of the scale, sanding discs for US furniture makers.

In 1969, Sunstrand was approached by EDB staff Chan Chin Bock who headed EDB’s office in Chicago. Out of more than 10,000 precision engineering companies in and around Illinois, Chan identified Sunstrand, which had 90 per cent market share of the constant speed drives used in

commercial airplanes, as one of the best companies for EDB's promotion programme. Sunstrand was a market leader respected by its peers with good track record backed by sale and profit figures. The company was unable to expand its US operations due to a shortage of skilled workers in its base in Rockford, USA. Due to the high quality standards required of its products, the company typically required its employees to undergo 2 to 3 years of specialized training. German labour costs were then about the same as those of USA's and hence there was no advantage in expanding its operations in Germany.

EDB officers quickly invited Sunstrand to Singapore to view what the country could offer. The quality of the training centres as well as the meticulous and efficient planning of the visit programme sufficiently impressed Sunstrand's executive to recommend to its senior management to invest in Singapore. However, Sunstrand was uncertain about Singapore's skills capabilities and investment climate. After a year's deliberation, the company decided to adopt a minimum risk approach and move its least profitable, lowest-end manufacturing component to Singapore. It sent a young, inexperienced manager not over 30 years of age to start its manufacturing base in Singapore. As it was willing to commit only $250,000, Sunstrand did not qualify for pioneer status as this required a fixed asset investment of $1 million or above. Despite this, EDB took Sunstrand's interest as a positive first step and went out of its way to help it obtain pioneer status, obtain lease to factory space and recruit its workers who were some of the best trainees the country has to offer from its training centres.

During the initial two years, Sunstrand Singapore struggled to attain financial viability. It decided to withdraw from Singapore. EDB encouraged Sunstrand to capitalize on its special tax free status and lower cost structure by investing in higher margin businesses in Singapore. On its part, Singapore extended its pioneer status and helped Sunstrand groom its skilled technicians by providing it with its best trainees for training in the company's US plant. Sunstrand was also assured that there will be no absenteeism among its Singapore workers, something that has plagued the company's Colorado plant. Sunstrand committed $60 million to its Singapore plant - an increase of 250 times its start-up investment, and sent a key senior executive to lead the Singapore subsidiary. Thus was born Singapore's long-term relationship with Sunstrand and the country's aerospace industry.

Source: Chan (2002) and interview notes

B. Enhancing the domestic skills base

Education

During its early industrializing phase, the Singapore Government initiated an accelerated school building programme (International Labour Organization, 1997). To meet the dramatic increase in primary and secondary school enrolment, large numbers of teachers were recruited and trained in service. With the shift to export-oriented industrialisation, greater emphasis was given to technical education. The secondary school system was again restructured. During 1966 and 1973, local training institutions that focused on technical skills were established (e.g. the Singapore Technical Training Institute to train instructors for other vocational institutions). And major changes were made to the industrial training system. In 1979, Singapore's Ministry of Education (MOE) undertook a broad review of education and proposed a new education system. The previous mixture of language and ethnic schools were merged into a single National Education System (NES), which the government designed to meet the needs of foreign investors by selecting English as the medium of instruction, requiring 12 years of mandatory education, focusing the curriculum on technology, and explicitly tying vocational education, especially at the tertiary level, to specific industrial sectors and skill needs. Coupled with the NES, there were major curriculum changes at the university level, particularly in engineering, to ensure the long-term technical skills were produced (International Labour Organization, 1997).

From the 1980s, the Singapore Government moved to further improve the quality of primary and secondary education. University enrolment increased from 9,200 in 1980 to

22,095 in 1989. More concentration on post-secondary and tertiary education was given in the 1990s to develop the human capital needed for the push to high technology and knowledge-intensive products and services, features of a developed economy. Between 1990 and 1999, polytechnics graduates more than doubled, while university graduates further increased from 5,334 to 9,355 (table III.1).

Table III.1: Higher and technical education graduates in Singapore

Year	University Graduates	Polytechnics Graduates	Institute of Technical Education Graduates
1960	1,030	-	-
1970	1,776	436	1,426
1980	2,874	2,553	7,862
1990	5,334	6,199	7,469
1999	9,355	13,676	7,718
2000	9,244	14,059	7,650
2001	9,586	14,936	7,208
2002	9,923	15,581	7,084
2003	10,010	15,404	7,741
2004	10,165	16,834	8,127
2005	10,031	16,515	9,059
2006	10,427	16,638	10,056
2007	11,171	17,413	10,479
2008	11,472	19,317	10,600

Source: Ministry of Education, Singapore

The Economic Development Board (EDB), Singapore's key promotional body for FDI, has been decisively involved in the country's wide-ranging skills development. Skills requirements of existing and new industries from FDI were ascertained by the EDB, which focused particularly on building skills to meet investors' needs. While the EBD focused particularly on the skill needs of foreign investors, the Ministry of Education (MOE) had broader jurisdiction over schools, polytechnics and universities.

Another key institution for skills building was the National Manpower Council (NMC), where the ministers from the Ministry of Trade and Industry (MTI), MOE and Ministry of Manpower met to consider the intake and output targets of the technological institutes, polytechnics and universities in the manpower development in Singapore. The NMC had overall responsibility for matching the demand and supply for skills in the economy. Based on existing levels and estimated future needs, this body worked together with different parts of the education system (universities, polytechnics and schools) and skills development institutions (institutes of technical education and other industry-specific training institutes) to ensure the supply of sufficient numbers of workers with the desired level of skills for industry requirements. Information on existing skills output from educational and training institutions along with the type of industries that the country wanted to attract were used to analyze the future supply of skills in Singapore and identify potential skill shortages. This information was used to set specific targets for the education and training system in Singapore and to decide whether skilled labour from outside the country had to be imported. While channels of communication across these different institutions were present at different levels, management boards were also tripartite in nature, representing employers, government and labour unions. This ensured that different interests were brought on the table and allowed for reaching a national consensus. This tight connection between different government entities essentially delineated Singapore's success in human resource development.

Another important element of Singapore's education efforts has been the establishment of the Skills Development Fund (SDF) in 1979. When, by the mid-1970s, Singapore had addressed its unemployment problems by attracting TNCs involved in low-skill, low-wage, and labour-intensive manufacturing, the government reoriented its focus for attracting FDI from low-skill and labour-intensive industries to high-skill, capital- and knowledge-intensive industries. The SDF was implemented both to ensure that its labour force could support this transition and encourage firms to participate in the skills development process.

The SDF was essentially a tax on employers of low-skilled employees to discourage them from using cheap labour and incentivize them to upgrade workers by equipping them with appropriate skills. Enacted in 1984, the legislation required employers to contribute 1 per cent of gross salary of all employees earning less than $750 per month (revised upward $1500 in July 2000) into the SDF. The SDF provided financial support for technical and vocational training through subsidies of 50 to 80 per cent of employees training costs, which could include absentee payroll. Employers were required to contribute a portion of the training cost to ensure that they had a vested interest in the nature and success of the training programmes and that the specific skills were in demand by the employers. The training grants were structured such that firms providing training in skills that were in demand, or had training plans that covered over 50 per cent of the workforce, were provided higher sums, while companies that contributed to use low-skilled workers in low-cost operations were penalized.

The SDF has been instrumental in expanding Singapore's skills base. By 1990, roughly 30 per cent of the workforce had undergone some kind of training under this system, and the average training expense of corporations was about 2.4 per cent of total payroll costs (Kuruvilla, Erickson and Hwang, 2002). By 1996, roughly 33 per cent of the workforce was receiving training, and corporations were spending 3.6 per cent of their payroll on training. In 1999, 100 per cent of firms with more than 10 employees and 33 per cent of firms with less than 10 employees utilized the fund to pay for training (Singapore Skills Development Fund, 1999).

Migration policies

While foreign skill entry added directly and significantly to Singapore's existing skill base, accessing foreign skills through sophisticated migration programmes was also an important factor for FDI attraction. For foreign investors, the criticality of guaranteed access to skill, particularly foreign skill through FDI-related entry approval processes, has been critical to the investment decision and increased the level of skills available to the Singaporean economy. The importation of foreign skills to support investment in Singapore has been essential but operated under a paradigm very different to that of Canada. While immigration authorities exercised normal powers over the movement across the borders, FDI-related entry decisions were often effectively part of the FDI approval process itself. In effect, this meant that the immigration concerned itself with the fitness of an individual in terms of health threats or criminal or security issues, while the over-arching agreement on access to foreign skill was determined by the country's investment promotion agency, the EDB.

Singapore's strategy for entry of foreign skill was linked with its FDI promotional efforts through the EDB. The EDB negotiated with the Ministry of Labour/Manpower for specific companies to import foreign workers. The criteria for assessment were based on the ability of the companies to contribute to technology infusion to the local economy. At times, in order to attract strategic investments, EDB negotiated for temporary allocation of foreign workers above the dependency limits allowed for the industry for specific companies.

Broadly, the framework differentiated fairly sharply between skilled and unskilled entry. Singapore imposed a limit to the entry of low-skilled foreign labour through a system

of quotas, dependency ratio, levies and approved source country. In addition, low-skilled foreign labour was permitted to be employed only in activities that were specified in the work permit. They could not freelance or be self-employed. Employers of low-skilled foreign labour were responsible for their lodging, maintenance and eventual repatriation. As a result, employment of such workers tended to be employer-specific. Harsh penalties were meted out to employers who did not conform to employment legislation, which included jail terms and fines. Apart from the levies imposed, unskilled labour was also closely controlled with significant restrictions on marriage to Singaporean residents. Citizenship was largely unavailable to the non-skilled.

In contrast, there were no restrictions and entry barriers to skilled labour, in particular, those who possessed acceptable degrees, professional qualifications or specialist skills. The skilled were professionals and managers, often closely aligned with the operations of TNCs, with nationality associated with the source of investment or the regional skills base (e.g. Japan, USA, Australia and the European Union). Skilled workers were eligible to take up permanent residence or citizenship (skilled workers could take 2 to 10 years to access it) and could bring their dependants into the country. Unlike unskilled workers, skilled foreign workers were integrated into the resident population. This tiered approach to foreign workers was seen by Singapore as a way of dealing with the problems of integration faced by many developed countries.

In the early 1970s, the annual flow of foreign workers, both skilled and unskilled, into Singapore was small (Pang and Lim, 1982). The flow surged from the late 1970s. During the 1980s, there was a significant increase in temporary migration but permanent residence was not a significant feature of these movements. This partly reflected that professionals associated with TNCs largely had no settlement intentions. It is estimated that in 1986 only about 5,000 people were granted permanent residence (UNESCO, 2003). However, by the end of 1990s it was over 4 times this level. The number of non-residents in Singapore, though small compared to the total population, has been increasing and essentially accounts for a large percentage of the increase in the country's total population (Singapore Department of Statistics, Population Trends 2009).

Singapore's experience with both skilled and unskilled foreign labour has been highly positive, with foreign workers contributing significantly to economic growth. One study estimated that 41 per cent of Singapore's GDP growth in the 1990s came from the inflow of foreign workers, both skilled and unskilled (Tan et al, 2002). 37 per cent of the GDP growth was due to skilled foreign manpower (i.e. workers holding employment passes). Another study (Chia, Thangavelu and Toh, 2004) reinforced the importance of foreign talent to Singapore, by estimating that since the mid 1980s a 1 per cent change in the number of employment pass holders is associated with a 1.9 per cent change in skilled local employment and 0.2 per cent change in unskilled local employment. Foreign labour has had other positive yet unquantifiable effects, also through transferring skills to the local economy (see section III.C).

C. Disseminating FDI-related skills

Singapore’s success in transforming itself into a more highly skilled economy has been seen as reflecting “a strong degree of centralized articulation and planning of skills development needs, coupled with an innovative government-private sector partnership that integrates FDI and technology transfers” (Kuruvilla and Erickson, 2002). Singapore's strategy of actively courting TNCs, apart from generating employment for local workers and growth for the economy, also provided access to a network of technologically advanced affiliates through which skills, knowledge and technology were transmitted to the domestic economy. The increased technical and managerial know-how and skills helped promote output

efficiency and productivity growth. This technocratic approach was supported by a strong private sector involvement, educational reform and the Skills Development Fund.

Table III.2 shows a pattern of increased FDI inflows, increased literacy rate and labour productivity in Singapore, matched by increasing growth rates. Though causality for these relationships has not been established pre se, the presence of TNCs in Singapore has been most likely accompanied by productivity increases. TNCs in Singapore, apart from being good paymasters, provided valuable training to new recruits with excellent career prospects. This is borne out by workers in foreign manufacturing firms earning 60 per cent more income and having 4.4 times higher productivity than those working for local firms. Value-added per foreign manufacturer is 34.5 times higher than a local firm.[6]

Table III.2: General macro-indicators for Singapore (selected years)

Year	GDP growth rate	Growth rates of FDI	Change in labour productivity	Literacy rate
1965	6.6			60.2
1970	13.4			68.9
1975	4.0			76.2
1980	9.7			82.3
1985	-1.6			
1986	2.3	10.5		
1987	9.7	21.2		
1988	11.6	19.5	5.0	87.7
1989	9.6	14.7		88.4
1990	9.0	21.3		89.1
1991	7.1	9.4		90.3
1992	6.5	3.84		90.3
1993	12.7	10.77	9.1	90.8
1994	11.4	18.86	6.4	91.3
1995	8.0	12.9	3.3	91.8
1996	7.6	11.5	1.2	92.2
1997	8.5	19.2	2.2	92.8
1998	0.1		-2.3	93.1
1999	5.9		5.8	
2000	9.9			

Source: Kuruvilla, Erickson and Hwang, 2002.

Training

Domestic training initiatives in Singapore, aimed at attracting skill-building FDI, were integrated with FDI, which added to the skills base of the economy. The Singapore Government's efforts to effectively link human capital development with FDI were accomplished through a number of mechanisms:

- Leapfrogging, which involved finding international industry partners with proven training systems and adapting them to meet emerging local needs.
- Overseas training programme, by which promising young trainees were recruited and sent to Germany and Switzerland for up to 3.5 years to form the backbone of the manufacturing sector workforce and trainer pool.
- Traineeship/scholarship scheme, which provided relatively generous stipends but with bonds to serve in selected companies. This also helped to raise the stature of industrial

[6] Computed from Economic Development Board, Report on the Census of Manufacturing Activities 2007. Figures refer to wholly foreign or wholly local firms.

training institutions and removed the then commonly held perception that they were schools for academic drop-outs.

The link between skills development and FDI was established through the EDB's evolving model of technology transfer, involving joint government and private sector management of training (Kruvilla and Chua, 2000). Several Joint Industrial Training Centres were developed in collaboration with major TNCs in the 1970s to provide training in high skills such as electronics and precision engineering. These included the EDB-Tata Training Centre for tools, dies and moulds (Indian TNC, formed 1972), the EDB- Rollei Training Centre for optics and precision mechanics (German TNC, formed 1973) and the EDB-Philips Training Centre for precision machining (Dutch TNC, formed 1975). The training centres were established with EDB providing land and buildings, machinery and equipment and some share of operating costs. The TNCs initially supplied the training experts, programmes and systems. This partnership ensured that the trained labour force possessed relevant skills that met the demand of existing and new industries.

The EDB participated in the management of the training centers established in collaboration with foreign investors, sometime taking them over after some years, or integrating these centers with the existing vocational training apparatus in Singapore. The number of students enrolled in technical and vocational institutes was 843 in 1963, 4727 in 1970 and 12542 in 1980.[7] By the early 1980s, the need for a much larger supply of skills as a result of higher levels of inward FDI prompted the EDB to create training centres that are funded jointly by other governments. As a result, several joint skills training institutes were formed during 1979-1984: the Japan-Singapore Government Training Centre, German-Singapore Institute for Production Technology, French-Singapore Institute for Electro-technology, and the Japan Institute for Software Technology. As demand for larger skills supply grew, these institutes were combined to form larger institutes or polytechnics. For example, the German-Singapore Institute for Production Technology was transformed into a computer training centre. In this way, Singapore was successful in generating sufficient skills through sharing of cost and resources.

This model of cost-sharing with foreign investors and the Singapore government (through the EDB) was successful not only at generating the skills required for foreign investors in the short-run, but also served as centers of training for future transferable skills and general human capital by harnessing foreign firms' unique expertise. For example, the German-Singapore institute became an industry training center, with world leaders in several different technologies providing training. Another example concerns the computer industry, where Japanese electronics companies such as Seiko, Sankyo Deiki, Matsushita and Mitutyo provided expertise in surface mount technology, IC design, and computer numerical control technology; European companies such as Siemens, Asea, and Carl Zeiss contributed equipment and skills in the areas of artificial intelligence, laser and vision technology; and Hewlett Packard and Auto Desk provided training and expertise in CAD/CAM robotics and simulation software. This training center model was soon expanded to several other industries as well.

The provision of incentives for foreign investors to establish joint training centres with the State was a clear reason for the success of skills transfer through FDI in Singapore (Kuruvilla, Erickson and Hwang, 2002). The EDB induced foreign companies to take the initiative in training with training subsidies and grants. Incentives were offered to foreign investors to establish joint training centers with the State. Specific foreign corporations were provided finance and infrastructure to set up training centers in Singapore. The programme initially started on a small scale where the EDB targeted specific companies such as Rollei

[7] Department of Statistics (1983) Economic and Social Statistics Singapore 1960-1982, Singapore: Ministry of Trade and Industry.

(Germany), Phillips (Netherlands) and Tata (India). The incentives offered to the companies varied. For example, in the Tata case, the government provided loan finance to the group to set up their business, reasonable land rents, and paid for the purchase of training equipment and materials, as well as 70 per cent of operating costs.

In the early 1970s, foreign investors who established training centres in collaboration with the Government were guaranteed the first right to hire graduates from these centres. This ensured that the foreign investors did not face skill shortages in a tight labour market and had some control over the type and supply of skilled labour. For example, the EDB granted Rollei (Germany) and other German firms 44 per cent of the Rollei-Government graduates. Technology was transferred from Rollei to local workers who attended the training centre and were sent to Rollei Germany for training. Inter-firm technology transfer occurred when some of these trained Rollei employees left to set up supporting industries in Singapore. Another channel of inter-industry skills transfer occurred through TNCs training of non-employees in the training centres. As the government intensified efforts to attract high-technology industries in the early 1980s, joint skills training institutes, which awarded 3-year diplomas with specialized skills know-how and training in mechanisation, automation and computerisation, allowed for the dissemination of skills to locals who were not necessarily employed in a particular TNC resident in the country. These training institutes were merged into a single polytechnic in 1993.

The case of STMicroelectronics in Singapore (box III.2) is a clear example of a foreign investor providing direct training to the domestic population. The result was that overwhelmingly the cadre of initial managers left Singapore after 3 years, with trained local staff taking their place. ST also encouraged the development of other companies to meet its needs resulting in skill and technology transfers. Training skilled workers in excess of those required by the TNC partners, and allowing the placement of trainees to other TNCs and local supporting industries, helped to induce further investments from other TNCs and develop the capabilities of local industries. When the company subsequently invested in Malaysia, it was Singaporean staff that formed the training expertise in the start up of those operations.

Box III.2: The case of STMicroelectronics

STMicroelectronics (ST) was created in 1987 by the merger of semiconductor companies SGS Microelettronica of Italy and Thomson Semiconducteurs of France. ST is one of the world's top five semiconductor suppliers with sales nearing $10 billion with over half being in Asia.

When the ST Manager Director visited Singapore in January 1969, he dealt with the EDB and in the three days he was in Singapore he had agreement to:

- a preferred site, notwithstanding that had been nominally set aside for another company;
- a start-up loan of $12m; and
- release of EDB's liaison officer to join the company as its first Singaporean employee.

In discussions with the Singaporean Government, ST had a long list of requirements and questions. Among these were the significant electricity and water requirements to service the plant. The result was that the Singaporean Government expanded the electricity generating capacity of the local plant and diverted a water main to the factory.

The Singapore subsidiary was set up April 1969 and the plant started assembling and testing basic semi-conductors in June 1969. Since that time it has invested around $3.4 billion in the Singaporean economy. In the initial phase, 40 managers were sent from Europe covering the various production and management functions. Their job was both to manage the processes and to train. Most completed their transfer of skills and left at the end of their two-year contracts, leaving only a nucleus of expertise to support the newly trained indigenous talent. Further plant upgrades similarly involved temporary placements of specialists in Singapore for 6-10 months. When lower-end facilities were set up in Malaysia in 1974, largely Singaporean expertise was used to train the Malaysians.

The transfer of skills in the second investment phase (R&D and wafer fabrication in the 1980s and 1990s) had to be achieved through a different strategy with Singaporean staff trained in the European plants with EDB subsidies of over 50 per cent. There was a strong incentive to develop local suppliers in order to lower supply costs (up to 30 per cent) and having suppliers close by to better collaborate and increase service levels. These initiatives, supported in the 1980s and 1990s by the EDB through the Local Industry Upgrading Programme, resulted in about 9 indigenous companies becoming significant local and international players.

The role of the National Trade Union Congress (NTUC) was said to be critical to facilitating the investment on two broad fronts. Firstly, the second phase of technology transfer had been blocked in Italy by the unions on the grounds that it was exporting the jobs and exploiting foreign workers. A delegation of Italian unionists was sponsored to visit Singapore and the NTUC was able to satisfy the union delegation that no labour exploitation was taking place. Secondly, it cooperated on a move to 12 hour shifts which increased plant work hours from 8,600 in Singapore compared to 6,600 in Europe, allowing a potential saving of around $85m against a $1billion investment.

Source: Interview with STMicroelectronics

Linkage effects

Within the context of Singapore's strategy of augmenting 'technological deepening' through inward FDI (Lall, 1996), incentives were offered to encourage TNCs to spread their labour and material sourcing from the local economy. Efforts to link indigenously owned supplier firms with foreign "mentor" TNCs proved an effective way of improving local skill levels.

An important contributor to the dissemination of skills was the Local Industry Upgrading Programme (LIUP), initiated in 1986, which provided incentives to TNCs to upgrade the skills and quality of supporting inputs and services from local firms. Under the LIUP scheme, the EDB subsidized a percentage of a TNC manager or engineer's salary if he was sent to work in the local supplier's factory. In that way, experienced technical and managerial employees were transferred from the TNCs to local firms, thus raising the standards in local SMEs through knowledge transfer and training. It further permitted an increased outsourcing of TNC's input to local suppliers at lower costs and facilitated the emergence of major local companies.

With the assistance of these TNC "mentors", local firms gained expertise and capacity to become efficient suppliers. Partly as a result of this initiative, local Singaporean firms have been able to transition out of low-wage, labour-intensive industry into more capital- and knowledge-intensive industries, including high technology electronics manufacturing, petrochemicals, and a nascent bioscience industry (McKendrick et al., 2000). For example, the Local Industry Upgrading Scheme was pivotal in the transfer for skills from STMicroelectronics to its local suppliers, which transformed them to significant local and international players (see box III.2).

As important as the advantages of establishing supplier linkages was the identification of why some firms did not, at least initially, recognize the potential of working within such arrangements. While it is clear that TNCs, which tend to be associated with higher technology, may have needs more sophisticated than the local market can meet, AT&T's experience suggested that some of the gaps were more basic. Some local suppliers were happy to continue to produce for the local market and did not actively consider the wider opportunities associated with a larger market; local markets did not necessarily have the same requirements for continuity of supply associated with high-volume, higher-tech production of TNCs; and many local suppliers did not have quality control standards equal to those required by TNCs.

The development of clusters, as a way of facilitating linkages, has also worked as an important platform for skills dissemination in Singapore. Workforce specialization within clusters implied that many of the skills built up by TNCs and transferred through labour mobility could be used by other firms working in similar or related fields. At the same time, high-technology clusters were characterized by high levels of foreign ownership. The case of AT&T in Singapore (box III.3) shows that while the involvement in clusters conferred significant operational advantages (such as reduced costs, higher service levels, quicker service), there was also higher potential to collaborate in research and co-design solutions. The increased scope for collaboration was in the interest of both primary and supplier organizations and was associated with successful ancillary education and training programmes, often facilitated by government investment. This ensured a greater pool of skilled workers.

Box III.3: The case of AT&T

AT&T was a major US Company that had to divest itself of its overseas holdings because of requirements within the USA. By the time it was ready to look internationally at the production of telephones in the 1980s, it had lost its experience in operating in an overseas environment.

In approaching Singapore, EDB acted as a one-stop shop, hand-holding operation for AT&T dealing with almost every issue it had to confront, including finding accommodation for senior executives, providing information on establishment, and finding a production site.

Its ramp-up in Singapore was said to have been, up to that time, the fastest on record because of the skill development that took place through the SDF ahead of the plant's commissioning.

Up to the mid-90s, there were no major concerns on accessing overseas workers, with the only problem being very high levels of staff turnover. Later in the 90s, accessing appropriate semi-skilled staff became increasingly difficult in the light of restricted inflows so that concessional entry arrangements formed part of the FDI package. When AT&T subsequently wanted to expand its operations, it negotiated a tax break with EDB. Yet, EDB offered in return a more substantial tax break if AT&T was prepared to adopt a higher-tech plant it was considering opening in another country. As a result, a higher-value plant than what had been intended was opened in Singapore.

The Government organized suppliers and provided incentives to companies to transfer skills, such as meeting some or all of the costs of key company staff to develop and train potential suppliers. It was suggested that company interest in developing suppliers reflected both the potential reduction in supply costs, as well as securing higher service levels from a local manufacturer. For AT&T, for example, it led quickly to the local supplier having to adopt a more sophisticated conveyor system for the handling of semi-conductors leading to that company having a technological edge in dealing with its other customers.

An important aspect of the AT&T's development was said to have been its involvement in clusters, which conferred some significant advantages on its operations. In particular, it was noted that it reduced costs (through reduced transportation costs and just-in-time delivery of equipment); increased the scope for collaboration including common research interests; allowed suppliers to more readily understand its needs; and ensured that there was a greater pool of skilled workers.

It was also noted that fewer top executives were coming to Singapore and passing on their skills, as many top positions had been taken by Singaporean nationals. However, specialists and other technical positions continued to spread skills as many were young and formed attachments to the country.

Source: Interview notes - Singapore International Chamber of Commerce

IV. Lessons on how to integrate FDI in the skills development process

Skills development is an important policy priority for all countries, regardless of their level of economic development. A solid skills base is a precondition for the growth of skill-intensive industries, and thus a necessary step for developing countries to move away from relying on low labour costs to compete in the global economy. Improvements to the skills base are above all a function of the domestic education system. Yet, other policy tools can make significant contributions. By reviewing the trends, institutions and policies related to education, migration, the attraction of FDI and the subsequent dissemination of skills to the local economy, this study identifies lessons on how countries can effectively integrate FDI into their skills development process.

1. There is no single model to skills development

Differences related to development levels, existing skills base, and other contextual factors shape the objectives and options available to governments with respect to skills development. Plans to integrate FDI into the process must therefore be designed accordingly.

Canada and Singapore offer two distinct yet successful approaches to skills development. Considering the countries' different starting points, both in terms of their stage of economic development and also the level and quality of the local skills base, this is not surprising. Canada, a country historically with abundant high skills, took a broader approach through tailoring its education system and migration policy to further expand the skills base. In this regard, attracting FDI and highly educated workers fuelled a continuous cycle of skills enhancement in the country. Singapore, on the other hand, successfully made the difficult transition from a low to a highly-skilled economy, using FDI as a key element of its skills and economic development path. Singapore showed an extraordinary level of policy convergence in attracting skill-intensive FDI, ensuring that these foreign skills were effectively transferred to the domestic economy.

There is no single best skills development model. The issue is to developing a model suited to a country's specific circumstances. Regardless of which policy model is selected, it needs to be carefully supported.

Different sets of policies can be instrumental in encouraging and maintaining the upward sloping FDI and skills virtuous circle. FDI attraction strategies, education and migration policies, FDI targeting in education as well as different skills dissemination policies, also in the context of national innovation systems, are important elements of a skills development model. If the local economy is to benefit from the TNC activities and upgrade its domestic skills base, it needs to carefully design and sequence these different policy factors, always in conjunction with its unique needs and characteristics. For example, Canada's lack of density and wide geographical spread have been reflected in a largely decentralized skills development approach, involving strong provincial initiatives. Singapore's successful approach to skills building, on the other hand, has been more centralized, involving systematic and concentrated country-wide efforts.

A dynamic skills development approach may require increasingly sophisticated institutional structures. Interaction, coordination and synergies between different skill-related institutions can be supportive of a self-sustaining model.

The case of Singapore shows how close integration between FDI, industry and skills policies can come through dedicated institutional bodies. Singapore's success in skills development was the result of a concentrated national effort, with the Government taking the lead role and different institutions working together. This tight connection between different

institutions, combined with a sustained and proactive re-organization and consolidation approach, and the involvement of the private sector in training and maintaining the relevance of skills development, were key mechanisms for the country's success. Eventually, these mechanisms became self-sustaining through creating synergies in the skills development process.

2. Government educational investment is critical for building a strong skills base

The primary responsibility for skills development in a country rests with the national education system. Countries can better identify skill shortages, continuously evaluate human resource development policies in light of their skill needs, and translate them into targets for the education system.

In one of its report, UNCTAD concludes that host countries cannot rely on foreign investors to meet their broader or emerging skill needs: "Such investments are generally more expensive and long-term, and here it is educational institutions that have to meet the needs. In other words, the upgrading of the general skill level and provision of high-level specialized training is something that host countries have to do for themselves. Indeed, such upgrading itself can be used to attract higher-quality inward FDI and to induce existing investors to move into more complex activities" (UNCTAD, 2000b: 17).

Both Canada and Singapore have made significant educational investments to build up their human capital. As a developed country, Canada has set up a sophisticated educational system that addresses the changing needs of the industry. This contributes to a high rate of educational attainment and also improves the country's investment attractiveness. Singapore's human capital development policies evolved to provide the skills necessary for each phase of economic development. Starting from a low skills base, the country adopted policies, provided funding for their implementation and created the relevant institutions for skills development, especially with a view to meeting the needs of foreign investors.

Adopt flexible demand-driven policies to ensure that, over time, the supply of skills matches demand. Building and regularly updating a list of skills that are scarce in the entire economy is a useful guide to domestic educational investment.

Singapore's human resource development policies were essentially demand-driven and systematically re-evaluated in light of the country's skills needs. Information on existing educational outcomes along with the types of industries that the country wanted to attract was used to determine the future supply of skills in the economy, identify potential skill shortages, and set targets for the education system.

Ensure that the content of local education meets the needs of foreign investors in order to foster FDI attraction efforts.

Demand-driven education policies need to accommodate the needs of private, both domestic and foreign, investors. The establishment of effective IPAs with clear mandates and strong management to coordinate human resource development, such as Singapore's Economic Development Board, can be a key starting point. IPAs need to have good links with industries and TNCs to help indentify the skill needs of the economy and establish a continuous dialogue with relevant ministries, such as these of labour and academia. This can be crucial in devising effective educational policies and establishing government-funded skills development institutions.

Education policies ensure that the absorptive capacity of the local workforce is enhanced to a level that it can subsequently absorb spillovers from exposure to foreign knowledge, technology and skills.

Efforts made by host developing countries to improve their absorptive capacity are important to facilitate skill transfers. Todo and Miyamoto (2002) provide direct evidence supporting the importance of domestic firms' absorptive capacity on such transfers. Blomström et al. (1994) show that FDI contributes more to skills growth only for a country that already has the necessary capabilities to absorb FDI-related technology transfers. For example, there is evidence that reducing the technology gap between TNCs and the domestic economy increases technology transfers (Borenzstein et al., 1998).

Developing an education and training system through studying the experience of other countries might be useful.

Singapore has studied the experience of industrialized countries like Japan and Germany, identified their best practices and used them to help develop its education and training system. Thus, for example, it looked at the educational practices in the teaching of the working language and mathematics of these two countries. It also learnt from Germany's "dual" apprenticeship system and Japan's on-the-job training programmes. It therefore avoided the cost and complications which invariably arise from trial and error. In addition, joint training centres were established with major foreign investors from these countries, and also with other governments, such as with Japan, Germany and France.

3. Encourage foreign investors to directly invest in education, particularly in areas of skill shortages

While public investment in education remains the single most important driver in building human capital, private investment and FDI can also make a significant contribution.

The substance of the educational system should be formulated by local entities. Nonetheless, foreign investors can be attracted to invest directly in education, specifically in areas where skill shortages are present. In this regard, the direct contribution of FDI in education can be particularly important in developing countries where the level of formal skills and human capital is low. As domestic educational investment represents a considerable expenditure commitment by a developing country, foreign investors may be able to finance education efforts when the state is not in a position to make the necessary investments.

The expertise and knowledge of foreign investors can be used to improve domestic education and research infrastructure through participation in management and funding efforts.

Involving foreign investors in the creation and management of training centres, research institutes, or consulting them with respect to major educational initiatives, can improve the country's investment attractiveness to foreign investors and foster the relevance and quality of education. UNCTAD (1994:218) reports that TNCs' demand for highly trained graduates manifests itself in the form of financial support, particularly to business schools and science facilities, the provision of assistance and advice through membership of advisory boards, curriculum review committees, councils and senates. For example, various training programmes in Thailand are run jointly by international chambers of commerce (of which TNCs are prominent members) and the Thai government. In Malaysia, several skill development centres have been established by the government, local business and foreign TNCs, such as the Penang Skills Development Centre that has been widely lauded for its success.

In Canada, domestic and foreign investors play an important role in managing some of the higher education and research institutions. Insights from investors are integrated into these local institutions to improve their relevance and quality. This ensures that future skill development is tailored to the needs of the industry. In Singapore, while the Government has played the lead role in the development of education and training, the participation of foreign investors has also been important in this process. Training centres were established in collaboration with major foreign investors to provide training in high skills. The involvement of foreign investors in the skills development process was successful in generating the skills required in the short run and to transferring skills and general human capital through harnessing the foreign firms' unique expertise. Singapore already has eight American and European schools that have strong links with industry.

UNCTAD (2009) has identified a variety of modes by which foreign universities can enter a host country. Export modes include distance learning programmes that, despite their potential for fairly large-scale coverage, services provided are usually inadequate. Collaborative modes take the form of associations/partnerships and involve stronger contribution by foreign universities than export modes. Collaborative modes are usually combined with training of local staff and offer major multicultural benefits. Joint venture and wholly-owned subsidiary modes are differentiated from collaborative modes by the establishment of campuses in the host country. The latter modes entail a greater degree of commitment, extending to, for example, training of host country faculty abroad. Some joint ventures can be established by intergovernmental agreements e.g. between a foreign university (acting on behalf of the foreign Government) and the host country Government. Advantages are similar to collaborations though spillover benefits may be stronger.

4. Flexible migration programmes can facilitate the necessary entry of foreign skills and promote further FDI attraction

Taking into account skill requirement in the design of the immigration policies can help address skills shortages or local unavailability. A regularly updated list of skill shortages in all economic sectors allows for foreign skills to enter the country on a selective basis.

Access to skilled workers is a key factor for any investment decision. In the absence of adequate local skills, flexible and focused migrant entry requirements are essential to attract skill-intensive FDI. No economy can expect to be able to meet all current and future skill requirements associated with major investments, particularly if the investment involves higher levels of technology in a competitive marketplace. Migration policies ensure that the required foreign skills can enter a country. Nonetheless, achieving a balance between the legitimate interests of investors to have the required staff and the national interest of citizen job protection, training and advancement is not an easy task.

Countries can adopt different approaches to introducing foreign labour in their markets. For example, they can determine the number of positions open to foreign entry based on the foreign capital invested in the country and, in some cases, the priority attached to attracting investment in a specific sector. In this regard, large TNCs with well-known brand names, extensive human resource networks and effective recruiting and training practices possess an advantage when it comes to drawing international talent to service their investments. UNCTAD (2005) recommends that countries adapt their entry system based on an assessment of corporate-wide training performance to ensure that expatriate hire goes hand in hand with local skills development. Under this new system, countries would introduce an open list of skills shortages to be reviewed annually. Investors would be allowed to recruit foreign employees with the required competencies subject to verification of their credentials by the immigration authorities and also the commitment of the company to a training programme for the advancement of local staff.

As it is clear in the case of Canada and Singapore, FDI would not have taken place if there was a risk that the investment would not benefit from the availability of skilled workers. Canada has improved its attractiveness as a destination for FDI, especially in skill-intensive sectors of the economy, by ensuring that its migrant entry processes add to the domestic stock of skills or provide foreign investors with access to foreign skills when these are not available locally. The Canadian immigration system responds to demand in a number of ways: it has relatively liberal short-term entry provisions, it provides for market-testing to identify specific shortages, and also offers a range of employer-sponsored entry programmes while also allowing the provincial government to fast-track such applicants through the Provincial Nominee Programme (PNP). Singapore posed no restrictions or entry barriers to foreign skilled labour, which was integrated into the resident population. For foreign investors, guaranteed access to skill, particularly foreign skill through FDI-related entry approval processes, has been critical to the investment decision and increased the level of skills available to the Singaporean economy. An important feature of the Singaporean approach was to provide very significant powers to the Economic Development Board, so that immigration decisions were, in effect, subservient to the overall FDI approval process.

FDI can act as a magnet for international talent, which, upon permanent settlement, adds to the national skill base.

The capacity to directly expand the skills base through migration will be enhanced if there is a possibility for permanent residence. While major TNCs have great power to attract highly-skilled workers, based on attractive job opportunities, a country's attractiveness and possibility for permanent settlement can also be decisive. In Canada, a fundamental shift is currently underway within its immigration programme, with a view to facilitating and encouraging the transition from temporary to permanent status. In Singapore, during the 1980s, there was a significant increase in temporary migration but permanent residence was not a significant feature of these movements. This partly reflected the fact that professionals associated with TNCs largely had no settlement intentions. However, by the end of 1990s, this trend has been shifting, also due to the increased attractiveness of the country as a place of residence.

5. Attract foreign investors in skill-intensive industries. Focus on matching FDI with current skill levels and realistic skill targets

While generally ensuring a favourable business climate is critical to attracting foreign investors, government policies can help to target FDI in skill-intensive industries.

An attractive investment climate and sound policy environment are important for host developing countries to successfully attract FDI. Among these, the level of human capital has been a crucial factor that TNCs, especially the high value-added ones, are seeking when selecting a new location for their operations. This has recently become even more crucial as the mode of TNC production is becoming relatively skill-biased with an increasing number of high-technology manufacturing and services TNCs seeking labour force equipped with knowledge in engineering, technology, organizational skills and business administration.

If host countries attract TNCs that will not lead to much skill upgrading of the economy, the virtuous circle cannot be initiated. Thus, host developing countries must first identify the type of TNCs that they would like to attract in the short run (potentially increasing employment and tax revenues) and also the types that would most likely benefit the economy in the long run, through increased training opportunities and technology spillovers. The next step is to assess whether the country has the right investment climate for this type of TNCs and adopted the required corrective measures when appropriate.

Well-designed incentives can be particularly relevant as a first step to initiate the FDI-skills virtuous circle, especially in developing countries. In the presence of gaps between investors' demand for skilled workers and their availability in the host country, investment incentives can be decisive in attracting the appropriate levels and types of FDI.

Fiscal and financial incentives are straightforward policy instruments to ensure that the required levels and types of FDI are attracted in the economy, also with a view to satisfying skills development objectives. Singapore has taken an active approach to the provision of incentives, not only as general FDI promotional arrangements, but also as inducements to specifically attract FDI in skill-intensive industries. While a wide range of incentives were offered, Singapore's approach included key protections. The main concessions generally took the form of tax breaks rather than direct subsidies, which meant that profits had to be earned before a subsidy was effectively provided. In addition, although a number of agencies were able to offer concessions, there was still a one-stop shop to assess the overall impact of those concessions. TNCs were also selected based on their potential contributions, including in terms fo skills enhancement, to the Singaporean economy.

6. Consider policies that promote the diffusion of foreign skills to the local economy

Provide incentives for foreign affiliates to undertake on-the-job training.

Studies have shown that TNCs generally invest more in training than their local counterparts, are more aware of emerging trends in training and the need for new forms of skill creations, more able to use state-or-the-art training materials and techniques, and tend to orient their training more towards global markets (Miyamoto and Todo, 2003; UNCTAD, 2000b). TNC training is important for developing countries since it is most likely to bring in the advanced skills and technologies to which domestic firms would have no access. Summarizing numerous studies of human capital development in TNCs, UNCTAD (1999: 275) notes that even in low-wage operations in developing countries, where training efforts could be expected to be the lowest, export-oriented TNCs still invest significantly in training since they must meet high standards of quality and delivery, and need good skills at supervisory and managerial levels.

Incentivizing foreign investors to undertake on-the-job training usually includes sharing the financial burden or offering other types of concessions. In general, financing schemes in developing countries can be categorised as follows (Batra, 2003): i) levy-grant scheme, where payroll levies are later used by fund administrators to give grants to employers for approved training; ii) levy-rebate schemes, where payroll levies are later partially reimbursed for approved training; iii) levy-exemption schemes, where payroll levies are exempt for employers that spend a given percentage of their payroll on training; and iv) tax-incentive schemes, where firms can deduct training expenditures to calculate their profit before tax. A number of countries including Singapore, Chinese Taipei, Argentina and Costa Rica have adopted the levy-grant scheme. In general, payroll tax levies are preferred to training grants since funding levels are more stable.

In Singapore, the provision of incentives for foreign investors to establish joint training centres with the State was a reason for the success of FDI-related skills transfer. The EDB provided foreign companies with training subsidies and grants. Apart from financial incentives, foreign investors who established training centres in collaboration with the State were also guaranteed the first right to hire graduates from these centres. This ensured to foreign investors that they would face no skill shortages in a tight labour market.

Develop active schemes for skills spillovers to take place. These may occur through four main channels: vertical linkages, horizontal linkages, labour turnover and labour spin-offs.

Vertical linkages are common mechanisms for skills diffusion. TNCs may train or provide technical support to domestic firms that supply them with intermediate goods (backward linkages), or to buyers of their own products (forward linkages). There is much evidence of such spillovers taking place (UNCTAD, 2000; Lim, 2001). Government matching and financing efforts can help support supply chain linkages, which can result in skills dissemination.

Canada offers many examples where supplier linkages have resulted in the dissemination of skills to the local economy. The Quebec Aerospace industry shows a very high level of vertical integration as the primary contractors have an industry built around them. Another example is that of Rolls Royce in Montreal, which operated an extensive supplier training programme seeking to integrate small, local businesses into the company's supply chain. In Singapore, efforts to link indigenously owned supplier firms with foreign "mentor" TNCs were mainly manifested through the Local Industry Upgrading Programme (LIUP). The scheme was pivotal in the transfer of skills from foreign investors to their local suppliers and proved an effective way of improving local skill levels. Partly as a result of this initiative, many local Singaporean firms were able to transition into more capital- and knowledge-intensive industries, and evolve to significant local and international players.

Horizontal linkages occur when domestic firms in the same industry gain skills through industry or region-wide skills development institutions that are supported by TNCs. TNCs' infrastructure development, technical support and programme design, advanced technologies and skills are expected to spillover to other firms in the same industries receiving training at these skills development institutions. Horizontal linkages may also occur through competition effects, which can prompt innovation, efficiency, and technical improvements in domestic firms. Stronger competition urges host country firms to either use existing technologies and resources more efficiently or adopt new technologies and organizational practices, which provides another important channel for such spillovers (Glass and Saggi, 2002). Increased competition may also encourage the affiliate to transfer technology from the parent in order to compete locally and/or it may also dictate the use of higher quality management in the local market thereby increasing the likelihood of spillovers (Görg and Strobl, 2003).

There is evidence of competitive linkages taking place in Singapore. For example, in the AT&T example, its demand for more sophisticated conveyor belt technology led to a competitive advantage being conferred on its supplier relative to its other competitors. This suggests that it is difficult to contain the spread of technology and skill once it is introduced into a market and that the transfer of technology across an economy is not necessarily detrimental to the interests of the TNC.

Spillovers can also take place through labour turnovers and spin-offs. Labour turnover occurs when TNC-trained workers or managers transfer their knowledge to other firms when switching employers. When employees of TNCs seek alternative firms to work in, it is likely that they will try to sell their skills and experiences attained while working at the TNCs. Domestic firms interested in new skills and technologies would most likely seek ex-employees of a TNC in the same industry. Spin-offs occur when such employees decide to use the acquired skills to start up a new company. Case examples of these are found in the Intel case for Costa Rica (Rodriguez-Clare, 2001) and in the machine-tools industry case for Malaysia (Lim, 2001).

In Canada, skill transfers took place through labour mobility. For example, the Conference Board of Canada noted the unusually high number of senior executives who were

foreign born but had not stayed with the companies with which their entry was associated. Similarly, examples from Singapore exhibit a very rapid replacement of foreign executives by local staff. It is also not surprising that foreign executives form attachment to countries, including through marriage, and remain to pursue a career taking them across a range of companies.

Cluster arrangements, due to the proximity of firms to one another and their commonalities, are effective foundations upon which supplier and competitor linkages and associated skills dissemination can emerge. Clusters may also provide economies of scale for industry-specific training initiatives.

While clusters confer a number of cost- and quality-related advantages to members, there are also significant benefits in terms of an increased potential to attract the most talented people in the field and a rapid diffusion of knowledge through extensive spillover effects. Collocation is also associated with successful ancillary education and training programmes, often facilitated by Government investment. In Canada, the Ontario MaRS project has evolved into an innovation cluster, bringing scientific and technological know-how together, under one roof, with investment capital firms. In the case of Singapore, an important aspect of AT&T's development was said to have been its involvement in clusters, which was associated with successful ancillary educational and training programmes.

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