Chapter 6

India Country Case Study

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Acronyms

EPFL:	Ecole Polytechnique Fédérale de Lausanne (Swiss Federal Institute of Technology)
CERN:	Centre Européen de Recherche Nucléaire
EU:	European Union
GDP:	Gross Domestic Product
GIAN:	Geneva International Academic Network
FDI:	Foreign Direct Investment
IEEE:	the Institute of Electrical and Electronical Engineers
ILO:	International Labour Office
IOM:	International Organization for Migration
ISCB:	Indo-Swiss Collaboration in Biotechnology
ISCO:	International Standard Classification of Occupations
IT:	Information technology
NCEU.S.:	National Commission for Enterprise in the Unorganised Sector
NGO:	Non Governmental Organization
NRIs:	Non Indian Residents
NASSCOM:	National Association of Software and Service Companies
NSSO:	National Sample Survey Organisation
SDC:	Swiss Development Cooperation
STIO:	Scientists & Technologists of Indian Origin
TOKTEN:	Transfer of Know-how Through Expatriates Nationals
TiE:	The Indus Entrepreneurs
OECD:	Organization for Economic Co-operation and Development
PIO:	Persons of Indian Origin
R&D:	Research & Development
U.K.:	United Kingdom
UN:	United Nations
U.S.A.:	United States of America

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Executive Summary

This qualitative research holds promising findings for a better understanding of highly skilled migration from India to Switzerland and policy options relating to scientific diasporas, brain gain and development of the country of origin.

As identified through this project, the main causes of Indian skilled migration to Switzerland were the search for personal achievement, international prestige, better professional and academic prospects and the existence of social networks. Lack of employment opportunities and migration for study reasons were other factors influencing Indian international skilled mobility. For PhD students, it was about looking for curricula and diplomas with international standards, studying in institutes with excellent reputations, having the privilege to be supervised by Nobel prize winners and distinguished professors, studying in international environments to increase the chances of being recruited to the labour market and being involved in bilateral scientific exchange programs. Bilateral scientific exchange programs are also a framework that allows scientific mobility for Post doctoral fellows, scientists and researchers. Student and scientific migration occurred mostly outside of the institutional framework, as many PhD students and scientists asserted that they directly contacted the corresponding research or post graduate institute via the internet or through the recommendation of their former professors. A few respondents mentioned that they were aware of existing scientific and research opportunities in Switzerland thanks to social networks (colleagues, friends, superiors). Professional relocation, which reflects the international circulation of knowledge workers, represented one of the main reasons for immigrating to Switzerland for IT specialists (engineers, managers); staff of diplomatic missions and international organizations. Family reunification was another reason for highly skilled emigration to Switzerland. Furthermore, students were likely to seek employment after completing their studies in the country of destination, which reflected the intersection between student and labour migration.

This research shows that highly skilled professionals (especially from international organizations and multinational groups) were likely to move to different places in the course of their international careers, whereas Switzerland was *"the first experience abroad"* for most PhD students in the sampling. These findings suggest that highly skilled professionals are involved in international circulation. Countries such as Switzerland are new destinations for highly skilled Indians, which may reflect changing migration patterns as English speaking countries, notably the U.K. and the U.S.A., are traditionally the main destinations for Indian students and highly skilled workers.

With regard to their integration into society in Switzerland, language did not appear to be a major constraint for most of the respondents as English was noted as the working language in the international labour market and in Swiss universities and research centres. However, many interviewees took language courses either in French or in German, according to geographical location, to better cope with the realities of living in Switzerland. Furthermore, an interesting job does not automatically imply successful integration in the host country. There are also other elements that may play a crucial role in the integration process (familiarity with Swiss colleagues, social networks, happenings, etc.).

A couple of employees from international organizations and multinational firms mentioned the "divide between local Swiss and international groups" as a deterrent to their integration in Switzerland. Some PhD students, researchers and scientists stated that support to Swiss colleagues facilitated their exposure to Swiss realities. Others mentioned not partaking in social and cultural activities due to time constraints and family responsibilities.

To conciliate work and family responsibilities, respondents relied on various strategies: day care centres, colleagues and friends' support and shared domestic responsibilities. Most PhD students stated that they hardly found time for activities (leisure, partying, etc.) due to long hours spent on study and research.

Scientific and professional linkages at the local and international levels are developed by joining local and international scientific and professional networks. The majority of PhD students and researchers in the survey belonged to Swiss scientific associations according to their area of expertise (chemistry, physics, etc.). By joining local and international scientific networks, scientists and researchers have possibilities to develop contacts at the international level. Similarly, managers working in international corporations have chances to enhance professional contacts at the local and international levels. Lack of institutional support and unemployment can hinder international mobility and make it difficult to have international professional networks.

One of the objectives of this qualitative research is to examine brain gain mechanisms. Previously, three types of brain gain mechanisms (knowledge transfer through skilled diaspora networks, research and development (R&D) and North–South research partnerships) were identified. Other brain gain mechanisms came out in the course of the survey, namely outsourcing activities and social development related initiatives. Knowledge transfer related activities mentioned included exchanging information through the internet, sending articles or scientific publications to colleagues, temporary return of students and professors as visiting researchers, creating scientific and technological institutes and organizing scientific conferences, training activities and seminars during visits to the country of origin.

A few respondents were involved in research & development (R&D) activities. A couple of PhD students interviewed believed their PhD research could be useful for further R&D applications. Bureaucratic constraints, lack of institutional and financial support and lack of pragmatic vision were some of the impediments to R&D initiatives. Some managers described providing outsourcing opportunities and training programs to their local Indian counterparts.

With regard to social development initiatives (improving education and health systems), the survey identified a few initiatives: donations and fund raising to former schools and institutes, support to emergencies (natural calamities) and construction of dispensaries in rural zones.

This research also looks at the reasons for success or failure of brain gain initiatives. On the one hand, social networks and institutional support, sufficient funding, relevance of goals and objectives coupled with united strategies and efforts, excellent networking skills, partnership with prestigious and internationally renowned institutions or companies, enthusiasm and commitment of local counterparts, reliability and visibility (scientific publication in distinguished scientific journals, official position in a company or institute) and supportive institutions (addressing bureaucratic and administrative constraints) are some of the elements that can allow successful brain gain projects.

On the other hand, lack of supportive institutions (especially from the country of origin), effective scientific diaspora networks, and the absence of sustainable policies on diaspora contributions on science, technology and overall development are considered impediments to brain gain initiatives. Moreover, brain gain activities tend to be disparate, singled-out, informal and mostly oriented to families and local groups, which could hinder their long term sustainability and success. There are other hindrances for effective brain gain including lack of funding, bureaucratic constraints, slow procedures, social and cultural obstacles, language barriers and lack of political support and an unfavourable economic environment.

Interviewees stated that they kept family and social ties through the internet, telephone calls, private visits and gifts. Solidarity and brotherhood were, therefore, being reinforced. There were also other types of links with the country of origin such as business links (property, financial investment, technical support to firms, outsourcing, etc.) and private links.

The examination of respondents' future plans in terms of professional, private and family life provided useful information related to return to the country of origin, migrants' expectations, concerns and aspirations for the country of origin. The PhD students wanted to have stable professional situations, to succeed in their scientific and academic careers and to become internationally renowned in the country of origin. Managers aged 50 years or younger wanted to have greater professional responsibilities (top management positions) in the

coming years, with the possibility of initiating or extending collaboration. This included outsourcing activities with local Indian counterparts. Those managers who were 50 years old would be retiring in the next 10 years; some of them wanted to enjoy retirement in India or start businesses there. Junior staff from international organizations and firms foresaw bright professional options in their companies. In the coming years, scientists and researchers wanted to have international recognition in their area of expertise and allocate more time to research, teaching and project activities including professional and scientific exchanges with Indian local colleagues in benefit of the country of origin.

With regard to future plans in terms of private and family life, the PhD students interviewed stated that they hope to set up homes and establish families. Some respondents between the ages of 30 and 40 (managers, staff in international organisations, researchers) said they wanted "to have more kids" in the next ten years. Respondents with family responsibilities (especially working mothers) asserted that one of their main preoccupations would be their children's schooling, well being and development. Respondents who planned to retire in a few years were being torn between the nostalgia of their homeland and the practical benefits of settling in Switzerland (quality of life, children settling there).

This research looks at the issue of return to the country of origin. The decision either to settle in the country of residence, to move to another country of destination or to return to the country of origin was dependent on various factors including the situation in the country of origin and country of destination, the type of links with the country of origin, retirement and professional relocation options, the family dimension, the level of integration in the host country and an enabling environment in terms of scientific and professional opportunities.

Due to the booming economic environment and the facilities given by Indian government (property, banking, investment, higher wages, accommodation, etc.), skilled Indians are returning in greater numbers to India. The majority of the PhD students and Post doc researchers interviewed were willing to return, although they might not have had concrete plans to go back to the country of origin. A few Post doc fellows had concrete projects oriented to the homeland. Those planning to return to India wanted to create or maintain scientific or professional networks that would allow them to participate in bilateral research programs and projects. These would either be from a distance or short term mobility schemes as visiting researchers.

Respondents who stated that they would like to settle in Switzerland mentioned lack of opportunities in India, the quality of life in Switzerland, the prestige of working in internationally renowned institutes and research centres or companies, successful integration in Swiss society and mixed marriage as reasons for their wish to settle in Switzerland. Settling in Switzerland, how-

ever, was not for lack of patriotism; a couple of respondents believe they will always be loyal to their homeland despite geographical and physical distance.

Most of the scientists, researchers and managers holding Swiss passports wanted to "go and come back" between India and Switzerland. This reflects transnational practices and attitudes or a sense of "being here and there." For instance, some respondents stated that they would like to settle in Switzerland "where children can grow and quality of life and opportunities are better," but also visit the country of origin on a regular basis. There are also reverse "go and come back" schemes, of settling in India and visiting children, families and acquaintances based in Switzerland. Furthermore, transnationalism underlines other types of mobility: going and coming back for business and family reasons (private visits); bringing children to their homeland to recreate a sense of belonging, being visiting teachers or scholars.

For staff from international organizations and second and third generations, we observed an unclear plan with regard to the return to the country of origin. This is probably due to multiple sense of belonging among respondents (having dual or multiple citizenships or having settled in many places) that lead to a dilemma of choosing one place to settle. For this category, the decision to stay or leave depended on elements such as their employment situation (professional relocation, position in the field, etc.).

This study also tries to identify highly skilled individuals and associations' initiatives for their homeland. A couple of respondents are implicated in scientific and technological activities in benefit of the country of origin (training on computer science, management, engineering, scientific debates, workshops and seminars, knowledge management and diffusion, fundraising, technical support, etc.). Social and cultural activities are being organized by associations to develop solidarity and create a "feeling of India." Social and cultural associations might also provide financial support in case of emergencies and natural disasters (earthquake, tsunami).

Most of these associations functioned on a private and voluntary basis. A few associations mentioned in the survey were granted financial support (mainly from the canton of Vaud, Indian embassy and permanent mission) and other facilities (rooms and halls for meetings and festivals contributed by EPFL). The main constraints of these associations were lack of financial and institutional support, lack of new members and lack of visibility. Furthermore, lack of time due to family and/or professional responsibilities, lack of interest in programs and activities of these associations and lack of information about Indian associations based in Switzerland were some of the reasons for not joining these associations.

This research scrutinizes highly skilled migrants' perceptions of the country of origin, social, economic and political situations, current scientific and

technological research and migration policy. With regard to the social situation, India's unprecedented economic growth and efforts at social development have been achieved by the government. However, millions of people face poor living conditions, especially in rural zones. Despite fast economic growth, this "big country appears as a third world country" and has "infrastructure lagging behind." Persisting poverty, inequalities, illiteracy and social protection are also problems leading to frequent social and political turmoil.

With regard to the economic situation, the rapidly growing economy has led to increasing opportunities at the local and international levels (outsourcing in software development, R&D, delocalisation, etc.) and a better macro-economic balance (inflation control). However, massive poverty, corruption and bad governance, social and economic gaps and neglect of key economic sectors such as agriculture are impediments to the social and economic development of India.

The political situation, independent press, secularity, the growing presence of talented people in the ruling system and moderate government have helped strengthen democracy. Improvement in becoming a more rules-based society has contributed to attracting companies and businesses. However, India, similar to many democratic countries, is facing a slow-down of political, judiciary and economic reforms, bureaucratic constraints, corruption, unequal distribution of wealth and persisting poverty and social inequalities.

With regard to scientific and technological research, India attracts outsourcing opportunities and foreign direct investment thanks to the booming economic environment. Indian companies (pharmaceuticals, biotechnology, IT) are exported all over the world. More and more Indians abroad are returning to their country of origin to start scientific, technological and business activities or to mentor local scientists and researchers. Government provides support to scientific and technological research by increasing wages and giving facilities to skilled Indian abroad. However, the scientific and technological research is hindered by obstacles including a lack of balance between IT and other sectors, lack of support for research and development and lack of visibility of scientists and researchers.

With regard to Indian migration policy, the government has elaborated on some measures to retain and attract highly skilled people (creation of a special minister in charge of migration, incentives and opportunities for investment for nationals abroad, permanent visa for Indians abroad and a proposal for dual citizenship for PIOs). However, respondents voiced the need to address constraints related to dual citizenship, neglect of less skilled and unskilled groups, lack of effective diaspora policies in Switzerland and the negative effects of brain drain in India.

This study also examines Indian highly skilled migrants' perceptions of Swiss scientific policy, development cooperation and immigration policies and

the role of the scientific diaspora on social, economic, scientific and technological development of the country of origin. According to the respondents, Swiss scientific policy is successful due to a range of factors such as international prestige of Swiss institutes of science and technology, high value given to science, focus on research and development, good funding policy for research, bilateral and multilateral exchange programs, meritocracy and great efforts in promoting science and technology. However, in order to compete with industrially advanced countries, Switzerland should be opened up and address rigidity and restrictive policies toward students, researchers and scientists from developing countries.

Promising bilateral programs and projects (ISCB) are being carried out and should be strengthened. Swiss agencies and non profit organizations are involved in various humanitarian and development projects. Swiss companies have links in India and are outsourcing to India. However, there is a need to match these bilateral programs with the specific national needs and to avoid asymmetric relations.

On the one hand, Swiss immigration policy is considered restrictive and discriminatory. Citizens from developing countries often face difficulties getting work and residence permits and are subject to bureaucratic constraints which can reinforce stereotypes and hinder their integration in Switzerland. On the other hand, Swiss immigration policy is considered selective (focus on highly qualified people), well managed, humanitarian, quite inclusive and favourable (due to naturalization). A couple of respondents stated that greater openness would lead to uncontrolled migrant inflows in a small country such as Switzerland.

Scientific diasporas could be assets for the country of origin's social and economic development by: (i) strengthening measures and initiatives aimed at attracting and retaining highly skilled; (ii) boosting investment; (iii) granting dual citizenship; (iv) supporting diasporas initiatives; (v) identifying skills and qualifications within scientific diaspora associations and areas of possible intervention in the country of origin; (vi) developing attractive and proactive programs to attract new members to scientific diasporas associations and organizations; (vii) bringing diaspora members together with policymakers, governments and local leaders to discuss opportunities to mobilise skilled diaspora.

Scientific diaspora associations could be catalysts for strengthening local scientific and technological capabilities if the role of the scientific diaspora is valued and recognized. Moreover, the highly skilled abroad should be involved in science, technology and business related activities. Resources and competences within the diaspora should be mobilised for local scientific and technological projects and programs. There should be an increase in investment on education. Finally, scientific diaspora associations could be driving forces for scientific and technological enhancement by developing bilateral

scientific exchange programs; by promoting the visibility of the highly skilled on the local and international levels and by enabling partnerships (for instance through scientific and international forums and conferences).

Switzerland could play an important role in strengthening Indian scientific diaspora associations and skilled migrants' contributions to the development of their country of origin by: (i) strengthening bilateral agreements on science, technology and development cooperation with India; (ii) developing research and exchange programs and promoting student and highly skilled mobility from both sides; (iii) providing grants and funding to Indian diaspora associations to facilitate collective or institutional initiatives related to science, technology and business; (iv) helping Indian highly skilled migrants to organize into networks and associations; (v) ensuring ethical recruitment of Indian highly skilled people; (vi) exploring opportunities for investment; (vii) easing access for Indian highly skilled people to the Swiss labour market through bilateral agreements; (viii) providing administrative support to Indian associations (fund raising, training on project elaboration and implementation, etc.); (ix) deriving Swiss comparative advantages (pharmaceuticals, precision machinery, watch industry) to developing countries such as India; (x) enhancing economic and scientific presence on both sides.

1. Introduction and Methodology

1.1 Introduction

1.1.1 Context and Research Objective

International migration of highly skilled workers involves persons that have a tertiary education and professional experience (Lowell and Findlay, 2001). Growing flows of students, scientists, engineers and researchers from developing countries to developed countries have increased concerns about the brain drain and its vicious cycle as far as the development of sending countries, especially poor economic regions, is concerned. It has been argued that the emigration of highly skilled workers can undermine local initiatives on social development, thus decreasing economic growth. Local scientific and technological capacities are also undermined by the loss of human capital and the lack of intergenerational transmission of knowledge and know how, which could deepen the technological and knowledge gap between the developed and the developing regions (Lowell and Findlay, 2001).

The changing face of brain drain, especially the increasing amount of highly skilled migrants (Saxenian, 2002a. 2002b), provides new light with regard to the trends and issues relating to international migration of highly skilled workers and scientific diasporas. Highly skilled migrants and scientific diaspora initiatives related to knowledge transfer can enhance the scientific and technological capacities of sending countries. India, with many educated and trained engineers, scientists and researchers abroad, is benefiting from this international knowledge exchange that fertilizes scientific and technological research. China, Taiwan and South Korea are also benefiting. Scientists and well qualified people can provide various types of support (remittances, technical know – how, partnerships, international experience, etc.) that can strengthen economic growth whilst improving living conditions and promoting innovation on science and technology.

It is worth mentioning that the way students and highly qualified scientists and professionals can contribute to the development of their homeland is not thoroughly investigated, although this pattern has received increasing awareness among policymakers, scholars and researchers. This study aims to provide an understanding of the causes and characteristics of international migration and scientific diasporas from India to Switzerland. This research is also devoted to analysing how brain gain mechanisms (knowledge transfer, research and development, North – South research partnerships, etc.) operate, the links between highly skilled migrants and scientific diasporas within the country of residence and the country of origin and also investigating how scientific diasporas and highly skilled people could be factors of development of India.

There is evidence in the literature that shows the fundamental role of international mobility of the highly skilled vis-à-vis strengthening capacity in science and technology of sending countries, notably India and China. Studies and research focused on India have shown that well educated and trained Indians in the United States were critical in making India one of the giants in science and technology among the developing countries by transferring knowledge, machines and funds (see among others Khadria, 1999). The extent to which highly skilled workers can be a successful part of brain gain is linked to a range of factors, including the particulars of the migrants themselves, their links with the country of origin and the country of residence, the organizational and institutional support of the diaspora, etc. One fundamental challenge of this research is to scrutinize the brain gain initiatives, their strengths, challenges, limitations and favourable circumstances and conditions. It is also important to look at the sociological characteristics of highly skilled migrants and their daily life in Switzerland.

This research, similar to many others in the field of highly skilled migration, shows that scientific diasporas have the potential to impact the develop-

ment of sending countries. This qualitative research is innovative in the sense that it provides a sociological portrayal of the highly skilled migrants and explores what favourable and unfavourable conditions and circumstances make such initiatives successful or unsuccessful. It also provides an understanding of how highly skilled migrants' perceptions and discourse vis-à-vis the country of origin, the country of destination and scientific diasporas along with their educational and professional background and the level of integration in Switzerland can impact the contribution on science, technology and development in benefit of India.

1.1.2 Literature Review

The complexity of definitions and terminology on highly skilled migration issues provides contrasting theoretical and development policy perspectives. The migration of highly skilled workers can be viewed through various lenses as a brain drain (Özden and Schiff, 2005; Kapur and McHale, 2005; Schiff, 2005), a "brain gain" (Meyer and Brown, 1999; Saxenian, 1999, 2002a, and 2002b; Gaillard and Gaillard 1998 and 1999, etc.), a "brain waste" (Özden and Schiff, 2005), a "brain strain" (Lowell et al., 2004), "brain exchange" and "brain circulation" (Vertovec, 2002; Saxenian, 2002a and 2002b; Gaillard and Gaillard, 1998 and 1999).

According to Meyer and Brown (1999), "socio-professional" networks can be assets for sending countries. Nyberg-Sorensen (2004) highlights the use of social remittances (skill transfer, cultural and civic awareness/experience). Whereas the literature has argued for limits on viewing highly skilled migration merely as a loss for sending countries, there are other groups of scholars and practitioners that question the importance of scientific and technical diasporas in the development of sending countries (Lowell et al., 2004). These voices counter excessive optimism on brain gain. It is about finding appropriate policies so that highly skilled diasporas can create a win–win situation that can benefit both sending and receiving countries (Wickramasekara, 2003).

Multilateral agencies such as the ILO, IOM, UN, OECD and World Bank stress the necessity of mobilizing and maximising the development potential of migrants and diasporas. Migration implies benefits and costs to all sides (sending countries, receiving countries and migrants). The effects of highly skilled migration are driven by a range of factors, including the social and economic situation of the migrants, links with the country of origin and destination, the level of development of these countries and their commitment to migration and development issues.

The leading role of immigrant entrepreneurs and their communities in enabling their country of origin to benefit from knowledge and technology and

strengthen local capabilities shows that brain drain can be successfully turned into brain gain. Through the transfer of knowledge, know-how and international experience, highly skilled workers are bringing back opportunities, resources and skills to their home countries, which could upgrade the local capabilities, as witnessed in South Korea, Taiwan, China and India. Governments and firms have played a crucial role in mobilizing the highly skilled to contribute to upgrading the local capacity of firms and scientific and technological research centres (Saxenian, 2002a and 2002b). There is evidence of reverse brain drain effects resulting in the international mobility of scientists and professionals from South East Asian countries in the U.S.A. There are promising reverse brain drain situations in South East Asian countries thanks to the return of highly skilled nationals abroad who bring back wealth, technology, knowledge and know how. Due to the positive inputs of highly skilled migrants, India has emerged as one of the leading countries in software development (Saxenian, 2002a; Khadria, 1999). According to Saxenian (2002a) and Khadria (1999), there is evidence of brain gain mechanisms from Indian students and professionals in the U.S.A. However, there is still a debate whether this brain gain is or is not effectively countering "brain drain" results in out – migration of Indian scientists and engineers notably to the U.K. and U.S.A. Indian highly skilled migrants in the U.S.A. have had success in engineering, pharmaceuticals, biotechnology, IT, R&D and managerial positions. Besides this, government authorities are trying to mobilise scientific diasporas to participate in the development of the country.

1.1.3 Conceptual Framework and Definition of Some Key Words

By creating linkages with the homeland and mobilizing its skills and resources, diasporas can play a pivotal role in the development process. Information technologies can make a bridge between scientific diasporas and the country of origin (Barré et al., 2003). Scientific diasporas can be virtuous cycles promoting win-win dynamics as exemplified by the cases of China and India (Saxenian, 2002a and 2002b).

According to Mountford (1997), skilled migration can be beneficial as there are possibilities for acquiring skills, strengthening human capital and the formation of educational classes in one economy, thus minimizing the rate of under-education. International scientific mobility and the possibility to make a bridge between scientific diasporas and local scientific communities through the information technology system suggests a new approach centred on brain gain and brain exchange (Gaillard and Gaillard, 1998; Lowell and Findlay, 2001) and knowledge exchange (Mahroum and de Guchteneire, 2006). Scientific diaspora networks are ways to mobilise highly skilled migrants and con-

nect them with their country of origin. They can help identify the skills and resources within the diaspora. However, some studies underline their lack of sustainability and effectiveness (Lowell et al., 2004; Lowell and Gerova, 2004).

Migration or mobility?

Most researchers and scholars on the issue of scientific mobility have questioned the relevance of the term "migration" to describe the multiple facets of the international mobility of scientists, researchers and students. This is because migration implies short term or permanent stay, whereas highly skilled people tend to be involved in different mobility schemes (circulation, temporary migration, transnationalism, etc.) (Koser and Salt, 1997).

Skilled migrant

Skilled migrants are defined as professionals holding a tertiary education or specialized work experience such as architects, accountants, financial experts, engineers, researchers, specialists in information technology, etc. (Vertovec, S., 2002). Williams and Balá (2005) define a skilled migrant using the human capital approach that encompasses variables other than qualifications and income (interpersonal skills, self confidence, etc.).

The Canberra Manual's definition of highly skilled or Human Resources in Science and Technology (HRST) is based on two main criteria: the qualification (tertiary education) and occupation (mainly scientific and technology occupation). This definition was adopted jointly by the OECD and the European Commission/Eurostat, (see OECD, 1995, p. 16). It covers a broader population compared to the International Standard Classification of Occupations (ISCO). According to Lowell and Batalova (2005, p. 4) (quoting McLaughlan and Salt, 2002), highly skilled migrants should be defined both in terms of education and professional background "if relevance to policy is important." The Canberra definition, which is used in the European context, mainly focuses on the scientific and R&D sectors. It does not take into account workers with minimum education (baccalaureate degrees), whereas "the United States' well-known specialty worker H-1B visa program is based on a list of occupations and a minimum degree requirement of a baccalaureate" (Lowell and Bartalova, 2005, p. 4).

Brain gain

Brain gain can be defined as the way to turn brain drain into a virtuous circle both for sending and receiving countries. It suggests that the international migration of skilled workers can provide benefits to sending countries rather than

losses. Therefore, it can contribute to the development of the sending country by contributing resources and skills from within the diasporas (remittances, knowledge and technology transfer, foreign direct investment, etc.). The brain gain perspective challenges the nationalist view that considers skilled migration a dramatic loss for sending countries, especially developing countries as it leads to asymmetric exchanges between North and South. The promise of scientific diaspora networks and the difficulty of stopping skilled migration have led to shift in the understanding of migration. Scientific diasporas are considered components of the development of countries of origin. (For further discussions about brain gain, see among others Meyer et al., 1997; Gaillard and Gaillard 1998; Meyer, 2001; Mountford, A., 1997).

Scientific diasporas

Historically, the concept "diaspora" is derived from Greek and describes the dispersion of people or those that settle outside their ancestral homelands. There are misunderstandings about the concept of diasporas which is often used to mean "migrant communities, foreigners, non residents, mobility, integration," etc. Barré et al. (2003) define "scientific diasporas" as "self organized" communities of engineers and scientists mobilised for the development of their country of origin, notably in science, technology and education. One main challenge for researchers is to provide a consistent definition of scientific diasporas as the lack of consensus has led to a range of understandings and meanings depending on the countries (sending and receiving) and the players (policymakers, migrants, etc.). Due to growing concern about the effects of international migration on development as well as awareness of policymakers and governments on the necessity of reversing brain drain, the scientific diaspora has emerged as a key option for maximizing the role of the highly skilled in the development of their country of origin.

Transnationalism

Over the past decade, transnationalism, which is a new approach to migration that underscores the sense of multiple belonging of the migrants (connections with the country of origin, the country of residence, social networks, etc.) outside the boundaries of the nation-state (see: Glick Schiller et al., 1999; Portes et al., 1999) challenges the traditional approach of migration in terms of assimilation. It shows the process of social linkages created through migration when migrants live in different social spaces. Transnational people and transnational communities are examples of the multiple ways migrants are connected to social spaces and their ability to consolidate links with the country of origin, while being involved in daily life in the country of residence (Glick

Schiller et al., 1999). Therefore, the term transnational suggests that international mobility of highly skilled workers is not only a dual movement, but it entails circulation as the international labour market searches for skilled and talented professionals.

Knowledge transfer

A. Williams (2007, p. 361) asserts that studies have overlooked international migration as a vehicle of learning and knowledge transfer, "…even though it plays a significant role in effecting localized or face-to-face knowledge transfers" (see also Williams, 2006). In this study, knowledge transfer refers to the process of diffusion of science, technology and know how in benefit of the homeland. It is about the mobilization of the resources and skills within the scientific diasporas to enhance local scientific and technological capabilities. Knowledge transfer can be considered a long term process and implies a range of activities: visiting professors, scholars and researchers, teacher trainings, scientific conferences, workshops, special trainings, consultancies, exchanges of information. It is both demand and supply–driven (Wescott and Brinkerhoff (eds.), 2006).

Research & Development

Research and Development (R&D) refers to basic and applied research in the sciences and engineering and the design and development of prototypes and processes in order to increase the amount of knowledge and the use of this knowledge to explore new applications. One fundamental component of the innovation process is R&D. One of the most used definitions of R&D is included on the Frascati Manual according to the OECD recommendations:

> R&D is an activity related to a number of others with a scientific and technological basis. Although these other activities are often very closely linked to R&D, through flows of information and in terms of operations, institutions and personnel, they must be excluded when measuring R&D. R&D and these related activities may be considered under two headings: the family of scientific and technological activities (STA) and the process of scientific and technological innovation. (Frascati Manual, 2002: 18)

Non Indian Residents (NRIs)

NRIs are Indians citizens, holding Indian passports who settle abroad for an indefinite period for employment, business reasons, vocation, or for any other motive (Ministry of External Affairs).

PIO or Persons of Indian Origin

PIO refers to foreign citizens of Indian origin or descent who fall in one of the three following categories:

> A person who at any time has held an Indian passport; anyone either of whose parents or great grandparents was born in and was permanently resident in India as defined in the Government of India Act, 1935 and other territories that became part of India thereafter provided he / or she was not a citizen of the countries referred to in paragraph 2 (b) of MHA notification N°. 26011 / 4 / 98 – IC. 1 dated 30 March, 1999; the spouse of a citizen of India or a Person of Indian Origin, covered in the above two categories of PIOs (Ibid).

Scientists & Technologist of Indian Origin

Scientists & Technologists of Indian Origin based abroad (STIOs) refers to persons of Indian origin residing abroad that are part of the scientific and technological pool of Indians throughout the world. STIOs include a widening range of human resources in science and technology such as highly skilled people working in industries, research laboratories, universities and scientific departments located in various countries as well as entrepreneurs, business operators in knowledge intensive sectors and venture capitalists (S&T Professionals of Indian Diaspora).

1.2 Methodology

This country case study is part of a joint research project (EPFL, University of Geneva, ILO) funded by the Geneva International Academic Network (GIAN) on highly skilled migrants and scientific diasporas in Switzerland including two other sending countries (Colombia and South Africa) in addition to India.

Various meetings and email exchanges were carried out by the research team with the support of the scientific committee members concerned with the theoretical, methodological and policy implications of this research. The main activities of this qualitative research were the following: (i) literature review; (ii) preliminary interviews; (iii) selection of the country case studies based on official statistics in Switzerland; (iv) sample strategy and identification of key persons for the snowball effect method; (v) design of the qualitative interview guideline; (vi) qualitative survey; (vii) analysis of qualitative data.

1.2.1 Literature Review

Several sources have been consulted to extend our understanding of scientific diaspora issues, especially in Switzerland, and to better design appropriate

methodological tools for the survey. These sources include: cantonal offices and the Federal Statistics Office; the Federal Office of Migration; Cantonal Bureau of Employment, registration offices, universities and Swiss schools of higher education, research institutes, local and international scientific networks and associations, migrants' associations and scientific diasporas, NGOs and international organizations, web sites, archives, newspapers, telephone directories, CD-Roms, etc.

In order to prepare for forthcoming activities related to policy consultations and roundtables, lists of Swiss academic, scientific institutes as well as cooperation and development agencies and highly skilled migrants in the sample have been compiled.

The literature review contributes to the theoretical debate on highly skilled migration to provide a brief overview of the Indian and the Swiss cases as well as the international context. This research was complemented by data and information extracted from similar brain gain studies including local and international good practices.

1.2.2 Preliminary Interviews

Preliminary interviews were carried out with university researchers and academics working on the issue, specialists from international organizations and representatives of Swiss development cooperation and migration agencies in order to better understand the migration phenomenon in Switzerland. Before highlighting some specifics of the survey, let's first give some overall indications about the sampling strategy used to select the three country case studies for this research.

1.2.3 Sample Strategy

The three selected countries were: Colombia, India and South Africa. The choice of Colombia, India and South Africa may be explained by the importance of their highly skilled nationals worldwide and their experience as regards brain gain. Colombia ranks 4th in terms of share of highly skilled migrants in the total Latin-American migrant population in Switzerland (45.8%) and falls behind Mexico (69%), Argentina (61.2%) and Peru (46.8%). Existing networks and associations of highly skilled migrants of Colombian origin and the availability of key people in Switzerland were some of the main reasons of selecting Colombia as a country case study for the Latin-American region. The table below shows that the choice of India as a country case study for the Asia region is entirely justified. The share of highly skilled migrants out of the total migrant population of Indian origin residing in Switzerland (79.7%) is higher

than that of China (61.7%). South Africa (73.1%) ranks 1st in terms of the share of highly skilled migrants in the total Sub-Saharan African migrant population in Switzerland. (See table below).

Table 1. Distribution of the migrant labour force in Switzerland, by origin

	Migrant population		*Recent migrants**	
	Share of highly skilled	*Total*	*Share of highly skilled*	*Total*
Sub-Saharan Africa				
Ethiopia	20.4	1036	13.8	487
Angola	15.2	1653	7.0	449
Ivory Coast	28.1	438	24.1	259
Cameroon	26.9	992	24.8	585
Kenya	22.8	576	20.9	270
Congo (Kinshasa)	35.5	1939	32.8	590
Nigeria	37.9	737	35.7	419
Senegal	37.6	514	32.9	281
Somalia	13.2	1375	8.7	490
South Africa	73.1	629	78.7	424
Latin America				
Argentina	61.2	759	64.3	311
Brazil	32.7	4546	31.9	2546
Chile	33.2	2428	46.0	280
Equator	38.5	550	38.5	337
Colombia	45.8	1508	41.3	894
Mexico	69.0	607	71.9	346
Peru	46.8	1604	40.9	637
Asia				
China	61.7	2527	65.4	1257
India	79.5	2923	83.6	1227

Source: Swiss population census data 2000

Note: Men aged 15–65, women aged 15–61; human resources defined according to the Canberra Manuel (1995)

* "Recent migrants" corresponds to the migrants who arrived in Switzerland after 1995; only those with a number > 250 persons are taken into account. The coloured cells indicate the migrants coming to Switzerland who are increasingly skilled; so the other cells indicate the migrants coming to Switzerland who are less skilled with time.

The sampling strategy for the qualitative research was the sample by "convenient choice" (Beaud, 1984) as the objective is to provide an understanding of highly skilled migrants' perceptions, logic, strategies and intentions in the context of scientific diasporas, brain gain and development of the homeland rather than of identifying recurring situations, statistical figures or questioning theories. Thus, the principles of saturation, heterogeneity and structure are taken into account in the sampling strategy.

The sampling strategy was based on the snowball method (or snowball effect). The strategy for selecting appropriate persons for the survey was based on the networking schemes (interpersonal relations) and web searching. The selection of the respondents has been made gradually in the course of the field work through the chain referral sampling or snowball sampling. In the course of the field research, contact information of potential persons to be contacted was collected and validated, through the snowball effect. The strategy consists of asking a question at the end of the interview: "Could you please give us the name and contact information of any person that suits our research on highly skilled migration and scientific diasporas in Switzerland?"

The sampling included professionals and students from the following sub groups, according to the ISCO: students, academics and scientists, engineers, technicians, managers and executives. The fundamental criteria for the selection of academics, scientists and technicians was passion of a tertiary education diploma (PhD or related diplomas, diploma of engineering) or relevant professional experience in the country of residence. As regards students, the selection was based on their admission into a doctoral or post-doctoral program. Places to identify potential respondents of the survey included: academic and higher education institutions, scientific research centres, banks and financial institutions, multinationals located in Switzerland as well as national and international organizations recruiting highly skilled migrants (PhD fellows, engineers, etc.).

Regarding the Indian case study, twenty-three qualitative interviews were carried out including PhD and Post doc students, managers, scientists and researchers, engineers, staff from international organizations and physicians. The research team explored the sociological and demographic characteristics of Indian highly skilled migrants in the sampling after these additional qualitative interviews were conducted. The following table provides an overall picture of the sample by professional category.

Of significance is that in the male category, managers working in the private sector and multinational firms (28.57%) were more represented. Scientists and academic staff and those working at international organizations and NGOs made up a comparable ratio (21.42%). International organizations and NGOs staff (44.44%) and scientists and academic staff (44.44%) had a similar percentage under the female category in the sampling. Whereas PhD students ac-

counted for 21.42% of male respondents (3 out of 14); female respondents represented 11.11% (1 out of 9 respondents).

Table 2. Indian highly skilled by professional category in the sample

	Male		Female	
PhD students	3	21.42	1	11.11
Post doctoral fellows	1	7.14		
Managers in private sector and multinational firms	4	28.57		
International organizations and NGOs staff	3	21.42	4	44.44
Scientists and academic staff	3	21.42	4	44.44
Total	14		9	

Source: Dia, data collected during the 2007 survey

1.2.4 The Interview Phase

The principle underlying the qualitative interview was to allow people to express their opinions. The research team played a "facilitating" role (through guidance, explanation of the stakes of the survey) to ensure that the interview was in compliance with the rules of anonymity and trust in order to collect relevant data. It was important to gain understanding about highly skilled migrants' perceptions, strategies and practices with regard to the issues as follow: (i) sociological identification ; (ii) causes and characteristics of the international migration of highly skilled to Switzerland and migrants life; (iii) causes of international migration and migration paths; (iv) experiences of (highly skilled) migrants; (v) brain gain: mechanisms, strategies, opportunities, challenges and impact on development of country of origin; (vi) highly skilled migration, "brain gain" and impact on scientific and technologic research in country of origin; (vii) interrelations between the country of origin and the country of destination, settlement, return, transnationalism and circulation; and (viii) scientific diasporas and development of country of origin: which scientific policies and which development policies?

The qualitative interview guidelines were reviewed by the scientific committee members and tested prior to proper interviews with individuals selected in the sample. Five people responded to the questions during the testing phase.

The objective of the testing phase was to ensure clarity and relevance of the questions and issues to be discussed during the proper qualitative interviews.

The appointments were established through emails (which included a letter of information and a brochure about the research objectives, goals and expected results) or telephone calls. Prior to the interviews with the respondents (in cafés, at offices, restaurants), there was a phase of explanations about the fundamentals of the research (main partners, objectives, sampling and expected results).

By large, respondents were enthusiastic to answer the questions. However, lack of time due to professional responsibilities and other competing priorities along with the numerous issues and questions raised in the interview might have deterred some from being more comprehensive in their responses. Nevertheless, the ambiance during the interviews was frank and cordial. This excellent ambiance would not have been possible if trust and cooperation were not ensured. Respondents were informed that the information they offered would be strictly confidential and only used for scientific purposes. Very few refusals were recorded and only because of lack of time. Some asserted that they looked forward to the survey results if any practical implications for the development of their homeland arose.

These respondents were selected mainly through networking and also web searching, especially in the case of students in EPFL and ETHZ. A list of potential respondents was established, including names and contact information. Furthermore, the support of key persons within the three diaspora communities was crucial in identifying highly skilled migrants for the sampling, as they were well known within their communities of origin. As they had been living in Switzerland for many years, they had excellent social networks. A directory of members of Indian associations in Switzerland was also very useful in the course of the qualitative interviews. Telephone directories and internet research were also used during the interview phase.

Some practical problems occurred when using the snowball effect, especially how to identify highly skilled workers working outside scientific and technical spheres, and how to diversify professional backgrounds as the respondents often suggested their colleagues. One alternative to rectify this was, therefore, to ask them not only to focus on colleagues and friends in similar professional fields.

1.2.5 Data Analysis

A content analysis tool for the qualitative data was designed for the analysis of the qualitative interviews in a more systematic way. This content analysis was established in such a way that for each theme there were subsequent topics, in order to have a thorough understanding of the trends and issues there.

1.3 India: Social, Economic and Political Context

There is a dual India. One is prosperous and healthy with some of the best companies and businesses in the world. The other is a million Indians facing poverty, social inequalities and an array of risks. India is characterized by unprecedented economic growth, but there are many challenges that need to be addressed for better economic and social prospects.

India: A fragile economic giant?

The Indian economy has a GDP of $ 1.25 trillion and ranks twelfth largest in the world in U.S.D exchange rate terms (Economic Times India). When measured in terms of purchasing power parity (PPP), India has the second fastest growing major economy in the world with a GDP growth rate estimated to be 9.4 percent for the fiscal year 2006–2007 (Market Watch, 2007). According to experts, India and China are expected to be worldwide leading economies in the coming years. Such substantial economic growth occurs paradoxically, concurrently with persisting poverty of the majority of the population.

India is classified by the World Bank as a low-income economy (Business Standard) based on its population per capita income, which accounts to $ 4,542 at PPP and $ 1,089 in nominal terms (revised 2007 estimate) (IMF, 2007; CIA World Fact book, 2007). It faces numerous social and economic gaps such as massive poverty and a fast growing population. Poverty is a persisting challenge despite governmental efforts to reduce poverty rate.

There are an array of sectors ranging from agriculture, handicrafts, textile, manufacturing and a multitude of services. Services play an increasingly fundamental role in India's economy with a 7.5 percent growth rate in 1991–2000 up from 4.5 percent in 1951–80, claiming 23 percent of the workforce. Services totalled a GDP of 53.8 percent in 2005, whereas its share in the GDP was 15 percent in 1950 (CIA World Factbook, 2007). The Indian IT industry has attracted outsourcing of customer services and technical support and significantly raised the Indian balance of payments. However, it accounted for only about 1 percent of the total GDP of services. Indian skilled workers are well represented worldwide in knowledge intensive sectors such as software and financial services, software engineering, manufacturing, pharmaceuticals, biotechnology, nanotechnology, telecommunication, shipbuilding, aviation and tourism.

Despite slowdown agriculture is one of the main important sectors of the economy, with 18.6 percent of GDP in 2005 and 60 percent of the total workforce (Ibid). It is traditionally the dominant sector, with two-thirds of the Indian workforce, and its productivity depends on the monsoons. Industry accounts

for 27.6 percent of the GDP and uses 17 percent of the total workforce. Household manufacturing claims almost one-third of the industrial labour force (Business Standard). There has been privatisation of some public sector industries following economic reforms, which enables openness of public and private sector industries to foreign competition. As a result, there is growth in consumer goods (The Economist, 2003).

In 2005 and 2006, foreign direct investment (FDI) accounted for U.S.$ 7 and U.S.$ 14 billion (OECD, 2007). India attracts foreign direct investment due to its comparative advantage in various areas such as information technology, chemicals, pharmaceuticals, auto components, etc. There were many hindrances to investment due to rigid FDI policies. Recently, economic reforms have contributed to reducing these hindrances, making India one of the main destinations for foreign direct investment. India, with its massive, qualified manpower and a growing middle-class of 300 million (more than the total population of the U.S.A. and the E.U.), is a "powerful consumer market" (Middle class in India has arrived, 2005).

Poverty and persisting social and economic inequalities

Despite economic progress and government measures (the five-year plans), there are persisting regional imbalances in terms of poverty, infrastructural capital, human development indicators and per capita income. Inner and backyard regions are benefiting less from urbanization, industrial development, economic liberalization reforms, infrastructure, etc. (Datt and Sundharam, 2005; Bharadwaj, 1991). Likewise in the realm of human development indicators such as health and education, there is a large regional divide in benefit of urban cities (Economy Watch).

However, despite efforts to address poor living conditions and inequalities, poverty, discrimination on the grounds of social origin (caste) and rural and urban gaps remain some of the main challenges of Indian society. According to official figures 27.5 percent of Indians lived below the poverty line in 2004–2005 (Planning Commission of India, 2004–2005). According to estimates in 2007 (NCEU.S, 2007), 70 percent of the population in India faced difficult living conditions, unemployment and lack of social protection and were concentrated in the informal economy. The social and economic gaps could be potential sources of political and social instability if not properly addressed. These include discrimination against low castes and other vulnerable groups such as women and children, child labour, gender inequalities, health risks, lack of social protection and unequal distribution of wealth. There have been various government policies and measures to reduce poverty such as the Food for Work Programme; the National Rural Employment Programme of

1980 aimed to promote income generation for the unemployed and improve living conditions and rural infrastructure. In 2005, the Rural Employment Guarantee Bill was amended by the Indian Parliament. It strives to promote minimum wage employment to rural households in India.

There is concern about increasing inflation, which continues to impoverish many households especially in rural areas, despite government efforts. Inflation is expected not to exceed 5 percent according to official objectives. The agricultural sector lies behind, although it accounts for the majority of the Indian workforce. It hardly exceeds 2 percent growth on average over three years. Many peasants face hard living conditions. Unemployment is also another major government challenge with 106 million, almost 10 percent of the population, unemployed from 1990–2000 (Government of India).

The infrastructure is scarce and poorly managed. Since independence, the five-year plan has been focusing on infrastructural development. Corruption, bureaucratic constraints, urban gaps and inefficient investment have hindered the development of infrastructure (Sankaram, 1994). With economic reforms, infrastructure has been opened up to the private sector to attract foreign direct investment (Hiscock, 2004), resulting in a sustained growth rate of nearly 9 percent for the past years (Economic Survey, 2004–2005).

The Indian political system

India has a democratic system with regular elections, respect for freedom of speech and an active role of media and civil society. The new ruling coalition government (United Progressive Alliance under the mantle of the Congress Party) strives to undertake reforms to curb poverty, inequalities and focuses on development issues, as a continuum of those carried out since 1990. A "National Common Minimum Program" has been set up that underscores modernization, women's empowerment, rural development and the agricultural sector, providing education and employment to minority groups and low castes and poverty reduction (National Advisory Council, 2004). However, there are still impediments to political, judiciary, and economic reforms such as corruption, heavy bureaucracy and violation of fundamental human rights. Sharma Shalendra D. (2002) notes that one of the fundamental challenges of Indian democracy is to mitigate the "poverty problem" by closing profound gaps between economic growth and redistribution.

Higher education in India

Over the past two decades, there has been substantial development of higher education in India due to private sector initiatives. Though, these initiatives were not well organized and planned. Higher education in India is character-

ized by a prominent growth since independence. The number of universities remarkably expanded from 25 in 1947 to 348 in 2005 with a total enrolment from 0.1 million in 1947 to 10.48 million in 2005. Students from lower socio-economic strata are enrolling more and more (Agarwal, 2006, pp. 7–17).

However, many hindrances affect higher education in India. These include: inflexible academic structures, uneven capacity across various subjects, eroding autonomy of academic institutions and low level of public funding, dysfunctional regulatory environment, weakness of the accreditation system and lack of incentives for excellence and productivity. All of these deficiencies led to greater unemployment among graduates and a shortage of skilled manpower in various sectors. Declining standards of academic research are being observed. Lack of effective regulatory systems makes it difficult to upgrade standards and address exploitation. The number of quality institutions is low. There are many barriers to entry to these few quality institutions. Many Indians, especially those belonging to poor families, cannot get access to higher education systems due to heavy entrance tests, costly tuition and tough competition.

According to Kapur and Bhanu Mehta (2004, p. 27), the existence of some centres of excellence hides the reality of a deep crisis in higher education in India:

> India is facing a deep crisis in higher education, which is being masked by the success of narrow professional schools… The fact that the system nonetheless produces a noticeable number of high quality students has to do with the sheer number of students and the Darwinian struggle at the high school to get admission into the few good institutions.

India in the international arena

By signing bilateral nuclear cooperation agreements with the United States (Squassoni, 2005) in 2006, being part of international and regional consultations and diplomatic affairs, trying to attract votes for eligibility as a permanent member of the United Nations Security Council and finally, by playing a role as a donor country in development aid (approximately US $ 250 million per year), India aims to have a crucial role in the international arena. India has also signed trade agreements with many Asian countries and is enforcing its economic cooperation with China and the European Union. Since 2004, promising initiatives are being explored by India with regard to pacifying its relations with neighbouring countries especially Pakistan with regard to the status of Cashmere.

Indian skilled diaspora

Since independence, the international migration of Indians is characterized by two main features: highly skilled and qualified workers immigrating to industrialised countries (mainly to the United States of America, Canada, the United

Kingdom and Australia, which are the traditional destination countries for Indian highly skilled migrants) and semi-skilled and unskilled workers moving to the Middle-East. New dynamics are emerging with regard to international highly skilled migration, including new destination countries (Australia, Germany, Japan, and Malaysia) since the 1990s. Between 1950 and 2000, Indian highly skilled emigration was estimated to be nearly 1.25 million (Srivastava R. and Sasikumar S.K., 2003, p. 14). In Switzerland, it represents 0.117 percent of the total population (PIOs: 8400; NRIs: 4800 and stateless: 300) (Ministry of External Affairs).

The Indian diaspora spans more than 70 countries and is composed of 20 million people (Pandey et al. 2006). Most are involved in various knowledge intensive sectors in destination countries such as the U.K., Canada, United States of America and Australia, etc.

In the U.K, the Indian diaspora numbers over 1.2 million (Ibid: 71). The U.K. has long been the main destination country for skilled Indians due to colonial legacies and linguistic commonalities among other factors. Since the 1970s, there are diverse destination countries, notably Canada, the U.S.A. and Australia that attracted more and more Indians. However, skilled Indians' presence in the U.K. is still significant. In 2000, of 18,570 foreign IT professionals granted visas for work, 11,474 were originally from India. In 2005, of the 11, 800,000 non-EEA nationals, 687, 000 were coming from India. The U.K.'s attractive immigration policies toward skilled persons (nurses, medical doctors, engineers and information technology specialists, etc.) led to increased skilled Indian labour emigration (Khadria, 2006, pp. 175–177).

In the U.S.A., most Indian highly skilled migrants are concentrated in medicine, law, science and engineering, information technology, management and business. In 2001, Indian born students ranked first followed by Chinese students, when measured in terms of largest share in science and engineering in the U.S.A. Some 94 percent of Indian scientists planned to remain in the U.S.A. between 1998 and 2001. In 2001, the percentage of Indian scientists, engineers and doctors granted job or postdoctoral research offers in the U.S.A. was 77 % (Pandey et al. 2006).

Some of India's highly skilled are top executives in business firms and services. They also have a significant presence in the IT sector. For instance, in the U.S.A., 40 percent of the start-ups of the Silicon Valley are owned by or have at least one founder of Indian origin. The boom in the IT sector and the shortage of programmers have resulted in the increase in the number of the H1-B quota from 65,000 in 1998 to 130,000 in 1999 and to 195,000 soon after. (Ibid: 71–88).

Non-resident Indians (NRI) that immigrated mainly to the U.S.A. in the 1960s, 1970s and 1980s and returned to their homeland over the past decade

following the adoption of economic liberalization policies have played a major role in building the Indian software system. Ten of the 20 most successful software enterprises in India were launched by Non-Resident Indians from the U.S.A. (Chakravarty, 2001, quoted by Hunger, 2002, p. 6).

Highly skilled Indians are active in organizing and mobilizing skills and resources within the diaspora into knowledge networks. For instance, the American Association of Physicians of Indian Origin founded in 1984 is the most important ethnic medical association in the U.S.A. It serves as an umbrella organization for 100 professional associations. Indian IT engineers who succeeded in the U.S.A. joined together to create non-profit organizations (TiE, the Silicon Indian Professional Association) and linked up with Indian locals to help expand the IT industry in India (Ibid: 71–88). In the 1990s, NRIs formed the NASSCOM,[2] the National Association of Software and Service Companies. The Indus Entrepreneur[3] (TiE) is another organization created in Silicon Valley at the beginning of the 1990s by Indian software entrepreneurs to support young Indian entrepreneurs, set up new enterprises, attract venture capital and promote central IT training centres.

1.4 Switzerland: Immigration Policies and Bilateral Cooperation with India

Swiss immigration policies

After end of World War II and until the sixties, Swiss migration policies were based on a "rotation" system of the foreign labour force. The focus was addressing "over-foreignization" *(Grad der Überfremdung)* by recruiting guest workers mainly from Italy and Spain in response to economic needs. This "rotation" model ensured that family reunification and settler emigration would not augment tremendously in Switzerland and that the foreign workers could go back to their country of origin. As migrant workers were increasingly settling and integrating in Switzerland, the rotation model was challenged. The Swiss authorities adopted new policies which give facilities to foreign workers in terms of family reunification whilst addressing labour market segmentation (Efionayi et al., 2005, p. 2).

The economic upturn following the oil crisis led to massive recruitment of guest workers from Italy, Spain, Portugal and Turkey. In the late 1970s, the conversion of the seasonal permits to permanent residence permits for most guest workers was a shift in Swiss immigration policies. Such a shift was mo-

2 For more information about this association: <http://www.nasscom.org>.
3 For more information about this association: <http://www.tie.org>.

tivated by economic reasons as several economic sectors in Switzerland faced a shortage of manpower (Ibid).

Under the 1931 Alien Law (The Law concerning stay and settlement, 1931), different statuses were given to foreigners. Criteria for foreign communities outside European countries were more restrictive, although there were shifts in rules and regulations later. Clearly, this federal law was not a proper migration policy, notwithstanding its focus on the migrant population. It was more to prevent massive out-migration which would revive the *Grad der Überfremdung*, in light of increasing pressures from xenophobic groups (Ibid).

Following the Bilateral Agreement on the Free Movement of Persons between Switzerland and the EU Member States, EU nationals are allowed to live and work in this country under a quota system related to long term and short term residence permits. Subsequently, Swiss citizens can also live freely and be employed in all EU member states. This has led to increasing numbers of EU citizens in Switzerland (34,000 in 1997 and 49,800 in 2003) operating mostly in highly skilled occupations (finance, trade, services) (Ibid: 5).

There are restrictive policies with regard to non-EU nationals. A citizen from these other countries is recruited into the Swiss labour market under exceptional circumstances. The application submitted by an employer is subject to approval of the Cantonal labour market Office. An employer must certify that standards related to wage and employment conditions are ensured and that a Swiss national or a qualified worker from a European Union member country was not found for the proposed work. Under these laws, only highly skilled and qualified workers outside the EU/European Free-Trade Association (EFTA) are granted work permits. In 2000, highly skilled migrants outside the EU/EFTA accounted for 15, 500 persons in Switzerland. The regional distribution of these migrants is as follows: 6,700 from Eastern Europe; 4,000 from Asia; 2,400 from Africa and 2,400 from Latin America (Ibid: 6).

Residence permits granted to foreigners are subject to the laws and regulations of the canton which are influenced by the 1931 Alien Law. The Federal Law "Ordonnance limitant le nombre des étrangers (OLE)" was enforced in order to limit over migration through restrictive measures. Foreign workers are still recruited into the Swiss labour market under the quota system. Foreign workers especially (for work on restoration, hostels, construction) are recruited among Southern Europe countries but also among new EU member states (Ibid).

The December 2005 Federal Law adopted by the Federal Assembly of the Swiss Confederation (the National Council and the States Council) and approved by the Swiss via referendum in September 2006 (Conféderation Suisse, 2006) focuses on non-European citizens. Under this law, there are restrictions related to entry and exit of non-European citizens (article 1). Only the highly

qualified workers, executives and specialists are granted temporary work and residence permit (article 23).

In 2001, Switzerland launched the Berne Initiative aimed at defining a policy framework for better management of migration and better mainstreaming of migration into development policies for the mutual benefit of countries of origin and countries of destination. Switzerland was also a key player in the high level dialogue on international migration management and was part of the launch of the Global Commission of International Migration.[4]

The remittance transfer issue has raised attention among Swiss development policymakers. According to the Swiss Federal Council for the Millennium Development Goal, in 2001, remittance transfer from Switzerland to developing countries represented US$ 8.1 billion, excluding informal channels of remittance transfer (Efionay et al., 2005, pp. 5–6).

According to Hans Mahnig and Etienne Piguet (2003), Swiss immigration policies can be divided into three periods: the first period (1950s and 1960s); the second period (1970s and 1980s) and the third period (1990s to the present). During the first period, the proportion of immigrants in Switzerland was among the highest in Europe due to attractive policies toward foreign workers under guest workers programs with Italy, Spain and Portugal in response to increasing shortages of manpower. During the second period, there was significant growth in the number of foreigners following the shift from seasonal worker programs to family reunification that allowed most foreign workers permanent residency.

By 1970, the foreign population accounted for 17 percent of the total Swiss population, whereas in 1950 it represented only 6 percent. As an underlying consequence of increasing inflows of immigrants, especially from European countries, there were growing xenophobic and anti-foreigner movements resulting in restrictive immigration policies aimed at "stabilizing" or reducing the number of the foreign population. Responding to labor shortages to strengthen the Swiss economy whilst addressing the threat due to an increased foreign population has been one of the main policy concerns in the realm of immigration for Switzerland.

By 1990, stabilization in the number of the foreign population was noted following the adoption of quota system. While the number of seasonal workers was gradually reduced, there were alternatively increasing asylum seekers and inflows of immigrants from Eastern Europe in the aftermath of the collapse of the Soviet Union. Consequently, the third period was characterized by the adop-

4 For more information about Swiss Migration and Development Agenda and the role of the Swiss Development Cooperation Agency, please refer to the following website: <http://www.sdc.admin.ch/en/Home/Themes/Migration>.

tion of the "three circles" approach in order to mitigate the heterogeneity of new immigrants. The three circle approach included citizens originally from the European Union and from the European Free Trade Association (circle 1); citizens from the U.S.A., Canada and Eastern European countries (circle 2); and finally citizens from the rest of the world (Africa, Latin America, Asia) (circle 3). Under this three circle approach; priority was given to the circle 1, which led to much criticism due to its discriminatory and often racist effects.

By 1998, Switzerland moved on to a two-circle model following an increasing need of highly qualified migrants in the Swiss economy. This two-circle model seemed to match well with the European Free Circulation Zone of which Switzerland was about to join. Under the two-circle scheme, preference is given to citizens of the European Union countries in the Swiss labour market. Exceptionally, highly qualified professionals from developing regions in specific areas are admitted under specific conditions.

Swiss bilateral cooperation with India:

Since 1961, the Swiss Development Cooperation Agency (SDC) is active in India. Its main objectives are to contribute to poverty reduction and to sustainable development. Various programs are also carried out by other players (the Secretary of the State Economy, SECO, and almost 60 Swiss NGOs operating in this country, most of them supported by SDC).

New objectives related to bilateral cooperation were identified under the 2006 SDC Partnership Program (PP). The PP aims to promote bilateral cooperation based on mutual interest and a collaborative framework (joint initiatives, shared funding, etc.) with a strong emphasis on poverty reduction, knowledge and technology transfer. It is considered a shift in Swiss development cooperation policies with India when compared to the past which was based on resource transfer. Its priority areas are energy and climate (for instance, renewable energies, natural disaster management) science and technology (biotechnology, agriculture, food safety, ICT, etc.) and governance (decentralization i.e. strengthening local capabilities by training and empowering women promoting community participation and supporting NGOs working on decentralization issues).

To strengthen the capabilities and rights of the locally disadvantaged groups, especially in rural areas, the SDC focused on income generation and employment creation and mobilizing local partners including civil society organizations. The SDC strives to improve productivity and income through sustainable water management, micro finance and employment activities in rural zones and access to the formal banking system. The SDC carries out programs to support Indian organizations in the defense and promotion of the rights of vul-

nerable groups. With regard to energy and rural settlement, the main priorities are to provide support to poor people in gaining access to cheaper sustainable energy and residences built with local material that respects the environment and resists disasters.

Regarding humanitarian assistance, the priority for SDC is to provide support in case of emergency requiring effective and rapid interventions (for instance the hurricane catastrophe in the state of Orissa in 1999 or the serious earthquake in Gujarat in 2001) in collaboration with Swiss NGOs specialized in humanitarian assistance and multilateral agencies. Since 2007, priorities of the SDC are disaster management and strengthening local capabilities in the field of natural disaster prevention and management.

India and Switzerland have trade and finance cooperation. In 2004, Swiss exportation (machines and chemical products), importation (textiles, chemicals) and foreign direct investment towards India accounted for 1.2 billion CHF (more than 37 percent of total foreign direct investment, compared to 2003); 538 million CHF (more than 9.6 percent) and 165 million CHF. One of the key priorities is strengthening bilateral cooperation in the private sector. The challenge is to ensure balanced financial flows for the benefit of the two countries. This could be achieved if Indian businesses and companies also have easy access to the Swiss market. India's greater comparative advantage on high technology and service can be an asset for effective bilateral cooperation. For the Swiss side, one of the main concerns is addressing bureaucratic constraints on trade and business in India (Brookes, 2006). The two countries hold divergent views on multilateral trade agreement (highest tariff in agriculture versus highest tariff in industry for India) although they cooperate in the World Trade Organization.

In 2003, India and Switzerland signed a scientific bilateral agreement. This scientific cooperation includes life sciences and information technology communication and involves various universities and research institutes of the two countries. On 22 April and 2 May 2007, the Swiss State Secretary of Education and Research visited India to discuss possibilities to enhance bilateral cooperation in science and technology.[5]

5 The bilateral cooperation strategy has been elaborated by the Federal Council and amended by the Parliament in January 24, 2007.

2. Socio-demographic Characteristics of the Respondents, Causes and Characteristics of the International Highly Skilled Migration to Switzerland and Migrants Life

2.1 Socio-demographic characteristics of the respondents

As shown in the table, highly skilled Indians in Switzerland tend to be predominantly male. Male Indian highly skilled migrants represented a majority of the respondents, while Indian female highly skilled migrants accounted for less than half. This male predominance is reflected in the share of the total Indian migrant population in Switzerland.

Table 3. Gender distribution of the sample

Male		Female	
14	60.87	9	39.13

Source: Dia, data collected during the 2007 survey

When considering the age group of the sample, it appears that almost half of the male Indian highly skilled migrants were aged over 50. The percentage of female highly skilled aged over 50 was a mere 11.1 percent, which reflects a large proportion of men considering the age group 50 – SPA. However, when taking into consideration the age group 43–50, there was a large share of female highly skilled migrants. A little over half of the women interviewed belonged to this group, whereas only 14.28 percent of male respondents were aged between 43 and 50. A little less than half of the male respondents were younger than 40 years of age with a small percentage of female respondents falling in the same age bracket.

Table 4. Age distribution of highly skilled Indians interviewed

	Male		Female	
	Number	%	Number	%
17–25	2	14.28	1	11.1
26–33	3	21.42	2	22.2
34– 42	1	0.71		
43–50	2	14.28	5	55.5
50–SPA	6	42.85	1	11.1
Total	14		9	

Source: Dia, data collected during the 2007 survey

Most of the respondents had only Indian citizenship. Less than half had another citizenship. Four male respondents and two female respondents had a Swiss passport. There were also respondents holding U.K. and U.S.A. passports.

Table 5. Nationality

	Male		Female	
Indian	11	61.11	5	55.55
Indian and Swiss	4	22.22	2	22.22
Indian and other country[6]	3	16.66	2	22.22

Source: Dia, data collected during the 2007 survey

The majority of the male interviewees (12 out of 14) were married. The single respondents included mostly PhD students. The prominence of the married group was also noted when taking into consideration female groups in the sampling. A majority of the female highly skilled migrants (6 out of 9) were married, while two were still single and one was a widow. Within the single group, the proportion of women was relatively higher than men.

Table 6. Civil status

	Male		Female	
Single	2	14.28	2	22.22
Married	12	85.71	6	66.66
Widow			1	11.11
Total	14			

Source: Dia, data collected during the 2007 survey

The table indicates the prominence of respondents who had one or two children. The proportion of men who had one or two children was significant. The same situation occurred for the female group; the proportion of those who had one child was comparable to those who had two children. Only one out of 14 male respondents had more than 2 children. One male respondent and one female respondent indicated they had no children yet.

6 One respondent is Indian, British and Swiss.

Table 7. Number of children for respondents with family responsibilities

Number of children	Male		Female	
0	1	8.33	1	14.28
1	5	41.66	3	42.85
2	5	41.66	3	42.85
3	1	8.33		
Total	12		7	

Source: Dia, data collected during the 2007 survey

As reflected in the table below, the Indian respondents operated in various fields including biotechnology, chemistry, IT services, economics, medicine, physics, etc. Some respondents were pursuing PhD research on chemistry and communication systems (IT) whereas one respondent had completed his postdoctoral research on biotechnology. Most of the scientists and academic staff interviewed were working in Swiss higher education and research institutes such as the EPFL, the University of Geneva, etc. Professionals also served in international organizations such as the International Labour Office, the International Organization for Migration and the World Health Organization. The Indian skilled diaspora living in Switzerland is therefore involved in various knowledge intensive sectors which reflects that they have a greater potential that could be critical in strengthening scientific and technological research and social and economic development of the country of origin.

Table 8. Indian highly skilled by field

	Male		Female	
Biotechnology	1	7.14		
Chemistry	3	21.42	1	11.11
IT services	3	21.42		
Customer relations	1	7.14		
Communication system	1	7.14		
Sales electronic and Communication	1	7.14		
Finance	1	7.14		
Arts	1	7.14		
Public administration			1	11.11
Econometrics and economy	1	7.14	1	11.11
History	1	7.14	1	11.11
International relations – humanitarian issues			2	22.22

Table 8. Indian highly skilled by field (cont.)

	Male		Female	
Cancer pathology			1	11.11
Particle physics			1	11.11
Psychology			1	11.11
Total	14		9	

Source: Dia, data collected during the 2007 survey

A majority of the highly skilled Indian respondents had a PhD. All the women interviewed held a PhD degree except one who had a bachelor's degree. Within the male respondents, 2 of those interviewed had completed their Postdoctoral research and 3 out of the 14 had received their PhDs. A small number of the total respondents had only a master's degree; even fewer had an engineering diploma, while only one respondent had a bachelor's degree.

Table 9. Level of studies

	Male		Female	
Postdoc	2	14.28		
PhD student	3	21.42	5	55.5
Master and related (DEA)	5	35.71	3	33.3
Engineering	3	21.42		
Bachelor	1	0.71	1	11.1
Total	14		9	

Source: Dia, data collected during the 2007 survey

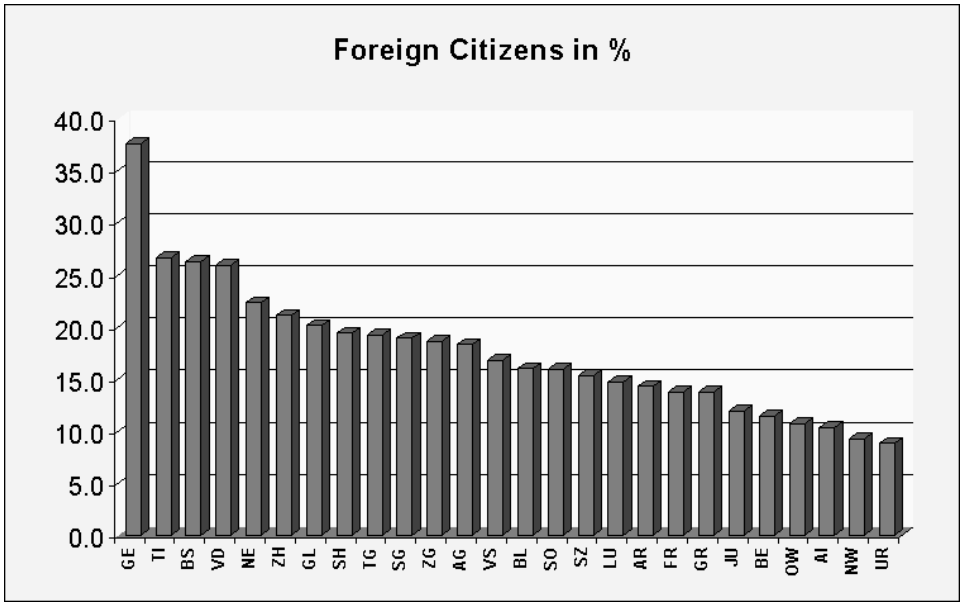
The three main places of residence of the respondents were Lausanne, Geneva and Zurich. There was a higher concentration of respondents living in Lausanne as most of them were either pursuing their PhDs or working as part of the scientific and academic staff at the EPFL. The presence of Indians in international organizations and multinational firms that have headquarters or representatives in Geneva may explain the higher concentration of skilled Indians in this city. Only one respondent lived in Zurich. However, this might not statistically reflect the real ratio of Indians residing in that city. One could assume that the ratio of highly skilled Indians living in Zurich should be more significant than reflected in this qualitative sample as it ranks first when considering the percentage of the foreign population by canton in Switzerland (see figure below) and hosts internationally renowned academic and research institutes which attract international students and researchers, including persons of Indian origin. Geneva and Lausanne were also main places of work for the persons in the sample.

Table 10. Place of residence

	Male		Female	
Geneva	6	42.85	8	
Lausanne	7	50	1	
Zurich	1	0.71		
Total	14			

Source: Dia, data collected during the 2007 survey

Figure 1. Canton by foreign citizens



Source: <http://www.about.ch/statistics/index.html> (last consulted 10-03-2008)

Table 11. Place of work

	Male		Female	
Geneva	6	42.85	7	77.77
Lausanne	6	42.85	1	11.11
Zurich	1	0.71		
Morges	1	0.71		
Temporarily unemployed			1	11.11
Total	14		9	

Source: Dia, data collected during the 2007 survey

The ratio of Indians interviewed holding Swiss passports was quite low. When considering the distribution of the respondents by gender, a little over a quarter of the male respondents and a minority of the female respondents had Swiss citizenship. This group included scientists, researchers and academic staff that had spent over 20 years in Switzerland. The percentage of respondents who had C permits was low across the gender board. Among respondents in the sample who had C permits, there were second and third generation migrants who settled in Switzerland due to family reunification or professional relocation notably in international organizations. Most of the holders of a carte de legitimation were working in international organizations and non-governmental organizations. They accounted for less than half of the total sample, of which the majority were women. Most of the respondents in the survey who had B permits were PhD students.

Table 12. Type of residence permit in Switzerland

	Male		Female	
Swiss passport	4	28.57	2	22.22
Carte de legitimation	2	14.28	5	55.55
Permit C	4	28.57	1	11.11
B permit	4	28.57	1	11.11
Total	14		9	

Source: Dia, data collected during the 2007 survey

The number of respondents who came to Switzerland very recently (less than two years) represented a minority of the total sample. Within this subgroup, more were women than men. This short duration migration may reflect student migration and the fact that Switzerland was the first residence country out of India for the PhD students. Almost half of the male respondents and a minority of the female respondents had lived in Switzerland for more than 18 years. This reflects long-term migration or permanent settlement of respondents; for these migrants, most expressed a dual sense of belonging and transnational identity.

Table 13. Length of stay in Switzerland

	Male		Female	
0–2	2	14.28	1	11.11
2–4	3	21.42	2	22.22
4–6	1	0.71	2	22.22
6–8			1	11.11
8–10			1	11.11
10–12				
12–14	2	14.28		
14–16				
16–18				
18–20	2	14.28	1	11.11
20–SPA	4	28.51	1	11.11
Total	14		9	

Source: Dia, data collected during the 2007 survey

2.2 Causes of International Migration, Migrants' Paths and Migrants' Life

The bulk of this section is to scrutinize the emigration of Indian highly skilled migrants to Switzerland. This section is organized into the following sections: (i) the causes of skilled immigration in Switzerland, (ii) the reasons for choosing Switzerland and information source, (iii) migrants' paths and (iv) migrants' life

2.2.1 Causes of International Skilled Migration

Search for scientific and academic achievement

Switzerland hosts some scientific and technological research institutes with excellent reputations (CERN, ETHZ and EPFL). Respondents noted that these institutes have gained international prestige in various scientific fields such as particle physics (CERN); chemical area of solar conversion and communication system (EPFL); and biotechnology (ETHZ).[7] This could attract academics, scientists, researchers and students in search of scientific and academic achievement. The possibility of pursuing doctoral or post-doctoral programs was one of the key elements of Indian skilled emigration to Switzerland. This finding is in accordance with Mahroum's (2000, p. 374) observation relating to

7 The international prestige of a university and a research centre is often the result of an annual ranking elaborated by some institutions such as the University of Shanghai. Such ranking is based on the number of Nobel Prize winners, scientists and researchers' awards and achievements and the number of publications in scientifically renowned journals.

the importance of the excellent reputation of a research and academic institute in attracting foreign students: "[…] Centres of excellence remain global centres of scientific gravity that attract significant amount of talents from all over the world. […] [T]he high reputation of an academic or scientific institution serves as magnet not only for local recruits but also internationally."

> CERN is the only laboratory in the world of its kind. In my field it's the premiere lab to be in. […]
> (Physicist, female)

> The first thing is after my PhD, I wanted to come to Zurich […]. Zurich is internationally renowned because of its six or seven Nobel prize.
> (Post-doctoral fellow, male)

> EPFL is at the forefront in the chemical area of solar conversion
> (Chemist, male)

> They are three Nobel prizes in this sector. My PhD supervisor is one of the biggest scientists in this field. Basically, it is the main reason I came here.
> (PhD student, male)

Labour mobility, search of employment opportunities and family reunification

There is an intersection between student migration and labour migration. For instance, studying in Switzerland might increase the chances to work in the international labour market as many international agencies headquarter or have official representatives in this country. This marks the search for employment opportunities and labour mobility as one of the causes of Indian skilled emigration.[8]

What comes out is that labour mobility includes different schemes: students searching for employment in the international labour market; scientists and researchers recruited to academic and research institutes, highly skilled professionals being relocated within multinationals, consulates, embassies and international organizations, etc.

8 For further information about intersectionality between student and skilled labour migration, refer to Tremblay, K. (2005) "Academic mobility and immigration", in J*ournal of Studies in International Education*, Vol. 9 N° 3, Fall 196–228.

Box 1: International labour mobility between relocation, search for employment opportunities and family reunification

Job offer

I got my MBA in India. After this degree, I realized that there are not many opportunities in India, so I moved to Europe to accept a better and more lucrative job (in my field). Also, I was young and single, wanted to explore.
(Manager, male)

Relocation

It was not my choice in 1980. […]It was not part of my choice. The organization decided to transfer me to Geneva. It's transfer within the international organization. It was headquarters.
(Economist, male)

Family reunification

My husband joined the ITC and I just followed him. I just followed my husband, there was no choice. He was posted in the Indian mission and then hired by the UN.
(Professor of psychology, female)

Student migration versus labor migration

[…] Basically, I came as a student. I was based in London during 2 years. I moved to Switzerland and the reason was I was interested in conflict, migration. I did a certificate at Webster University. What brought me to Geneva is the Refugee Migration certificate program. So I came here on an educational basis. I was an intern at the Red Cross and then I got a job in September 1999. I have been in many positions since 1999. […] One was to study and its place of international organizations. My studies were international relations. Geneva was very attractive to me in terms of plans. It was more to study and do internships to gain professional experience. My plan was to be here for 6 months. I was not aiming at seek employment. I got in touch with Webster University.
(Officer, female)

Social networks

A social network can be defined as a set of social relations that are critical in the migration process (the choice of the destination country, the information sources). Social networks include parents, spouses, friends and scientific and professional contacts. In addition, participating in scientific and professional associations and international conferences provided opportunities to emigrate in Switzerland. There is evidence in the literature to support the important role of social networks in international migration (Poros, 2001; Kearney, 1986; Portes, 1995, Massey et al., 1999; Vertovec and Cohen, 1999; Brettell, 2000). For instance, networks might help a migrant when looking for accommoda-

tion, job, etc. It might also connect a migrant with the country of origin and help alleviate solitude in a migrant's life.

A social network was one of the key elements for emigrating in Switzerland for a couple of interviewees:

> Accidentally, I met someone Indian in London that was a researcher in Switzerland; I received from him an opportunity to be part of an initial research group.
> (Chemist, male)

> Actually, the research which we were interested in is everywhere. But the particular reason I came here is my professor, my ex-professor in India. He discussed with me about the opportunity of doing my PhD in Switzerland. Then I looked at the research and what's going on this group and so became interested. That's the whole reason. […] My professor explained to me the research going on at EPFL.
> (PhD student, male)

2.2.2 Reasons for Choosing Switzerland and Information Source

The following table presents the reasons for choosing Switzerland and the information source at the disposal of Indian professionals and students once in the country of destination.

Table 14. Reasons for choosing Switzerland

Professional category	*Information source*	*Reason of the choice of Switzerland*
Manager, staff at international organization	Company and friends	Professional relocation
PhD students / scientists, academics, physicians, and researchers	Referee, research programs, senior students, web site, scientific publication, scientific bilateral programs, etc.	Personal basis plus professional (post doc opportunities, financial reason, study plan and work plan, etc.)
	Spouse, parents and the conjoint workplace	Family reunification

Source: Dia, data collected during the 2007 survey

As shown by the table, the main sources of inspiration for emigrating were career, mentor, teacher or senior, presence of family or friends in the host country. Khadria (2004, p. 27) found almost similar sources of inspiration in investigating the migration of Indian health professionals.

In conclusion, international skilled mobility is a complex combination of academic, social, economic and personal factors and determinants (Chang, 1992; Khadria, 2004, p. 10). Khadria (2004) highlighted business causes, family

reunification, employment, professional experience, additional higher education studies and professional relocation. Similarly, one of the findings of this survey is that highly skilled Indians in Switzerland were searching for better personal, scientific, academic, economic and professional prospects in Switzerland. There are specific rationales of Indian skilled mobility whether the interviewee is a PhD student (pursuing doctoral studies in higher education institutes); a scientist or researcher (opportunities in terms of scientific mobility such as visiting scholar programs or jobs in academic and research institutes); a professional working in embassies, diplomatic missions or international firms and organizations (work assignment, professional relocation) or whether the interviewee came to Switzerland for family reasons (family reunification).

2.2.3 Migration Paths

This qualitative research shows that many respondents lived in English speaking countries (U.K. and U.S.A.) before moving to Switzerland. This might reflect the importance of linguistic and historical compatibility in skilled Indians' decisions to emigrate (Srivastava R. and Sasikumar S.K., 2003, p. 14). A couple of interviewees (mainly staff from international organizations and managers, researchers and scientists) indicated that they moved to different places in the course of their international professional career. Respondents lived in other destinations such as Austria, Greece, the Middle East, Singapore and Ethiopia. This international circulation might provide multicultural, linguistic and work experience and a "capital mobility" which is defined as the predisposition of frequent travels abroad.[9] A good example of this international circulation is stated by a senior specialist:

> First movement was from India to Zambia, because my parents were based there. After finishing higher studies, I dabbled in teaching in a vocational training institute in Zambia, also taught part-time in a secondary school. I moved from India to Ethiopia (because of my parents), from Ethiopia I moved to the U.S.A. for 3 years to complete my PhD. Then back to Ethiopia, because I got a job there and for marital reasons. Then Switzerland in January 2004, I was transferred by my organization.
> (Senior specialist, female)

9 For more information about the definition of the mobility capital, please refer to Sussex Centre for Migration Research, University of Sussex, and the Centre for Applied Population Research, University of Dundee (2004) *International student mobility* Report commissioned by HEFCE, SHEFC, HEFCW, DEL, DfES, U.K. Socrates Erasmus Council, HEURO, BUTEX and the British Council. July/30 Issue Paper Higher Education Funding Council for England (HEFCE): London <http://www.hefce.ac.U.K./pubs/hefce/2004/04_30/>.

Many PhD students stated that Switzerland was their first country outside India. A few mentioned that they lived in other destination countries (Germany, United Kingdom and United States of America) before coming to Switzerland.

Due to attractive immigration policy and professional opportunities, the U.S.A. is the preferred destination country for highly skilled Indians, especially IT and health workers. Because of historical and linguistic bonds, as well as similarities in their higher education systems and attractive immigration policy toward highly skilled people, the U.K. is the second main receiving country of Indian skilled migrants. Canada remains a traditional destination country for Indian migrants. Changing Indian migration patterns in the twenty first century are reflected in the diversification of receiving countries, including Germany, France, Japan, Belgium, etc. (Khadria, 2004, pp. 8, 22–23).

The global competition for skilled labour and the ensuing conducive immigration policies have facilitated the international mobility of highly skilled workers, which are described as globe trotters moving to different places in search of greener pastures (Mahroum, 2000). The international circulation as evidenced by frequent travels abroad and multiple places of settlement and resettlement of skilled labour migrants challenges the permanent settlement migration paradigm underlying most studies and research about international migration:

> From a research perspective, we have to confront the situation that the bulk of our international migration data collection, much of our empirical knowledge and theory is anchored in a permanent settlement migration paradigm. We need to rethink our data collection systems regarding migration flows that often have failed to capture non-permanent migrations, or limit the amount of detail sought regarding them, compared with avowedly permanent moves. (Hugo, 2003)

2.2.4 Daily Life Experience, Living and Working Conditions of Highly Skilled Indians in Switzerland

This section provides an overview of a working day of highly skilled Indians. It also analyses the first experience in Switzerland, the strategies in order to balance work and family responsibilities and the integration in the Swiss society.

An overview of a working day of skilled Indians interviewed

The daily professional activities of a scientist, researcher and PhD student are related to teaching and research activities. Scientists and researchers are involved in research, teaching and monitoring PhD and post doctoral fellows. Daily activities of PhD students and Postdoctoral fellows are studies, experiments and teaching (as assistants). The daily activities of a manager (customer

relations, sales or IT programs on software development) are ensuring the deliverability of products, research, data collection and planning, budget controlling, coordinating between local staff and outsourcing, dealing with specific regions (Middle East, Central Asia, Africa and Eastern Regions).

A working day of a professional serving in an international organization is related to policy advice, liasing and networking, research and publication. A senior professional task includes policymaking, monitoring research, reviewing and editing publications. A junior professional is involved in research, capacity building and awareness raising issues.

Scientists and academics indicated they usually come to work around 8 or 8h30. Many PhD students interviewed have long working hours and even work during weekends. Most of them came to Switzerland one or two years ago. They live alone, have few friends in Switzerland, allocate extensive time to study and research and hardly participate to socializing or leisure activities due to time constraints.

Living in Switzerland: first experiences; constraints, disillusionment and coping strategies

Many skilled Indians interviewed stated their first experiences in Switzerland were "fascinating," "nice," "fantastic," "good" and "enjoyable." The key elements of such a positive experience were "no major problems in settling," "nice work environment," "familiarity of Swiss colleagues with English," "social networks," "support from colleagues and friends." Alternatively, language problems, lack of familiarity with Swiss realities (food, climate, etc.), and the fact that Switzerland was the first experience abroad were some of the main constraints for a couple of PhD students during their first period in this country.

A couple of employees in multinational firms and international organizations found their first experience in the Swiss society burdensome. There was a shift in their lifestyle (housing problems, difficulty hiring domestic workers, etc.). The lack of friendship and social relations, loneliness, linguistic barriers, long working hours and housing problems were main hindrances to their social lives.

A respondent voiced constraints related to renewing residence permit and continuous precarious employment:

> The first year, my father died. I came in August and he died in November. And then it was a struggle. A struggle to find a job started…Especially with the Swiss authorities. I had difficulties finding a visa because they were mean. Contrôle de l'Habitant: they were most unhelpful…I worked in the conference service with a messenger, replacing this messenger, distribution, whatever job to avoid Contrôle de l'habitant because I was working even with the break. The condition for me to stay here was to prove that I was working.
> (Finance assistant, male)

A female respondent stated that she had the feeling she had to work hard and be outstanding in order to be respected by her employer:

> Being a woman and coming from a developing country, you have to have an edge over every equally qualified European. I had to work doubly hard. That was really the challenge. Now I am a [permanent] staff…but this happened only 5 years ago, for 15 years I had short term contracts.

Another obstacle mentioned by a cancer pathologist interviewed was the lack of recognition of diplomas in the field of medicine. Socializing and networking, joining Indian associations, language courses, support from colleagues and friends and participating in social and cultural events such as children's school related activities were some of the coping strategies used by a couple of interviewees to alleviate the constraints in their first periods in Switzerland.

Conciliating work and private/family life

On the one hand, there are many constraints for balancing work and family responsibilities. They include extensive travels, long working hours and lack of social support from family members and friends.

A respondent noted:

> Demanding. Profession demands 80 hours a week and my family wants 80 hours a week. Very big juggling act.
> (Physicist, female)

Another interviewee indicated:

> The difficulty as an immigrant is that we miss our family here. If we were to live in India, next to our family, then we could have had a lot more support from family members. Here we have to depend on our friends. My colleagues, who are Swiss, with their grandparents around, get a lot of help, which is what we miss here.
> (Sales manager, male)

On the other hand, support from family members and friends and facilities such as day-care centres, family friendly policies at the workplace, good transportation systems, flexible working time, holidays and maternity leave and social arrangements can help conciliate work and family responsibilities:

> I think the environment is quite relaxed. For example: working hours. I can go home any time I want to be with my family. There is no strict rule.
> (PhD student, male)

Integration in the Swiss society

Some respondents were delighted about their life in Switzerland and thought they were very well integrated in the Swiss society. They argued that they had friends and social relationships. They were comfortable with the local language; had good exposure to the local culture and lived in a friendly environment, which helped them easily integrate the Swiss community.

Other respondents stated that they were "more or less" integrated. They indicated that they had more contact with international groups than with Swiss people. They socialized more often with colleagues at work who belonged to international groups. They reported language problems and felt no need to speak French or German fluently as English was used in their work environment. In this category is staff working in international organizations, multinational firms, diplomatic missions and embassies.

There were interviewees who believed they were not integrated in Swiss society. They pointed out a range of unfavourable circumstances and factors such as lack of time, lack of awareness of Swiss culture, constraining Swiss procedures and laws, language barriers, divides between the Swiss society and the international groups. Several mentioned that they were confined to their international work environment. A few indicated they did not feel the need to be integrated into Swiss society. Time constraints coupled with family responsibilities limited time for Swiss social and cultural activities.

To sum up, a migrant's living experience is determined by a host of social, economic, cultural, spatial and human circumstances and factors. Respondents strategised how to better conciliate work, personal and family life; and how to get used to Swiss realities whilst *entrenching* "the feeling of India" in their everyday lives. Most of the respondents found their living and working conditions decent and their Swiss experience fascinating. According to interviewees social integration depends on an array of elements such as the social and economic conditions, social relations and getting used to social and cultural realities of the host country. In this regard, there are multiple forms of adaptation or integration in the host society and favourable and unfavourable circumstances for migrant's integration rather than a linear conception of migrant's integration (Bolzman et al., 2003).

3. Skilled Diaspora, Transnationalism and Brain Gain: Is the Indian Skilled Diaspora in Switzerland a Catalyst of Scientific, Technological, Social and Economic Development of the Country of Origin?

The Indian skilled diaspora's contribution to economic, scientific and technological development of their homeland, especially Indian nationals living in the U.S.A. and the U.K. has been investigated by many scholars and researchers. There are fascinating success stories in the literature related to the Indian diaspora (see for instance Khadria, 2006). First and foremost, this chapter analyses the policies and measures implemented at the governmental level in the field of skilled diaspora. Secondly, it will analyse the nature, opportunities and limitations of the brain gain practices and mechanisms initiated by highly skilled Indians in Switzerland.

3.1 Indian Skilled Diaspora and Governmental Policies Toward Highly Skilled Indian Abroad

The Indian scientific and technological diaspora is represented in different parts of the world, some of the members having gained international repute in their respective fields. The Indian scientific and technological diaspora is organized into alumni based and professional networks which are mechanisms for their participation in the development of the country of origin and deepen linkages with the country of origin and the country of destination. Scientists and technologists of Indian origin (STIOs) have provided valuable inputs for India in various fields and have enabled several IT and biotechnology joint ventures. They also contribute to the student and scientific mobility of local Indians by placing them in academic-research institutions abroad and serve as members of advisory panels in knowledge intensive sectors. Bilateral scientific and technological cooperation with the countries (U.S.A., Europe and Asia) are ways to connect scientific and technological diaspora to the country of origin (Ministry of External Affairs).

Some of the members of the Indian diaspora are likely to return to the country of origin and invest in science, technology and business and help local scientists and researchers. Despite infrastructure and bureaucratic problems, the IT industry has been remarkably expanding over the years. Besides the successful experience of local Indian IT professionals working in India, one of the key elements of the IT expansion was the return of Indian IT professionals

abroad that invested in IT companies, IT R&D, IT teaching and training and outsourcing. By mentoring early-stage companies and by building confidence with major U.S.A. corporations to ensure investment and outsourcing activities, the Indian IT diaspora played a critical role in economic growth, science and technology (Pandey et al., 2006).

Policymakers are increasingly recognizing the positive effects of migration on Indian social and economic development. Prime Minister Atal Behari in his address during the 90th session of Indian Science Congress in 2003 accented the major role of the Indian scientific and technological diaspora in sustaining Indian economic growth and making India a giant in the realm of scientific and technological research. R&D partnerships with leading corporations could generate foreign direct investment and scientific and technological opportunities that could be useful for the country's overall development, with the proviso that lack of funding of R&D and negative effects of internal brain drain[10] and bureaucratic constraints are addressed. Furthermore, connecting the skilled diaspora to the country of origin by enabling highly skilled Indians abroad to work in Indian scientific and technology institutions and promoting their return to the country of origin is critical to the national development (PM Appeals, 2003).

A special minister is in charge of migration affairs and a "S&T Professionals of Indian Diaspora – Website"[11] has been dedicated to scientists and technologists originally from India residing abroad, an initiative of the Indian Ministry of Science & Technology (Department of Science & Technology – DST). This is an integral part of the overall Indian Diaspora initiative of the Government of India and the Ministry of External Affairs (See: good practice n° 1: Scientists and Technologists of Indian Origin based abroad (STIOs), Annex 1) Moreover, the government is trying to attract highly skilled Indians by increasing salaries and offering them financial, property, banking, and investment incentives. There are also government policies aimed at helping the Indian highly skilled abroad "to set up research and scientific and technological initiatives" and to create new business companies and start ups. To motivate

10 "We need to examine why a career in science is not considered worthwhile by so many of our talented younger scientists. Whatever the reason we must face this issue squarely by taking concrete steps to give promising scientists and technologists the necessary opportunities, recognition, standing, and adequate material compensation," he said. In PM Appeals to Scientific Diaspora to Return <http://www.financialexpress.com/old/fe_full_story.php?content_id=25229>.

11 Government of India Ministry of Comm. & Information Technology, S & T Professionals of Indian Diaspora (<http://stio.nic.in>).

researchers and other talented Indians abroad and competitive, "[…] salaries have been increased three of four times" (Post-doc fellow, male)[12].

Furthermore, the Transfer of Knowledge Through Expatriate Nationals (TOKTEN) India program has connected 650 STIOs with 250 Indian institutions from 1998–2001 in areas such as high performance construction materials, drug, diagnostics and medical instrumentation and agricultural biotechnology. The Report of the High Level Committee of the Indian Diaspora set up some recommendations for mobilizing STIOs toward the development of the country of origin. Among the recommendations are the launching and management of a website dedicated to STIOs, the establishment of joint venture companies based on technologies sourced by STIOs and enabling participation of STIOs as visiting scholars in Indian based scientific and technological institutions (Ministry of External Affairs).

3.2 Indian Skilled Diaspora in Switzerland as a Catalyst for Scientific, Technological, Social and Economic Development of India

This section tries to address the knowledge gaps relating to the contribution of skilled Indians in Switzerland as far as the development of the country of origin is concerned. What stands out is that skilled Indians maintain various links (economic, social, cultural, scientific, etc.) with the country of origin, the host country and at the international level. In the following sections, we will analyse the nature of these scientific and professional contacts and exchanges with the homeland.

3.2.1 Contacts with the Country of Origin

The scientific and professional contacts and exchanges with India include joint research projects and publications; student and researcher exchange programs; contacts with professors and juniors in similar fields; short term visits to India and outsourcing opportunities mainly in software development.

PhD students and scientists try to maintain contacts with their former schools and institutes in India. Similarly, professionals keep contact with local counterparts working in affiliate companies and back offices in India.

12 For further information, see the website Government of India Ministry of Comm. & Information Technology, S & T Professionals of Indian Diaspora <http://stio.nic.in> [Last retrieved 13-03-2008] and Ministry of External Affairs Foreign Secretary's Office (2001) Report of the High Level Committee of Indian Diaspora <http://indiandiaspora.nic.in>.

Moreover, one should highlight the sociological dimension of the contacts with the country of origin (friendship, family ties, etc.). All the respondents maintain social links (telephone calls, emails exchanges, private visits, remittance transfer, etc.) with families and communities in India. Several respondents stated that they are connected to social and economic realities in the country of origin and help improve the living conditions of local counterparts.

Private visits to India tend to be on a regular basis (annual or biannual). Family members living in India might also visit their counterparts living in Switzerland. Few respondents in this survey stated that they financially remit on a regular basis. Remittance transfer seems to be rare and occasional. Respondents asserted that they also sent occasionally gifts to families and friends in India.

Business links in India were also noted. These include owning property, financial investments, outsourcing endeavours, technical support to firms and research partnerships with the private sector.

3.2.2 Contacts with the Country of Destination

Many highly skilled migrants, especially scientists and researchers, develop scientific and professional exchanges with Swiss colleagues through research projects and publications, professional associations, activities in the workplace, neighbourhood events and school activities with their children:

> My son grew up here, so I have been through every conservatoire, and public happenings in Switzerland. I have been giving séances in the school (science for kids, experiments), did MBA in Switzerland, have my DSc from University of Geneva. I am very well integrated. I am involved in the politics. Professionally, at CERN all European countries are equal; Switzerland has its place in CERN. CERN is a European institute not a Swiss institute.
> (Physicist, female)

Respondents working in international organizations, firms and diplomatic missions stated that they have little interaction with the Swiss and socialize more often with people from international groups (UN system, embassies, diplomatic missions, multinational firms) who were more often their colleagues at work. Those working at the Swiss level (Swiss companies, Swiss academic and research institutes) tended to more easily create contacts with Swiss people than those serving in multinationals and international organizations:

> […] I teach language. I teach English, so that helps me at least know some students. I also take French classes and meet international people there.
> (Professor of psychology, female)

Several PhD students, scientists and researchers interviewed stated that they are members of Swiss scientific associations such as Swiss Chemical Association. These scientific associations organize various activities (symposia, conferences, publications and joint projects, etc.).

3.2.3 Contacts at Regional and International Level

A couple of interviewees stated that travel missions, conferences, workshops and visiting scholar programs are occasions to develop regional and international scientific and professional contacts. Skilled people working in international companies can extend local, regional and international professional contacts with different member states or different markets in the world:

> […] I travel a lot for conferences. I have been giving workshops and teaching at schools in different places in Italy school of Trieste, for South Asian countries, etc… I have done several séances there. I have one Sri Lankan student who is coming to do his PhD with me. In Israel, Canada, the U.S.A., India. I also have students visiting from Colombia, from India, from Iran, Thailand, and Egypt – non member state students.
> (Physicist, female)

> Professionally, I have much contact with the regions I deal with. We have factories in the U.K., Germany, and a commercial operations centre in Barcelona. I work with all types of people and areas… [company name] has factories all over; headquarters is in Palo Alto, California…I have meetings, travel often to the U.S.A., Europe, Japan, Malaysia and China.
> (Sales manager, male)

Suitable employment and institutional support can help develop international scientific and professional contacts, whereas unemployment and lack of institutional support might hinder scientific mobility. For instance, a respondent who is a cancer pathologist stated that she could not participate in international scientific meetings outside Switzerland due to unemployment and lack of institutional support.

3.2.4 Knowledge Transfer

A couple of interviewees indicated that they are involved in knowledge transfer with local colleagues in India on issues such as business know- how, disaster management, learning and teaching social psychology, communication theory, biotechnology, nuclear physics, econometrics and statistics, history and international relations, migration policies, etc. An institute of biotechnology has been created by a respondent who recently went back to India after completing postdoctoral studies in microbiology. This institute can be considered a good practice to enhance local scientific and technological capabilities through

knowledge transfer. (See: good practice n° 2: KIIT School of Biotechnology at the KIIT University in Orissa, Annex 1).

A few respondents mentioned being in contact with local researchers and scientists either on a formal or informal basis and working on research projects and scientific publications. A respondent stated:

> Lots of contacts and exchanges: joint projects; sometimes even in not funded research projects (only for personal interest). I receive students and researchers from India. I visit Indian research institutions. We do publications together. I send BA and PhD students to India. (Chemist / scientific project manager, male)

Moreover, during private visits in the country of origin, lectures, conferences, training or seminars are organized occasionally by PhD students, scientists and researchers.

3.2.5 Bilateral Research, North-South Research Partnerships and Research & Development

An Indo-Swiss Academic Alliance (ISAA) involving Indian and Swiss universities has been established to strengthen scientific and technological cooperation between India and Switzerland. This Indo-Swiss Academic Alliance is jointly financed by the two countries for the next four years; each university is being assigned specific responsibilities for the success of this bilateral scientific and technological partnership. The Memorandum of Understanding (MOU) is devoted to enhancing scientific and technological cooperation between the two countries through academic (science and engineering) cooperation in the realm of research & development, education, transfer of technology and dissemination of knowledge. The MOU intends to promote faculty exchange in terms of expertise, lectures and common research themes for mutual partnership; joint research projects and programs between universities of the two countries; graduate student exchange programs in science, technology and engineering with a focus on cultural diversity and fund mobilization to support scientific and technological endeavours.

The ISAA is composed by the following institutes: the EPFL; Swiss Federal Institute of Technology Zurich (ETHZ); Indian Institute of Technology, Bombay (IITB); Indian Institute of Technology, Delhi (IITD); Indian Institute of Technology, Gauhati (IITG); Indian Institute of Technology, Kanpur (IITK); Indian Institute of Technology, Kharagpur (IITKGP); Indian Institute of Technology, Madras (IITM) and Indian Institute of Technology, Roorkee (IITR). A Governing Board has been formed to manage the overall activities of ISAA. The Governing Board implements coherent visions, goals and strategies for the success of ISAA. The EPFL acts as a Leading House for the Indo-Swiss scien-

tific and technological cooperation. Various areas are identified for bilateral scientific and technological cooperation including computer science, telecommunication, life sciences and electrical engineering.

There are tools to enhance collaboration and cooperation between higher education institutes of India and Switzerland. These include: Faculty Exchange Fellowship (FEF) up to 1 to 3 months; research grants to support masters' and doctoral students involved in joint research; Graduate Education Fellowships for individual masters' and doctoral students to pursue their studies in the other country; IITR, EPFL & ETHZ undergraduate students to support undergraduate biotechnology students from IITs to complete their masters at EPFL/ETHZ or students from EPFL/ETHZ to complete their final year of their master program to IIT or eventually one year doctoral studies in the other country.[13]
There are various bilateral scientific programs, hosted by the EPFL, which serves as the Leading House for Swiss bilateral scientific cooperation with India. These include:

The Indo Swiss Bilateral Research Initiative (ISBRI)

The Indo Swiss Bilateral Research Initiative (ISBRI) is devoted to enhancing research partnerships between Switzerland and India by providing grants to Swiss and Indian academic staff and Ph. D. students and facilitating identification of potential scientific partnerships on both sides. The grants consist of providing funding that covers living expenses, accommodation and a share of travel costs for short term research visits up to one month or long term research visits for a duration of three months. EPFL is the coordinating and executing agency of the ISBRI which has an advisory board. The main donor is the Swiss State Secretariat for Education and Research (SER).[14]

The Indo-Swiss collaboration in Biotechnology

Launched in 1974 jointly by the Department of Biotechnology of India and the Swiss Agency for Development and Cooperation, the Indo-Swiss collaboration in Biotechnology (ISCB)[15] aims to promote scientific cooperation between India and Switzerland in the field of biotechnology and technology transfer. One of the objectives of the ISCB program is to fight against poverty by "increasing productivity of wheat and pulses."

13 Indo-Swiss Academic Alliance – ISAA EPFL ETHZ Indian Institute of Technology Roorkee Memorandum of Understanding for the Creation of ISAA <http://www.iitr.ac.in/living/mou/epfl.htm>.

14 The Indo Swiss Bilateral Research Initiative (ISBRI) <http://vpri.epfl.ch/page63138.html>.

15 The Indo-Swiss collaboration in Biotechnology <http://iscb.epfl.ch/>.

The ISCB is hosted by the Cooperation unit of the EPFL. Facilitating the exchange of information and promoting a synergy between academia, government and industry are two of the main tasks of the management unit of the program. The ISCB Program Management is involved in various activities, including identifying present and future areas of interest in the field of biotechnology; formulation, implementation, monitoring and evaluation of projects; organizing scientific events (meetings and workshops); promoting technology transfer; awareness raising campaigns on issues related to biodiversity, bio safety and intellectual property rights and financial resource management.

The two main funding agencies are the SDC (CHF 4.5 million) and the DBT (CHF 2.3 million). More than 150 scientists are working on the current ISCB research projects. Two key research areas of ISCB are agriculture and environment that are critical for the development of rural and urban cities in India. The key areas identified for the bilateral scientific program are the following: disease resistance in wheat; pest control in pulses; degradation and monitoring of pesticides; improvement of soil quality and transsectoral topics. (See: good practice n° 3: The Indo-Swiss Collaboration in Biotechnology (ISCB), Annex 1).

The Indo-Swiss Joint Research Program (ISJRP)

The ISJRP[16] is a joint framework to enhance bilateral scientific programs between India and Switzerland. Launched in 2004, it strives to facilitate scientific exchanges between the two countries, especially in information technology and life sciences. The main donors of the ISJRP project are the Department for Science and Technology (DST) and the State Secretariat for Education and Research (SFR), with EPFL representing the leading house and the Swiss National Science Foundation acting as the funding agency.

The ISJRP mandate is the following: funding innovative bilateral research projects; promoting bilateral science exchange and collaboration; enabling a favourable environment for the training of young Swiss and Indian scientists; encouraging sustainable contacts between Indian and Swiss leading research institutes; creating a supportive environment for possible synergies and knowledge management.

Few initiatives are related to North-South research partnerships. These include a CERN research project about detecting particles and involving four national research institutions, both North and South, and coordinated by an Indian scientist specialized in particle physics; an ETHZ project related to health

16 The Indo-Swiss Joint Research Program (ISJRP) <http://indo-swiss.epfl.ch/>.

and ageing; and drinking water and technology on safe drinking with Max Planck Institute.

A respondent explained the reasons for the failure of the R & D project with India:

> […] Ten years ago they brought people from India in an exchange program but from India it has not worked well, the results of investment in R&D back there were not very good. I am disappointed about that. Indian institutions were not very helpful, finances and funds were missing, there was sometimes no follow up.
> (Chemist, male, Indian)

Most of the PhD students argued that they would be interested in carrying out R & D activities oriented to the country of origin. According to a couple of these interviewees, some of their current doctoral and post-doctoral studies could lead to R & D applications and impact scientific, technological and economic development of India.

Box 3. Some examples of PhD student' thesis and possible R & D application

Both in education and practice. It's about theoretical telecommunication. Because in India or third world countries, telecommunication follows Europe and U.S.A. standards. If we have our own standards and people who know, probably we benefit much more economically and socially.
(PhD student, male)

Basically, the research field I am working on is becoming very important. I can help indirectly but making research indirectly. It's about magnetic resonance. We do NMRI.
(PhD student, male)

There is no direct impact. But indirectly, I'm going to India. That means it will have some scientific impact. I learn something from here, which I can implement. What I see I can go to India with. My PhD is about developing new reaction methodology.
(PhD student, male)

3.2.6 Outsourcing and Social Development Related Activities

The support of Indian executives working in international leading corporations has enabled outsourcing and off-shoring opportunities for local Indian institutions, hiring a large pool of low cost engineers and people with doctorates (Pandey et al., 2006).

This qualitative survey shows that initiatives are being carried out by a few Indian managers in the survey to bring business opportunities to their local counterparts, i.e. new markets, outsourcing and promotion of Indian products

and goods on the international markets. Moreover, training activities on business know – how and on the consumer goods business are also undertaken to enhance business capabilities of the Indian local counterparts.

Few social activities were identified. These include children's education (fundraising and donations (awards, furniture, etc.), care and support during natural catastrophes and improving health conditions in rural areas (building a dispensary and donating medicines). Socio-cultural events (spiritual celebration, charity foundations, cooking, festivals, etc.) are also organized in Switzerland to promote Indian culture and solidarity during natural calamities.

Box 4. Social development initiatives

[…] I take care of my older parents. In India, I will earn little for my Post doc. I have got social responsibilities. I belong to a poor village. I have taken social responsibilities. I am building a dispensary in my village…There is no hospital. I can spend the savings to build hospitals. I understand my social responsibilities. My parents are old. That's why I want to return to help them… Social projects like developing small hospitals.
(Post-doctoral fellow, male)

We did some fundraising. Where I did my studies in an engineering institute, we raised money to build something new in the institute. We raised money here with friends and from abroad. Overall, we raised CHF 75 000 joint efforts.
(IT manager, male)

I tried to help my primary school where I studied in India in terms of money. It's a donation from what I earn.
(PhD student, male)

More reactive type of work, where there is a natural calamity or something. Lots of initiative to provide assistance in different fields i.e. helping India where there is a big need.
(Sales manager, male)

In conclusion, as evidenced by Séguin, Singer and Daar (2006), highly skilled migrants have a "…feeling of moral responsibility or need to 'give back'" to the country of origin. This finding concurs with the results of our qualitative survey. There is a burgeoning Indian scientific and technological diaspora in Switzerland that has ambitions to help the development of their homeland. The scientists, engineers, researchers and IT managers interviewed carried out activities in the realm of knowledge transfer, R&D and bilateral research partnerships that could help strengthen scientific and technological capabilities and the social and economic development of the country of origin. The knowledge

transfer activities are related to internet based exchange of information, joint scientific publications, visiting professors, training, research and teaching activities. The knowledge transfer practices carried out by most of the interviewees are often on a one to one basis and through informal channels, rarely through scientific diaspora networks or institutional mechanisms. Very few of the respondents were involved in R&D and bilateral and North-South research programs and projects, and scientific and technological capacity building projects in benefit of the country of origin. A few of the interviewees were interested in outsourcing and in donations and fundraising to former schools, dispensaries and institutes, or support in case of natural catastrophes.

3.3 Highly Skilled Indians' Involvement in Diaspora Networks and scientific and professional associations

This section tries to address the knowledge gaps relating to the contribution of skilled Indians in Switzerland as far as the development of the country of origin is concerned. What stands out is that skilled Indians maintain various links (economic, social, cultural, scientific, etc.) with the country of origin, the host country and at the international level. In the following sections, we will analyse the nature of these scientific and professional contacts and exchanges with the homeland.

Scientific and professional associations

Many respondents indicated that they are members of international scientific and professional associations. These include the Institute of Electrical and Electronical Engineers (IEEE), the Project Management Institute[17]; Forum for Engineers,[18] European Chemical Society[19] and the American Chemical Association. Some of these scientific and professional associations have branches in different parts of the world. For instance, the Project Management Institute has international offices in many countries. The Engineers Forum Link has connections with the Swiss Chamber of Commerce. Its objectives are to seek investment opportunities and provide computer skills and technical know-how to schools.

These scientific and professional associations operate in various areas such as teaching and training on computer science, management and engineering.

17 <http://www.pmi.org/Pages/default.aspx>.
18 <http://www.forumengineers.com>.
19 <http://ecs.chim.ucl.ac.be>.

They are also active in "public policy debate" (debate, conferences) and knowledge diffusion (access to library, information source). Their activities include also "looking for investment opportunities and providing technical assistance to schools in terms of computer skills and technical know-how" (see Table 3).

Table 3. Scientific and professional associations and institutions oriented toward India

Title of the association and contact address	*Objectives*	*Position of the interviewee*
Association of Microbiologists in India (AMI) http://www.ami-india.org/ami.html	Microbiology researchers contributing to the advancement of micro-biology sciences in India	Individual member
Kalinga Institute of Social sciences (KISS) http://www.kissorissa.org	Providing education (teachers, learning) to tribal people by sponsoring 3000 children's education for free. Providing them skills (management, computer science and engineering) in order to help them earn money.	Individual member
Indian Society of Labour Economics http://www.isleijle.org	Promoting scientific studies of labour and related matters	Individual member
Indian International Centre National Association of Delhi http://www.iicdelhi.nic.in/index.asp	Organizing meetings, debates, cultural programs (theatre, festivals, etc.), conferences, and exchange of knowledge for a better understanding of amity between the different communities of the world. Wide range of research project including the Diaspora Project (2000-2001). Networks of professionals and artists.	Individual member
International Committee of Electrical Engineers and Electronics (IEEE) Indian section http://ewh.ieee.org/r10/india_council/index.html	Working toward getting their conferences in India. For the advancement of science internationally. Conferences in science. Medicine, electronics, computing. Many courses	Individual member

Table 4: Cultural and social associations based in Switzerland

Name of the association	*Membership Status*	*Objectives and activities*	*Challenges and constraints*
Indian Association of Lausanne www.geocities.com/ialausanne Contact : Mme Uthira Kalyanasundaram, présidente. Tel. 021 701 38 21	Founding member and president	Promoting networking and socializing. Social and cultural association. Organizing different cultural and social events related to Indian culture. Forum for all Indian nationals and those interested in Indian culture. Get together during religious festivals, etc. picnics. Giving people a feeling of India. Various member (EPFL staff, student, private sector, business world, …)	Low number of participants. Different local languages even if people come from the same country. Personal differences and different views. Political interference. Voluntary organizations. Difficulty capturing the entire Indian community in Switzerland. Not enough membership. Not enough weight for the organization
Indian Association of Geneva http://www.india-geneva.com/newweb/iag-home.html	Individual Member	Arranging celebration for all festivals and cultural programs and food, socializing. Maintaining roots and social ties. Cultural and social activities	Lack of time of members and Indian diasporas due to professional and family responsibilities. Taking the lead due to lack of time to spend leading these organizations
Art of Living Foundation http://www.artofliving.org	Individual member	Spiritual group / organization Sri Ravi Shankar offices in 144 countries. Fund raising for calamities, etc. (school in Bangalore funded by the association; selling during festivals events, food, etc.)	
World Mayalee Council http://www.worldmalayalee.org/[20]	Individual member	Cultural and social activities	Taking the lead due to lack of time to spend leading these organizations
Indian Students Association Zurich (InSAZ) http://www.insaz.ethz.ch/statutes.html	Individual member	Serve as a medium for Indian students and staff at the Swiss Federal Institute of Technology Zurich (ETHZ), the university of Zurich (UNIZH) and other research and academic institutes in Switzerland and individuals interested in India	

20 The World Malyalees Youth Forum Switzerland has gathered 150 youths representing the second generation of Malyalees in Switzerland on the occasion of Youth Festivals, Wintersports

Cultural and social associations

These associations organise different activities: meetings, debates, theatre and festivals, picnics and food, festivals, religious celebrations, other networking and socializing activities. Their objective is to develop solidarity and friendship among Indians living in Switzerland and also to create "a feeling of India" by maintaining links with the country of origin through cultural and social activities. They also serve to connect diasporas members.

These associations were built merely for social and cultural purposes:

> It's just a social association and has no economic role, otherwise it would be counterproductive; it's not a chamber of commerce.
> (Scientist/scientific project manager; male)

They may provide financial support to local communities in India in case of emergencies and natural disasters (fundraising during a big earthquake, tsunami).

Reasons for lack of participation in associations

Lack of time due to family and/or professional responsibilities, lack of interest in the programs and activities of these associations, lack of information about Indian associations are reasons, among others, for the lack of participation in Indian associations in Switzerland.

Box 5. Reasons for not participating in associations

lack of time due to professional and/or family responsibilities:
I hardly found the time to have a life before marrying. And since then, my quality time is limited. I have to take care of my son.
(Spokeswoman, female)

lack of interest in the programs and activities of the associations
Well, I have not been very excited by the kinds of things they are doing. If ever something comes up that interest me, then maybe. I think its mainly cultural activities, song, dance, film programs.
(Professor of psychology, female)

Day and Summersports, etc. This council has international branches in various parts of the world and youth wings in Switzeralnd (Basel, Zurich and Tessin). The objective is to help Malayalee communities better integrate in Switzerland and promote mutual understanding between this community and Swiss people whilst making them well rooted in their Malyalee cultural and social heritage. See Augustine Paranikulangara reports for Kaumudi Europe Email [<augustine_parani@yahoo.co.in>] <http://www.kaumudi.com/LONDON/swismon.stm>.

> *lack of information about Indian association based in Switzerland*
> There is no association which I know. I don't have any contact with them. I don't have time to participate.
> (PhD student/assistant, male)

Most associations function on a non-profit and voluntary basis. Few are granted funds and institutional support. The institutions supporting these associations listed by respondents are the Canton of Vaud, the Indian embassy, the Indian mission, permanent consulate and the EPFL.

Skilled diaspora, brain gain enabling and hindering factors: strategies, difficulties, favourable circumstances and lessons learned

Saxenian's study (1999) underscored the role of international professional networks in facilitating repatriation and brain circulation. The Indian highly skilled abroad (notably in the U.S.A.) attract business opportunities and mentor local counterparts to contribute to the international success of Indian domestic entrepreneurs and companies.

The successful experience of the Indian knowledge diaspora in the U.S.A. was due to a set of favourable elements that cannot be translated to many developing countries. Among these enabling elements are the longstanding tradition of mathematics, science and education in India; the great emphasis on higher education and the large pool of well trained scientific and technological graduates per year; the lasting hands-off policies relating to services (IT, business process outsourcing, knowledge process outsourcing and medical tourism). In addition the following are also favourable: the large scale of highly skilled Indians abroad, scientific, technological and business networks; influential people within the Indian diaspora and the beneficial links between scientists and professionals abroad and their local counterparts, plus the ensuing partnerships in various fields (Pandey et al., 2006: 95).

According to Kapur (2001) quoted in Pandey et al. (2006, p. 64), the Indian diaspora was part of "…the projection of coherent, appealing, and progressive identity […], which signals an image of prosperity and progress to potential investors and consumers."

Several respondents indicated their desire to contribute to the development of India and thought their work experience might be useful. The majority of the Indian highly skilled respondents are interested in carrying out brain gain initiatives. A few mentioned concrete brain gain initiatives. Many PhD students asserted that they are interested in brain gain mechanisms, but they were not in a position to carry them out or they did not have the institutional credibility and support.

To strengthen skilled diaspora initiatives, it is important to explore the reasons of the failure or success of brain gain initiatives. The following section examines the strategies, difficulties, favourable circumstances and main lessons to be learnt with regard to these brain gain mechanisms.

Strategies

We identify the following strategies with regard to brain gain mechanisms: one to one strategy; network strategy and strategies combining the two.

One to one strategies pertain to individual initiatives, whether one lacks institutional support or whether one cannot carry out brain gain initiatives on an official level. Most of the individual initiatives are related to informal exchanges of information (exchange of new ideas with friends, providing information to junior students, contacts with former professors in India through the internet), and training and lectures during private visits in India.

The highly skilled interviewed used various words and expressions regarding social networks: "networking," "face to face contact," "human element," "personal network," "lots of contacts," "friends," "professional associations," "contacts with Indian and international groups."

A couple of respondents stated that they combined both individual and network strategies to initiate some activities such as guest lectures, scientific conferences during private visits, student and visiting researcher programs, fundraising, joint research projects, joint publications with local counterparts. According to one interviewee, strong individual commitment plus "personal enthusiasm, initiatives and interests" and networks can be a relevant strategy to achieve brain gain.

Difficulties

According to a couple of interviewees, many obstacles (slow procedure, lack of financial resources, lack of institutional support, lack of political commitment, and cultural and social obstacles) hinder brain gain initiatives and reduce their developmental potential. The following table identifies some of the difficulties in carrying out brain gain initiatives.

Table 2. Difficulties related to brain gain mechanisms

Project on detecting particles (CERN) Student exchange and researchers visiting programs	– Slow procedures even in CERN, more in India – Lack of funding – Lack of "pragmatism"
Outsourcing with India on software development	Difficulty related to culture and expectations
Prospective knowledge transfer in learning and teaching environment	Lack of resources in India Language barriers Bureaucratic problems Lack of opportunities in R&D and North South research partnership
Joint research projects, student exchange programs, visiting scholar programs. ISCB program	Different work culture Different economic situation Bureaucratic constraints
Giving guest lectures during private visits	Individual basis Lack of job Bureaucratic and political constraints Family responsibilities

Source: Dia, data collected during the 2007 survey

Favourable circumstances

The research shows that personal characteristics (excellence, self-confidence, networking skills, etc.), relevance of one's project or work area, institutional support, professional and scientific contacts, funding and infrastructure are some of the key elements for successful brain gain.

Box 6. Favourable circumstances

I didn't face any difficulties. All the leading institutes and 17 professors are helping me. Maybe they realize I am going to do a good job. I am going to take 3 Nobel prizes. [A Nobel Prize winner] is going to inaugurate my new school. You can find out the web page. I was here in 2001 for six months for the ISCB programme. And then my boss was happy with my job. I published good articles in renowned journals. I got a good offer for post doc. I got lot of confidence because every thing was going in a right direction. And then, I never stop.
(Post-doctoral fellow, male)

I come from the Indian Institute of Technology and work at EPFL; both are top institutions; EPFL is at the fore front in my research field and my own personal interest.
(Chemist/scientific project manager, male)

> I wouldn't think in terms of difficulties. It was a hot topic in that time. There weren't major obstacles. People were receptive and ready to talk. I felt easy to get every body's attention.
> (Officer, female)

Lessons learned

What lessons should we learn by drawing on the highly skilled "brain gain" initiatives identified in this survey? Some of the main findings are the need for organizing scientific diasporas, addressing bureaucratic constraints, networking, working at the grassroots level, and promoting solidarity and respect for diversity.

Many highly skilled respondents interviewed stressed the importance of organizing the skilled diaspora to help brain gain initiatives have a greater impact on scientific and technological research and social and economic development of the country of origin.

Box 7: A critical element: organizing the Diaspora

> I think if many people like me can help, they can offer free education to many poor people. I can't make a difference with myself only. Some united actions will help make a difference.
> (PhD student, male)
>
> If you are part of an association then it helps you. Some people made inroads because they set up a small association. More work could be done, because then you're not an individual that is getting singled out, it's a whole association. Singled out for overstepping the line between personal and professional.
> (Senior specialist, female)

There is a consensus among many respondents as to the importance of the state support. Governments can promote brain gain by addressing bureaucratic constraints. Bureaucratic constraints include slowness, lack of state and institutional support, lack of information about ongoing research in India and lack of identification of skills and resources within the diaspora. The following quotation underlines concern for these bureaucratic impediments:

> Bureaucracy is an impediment; state-state support is something very important; lack of information available on what is going on in Indian research; I have to be patient because in India things go very slow.
> (Chemist / scientific project manager, male)

Moreover, according to an interviewee,

> One should try to be more specific on the key area that would receive support; there is a need to target Indian areas where such things were working.
> (Chemist, male, Indian and Swiss)

The critical use of networks in scientific and professional communities has been assessed by most scholars. According to Bruno Latour, the network is part of the shaping of the scientific community and creates socialization among the scientific sphere and a sense of belonging among scientists and researchers. Drawing on the responses of interviewees, networks enable brain gain initiatives. According to a couple of respondents, collective and unified efforts might bring more credibility and effectiveness than singled out initiatives. They also asserted that personal characteristics (excellence, enthusiasm, altruism, etc.), institutional support, organization and methods and social mobilization are other key elements for successful brain gain mechanisms:

> There is a very important human element involved (face to face contact is important to make things faster).
> (Chemist, male)

A respondent assessed the need to ensure that knowledge transfer and any other external interventions are in compliance with local realities. Working at the grassroots level and gaining a better understanding of the culture, potential and limits of the society can help maximise the initiatives for the country of origin:

> It's a complicated environment [India]. …Complex society. [As part of the Red Cross team during the earthquake in India] I often was the link between the foreigners and the society. Translating, being almost the approach person between host society [India] and white people, which was not my job. They (local population) admire me. They were proud to see that I was in a same length with white people. They were proud that someone from the same country of origin succeeds. The main lesson is to have a leg of the culture and to have experience and knowledge of the culture of the society you want to help. I was unique in having that.
> (Spokeswoman, female)

4. Highly Skilled Indians' Plans and Perceptions in Regard to the Country of Origin and the Country of Destination

4.1 Highly Skilled Indians' Future Plan

A spectrum of possibilities was noted: go and come back for business purposes or after retirement, visiting families in India on a regular basis, bringing children to the country of origin to maintain cultural identity, visiting teacher or researcher, returning to the country of origin, etc.

4.1.1 Scientific and Professional Activity

PhD students' greatest hope was to settle in a good position in India. Managers (aged between 30 and 40) expected high level responsibilities in the upcoming years, but in similar fields. Highly skilled migrants who would be retiring soon planned to go back to India or to settle in Switzerland whilst being involved in go and come back schemes:

> I want to go back to India after finishing my study. I will try to be lecturer or professor in some institutes in India and carry out research.
> (PhD student, male)

The future plan of a senior staff member of an international organization was a desire for professional relocation:

> I would hope I am not in the same job. I would like to have either a more managerial position or go to the field. I can't imagine doing this work in 10 years. I would say there is a lot of potential for me to do things but there is no working environment that makes use of the potential. The working environment doesn't help use my experience.
> (Spokeswoman, female)

With regard to PhD students, scientists and researchers in the sampling, what came across was the desire to focus more on research and teaching, professional stability and attaining a better position. It was also about scientific achievement, international reputation (publications in well-known journals, especially for PhD students, etc.) and being a role model for the country of origin. Drawn from their responses, their future professional plans were (i) to allocate more and more time to teaching and implementing projects; (ii) longer-term visits in India after retirement and regular "going and coming back"; (iii) more involvement in transnational knowledge and skill transfer for the benefit of India; (iv) to be a top scientist in ones area of research, internationally renowned and a success story

in science for third world countries; (v) to be more and more integrated in the Swiss society and research activities in Switzerland. A physicist indicated:

> I see myself as a key person in the operation of these detectors. I'm responsible for non-member states to be engaged in CERN. I'm responsible for safety implementation in experiments…hopefully also as an example of a woman coming from a third world country and making it big in the institute.
> (Physicist, female)

4.1.2 Private and Family Life

A highly skilled female Indian respondent stated that one of her major concerns was to support her children's schooling and personality development:

> Son will be in university soon. I want really to support him in doing what he loves. I want to spend more time catching up with friends and in my house and garden.
> (Physicist, female)

Many PhD students mentioned that their future plan was to establish themselves and settle down socially and professionally. Those respondents, aged between 30 and 40, "hope to have more kids" in 10 years:

> Just want to be with parents, family. Live a very happy life.
> (PhD student, male)

Some were torn between the nostalgia of their home country and the practical nature of settling down in Switzerland due to the presence of family there. A couple of respondents stated that they would stay in Switzerland with their family after retirement, with frequent visits between the country of origin and the country of residence. This brings us to the impact of migration on family and moreover, how migration processes (immigration, circulation, return, etc.) might lead to family reunification or separation (with kids because of schooling, naturalization, etc.).

4.1.3 Country of Origin

A study of Indian IT migrants revealed a widening range of deciding factors for their return to the city of Bangalore. These include: abundant employment opportunities, high quality of life (peace-loving, multilingual and cosmopolitan city), government conducive policies toward Indian skilled diaspora, growing opportunities for self employment, existence of modern infrastructure, better salaries, better health facilities and better education opportunities for children and proximity with the family. Return migrants stated that the skills, resources

and knowledge they gained abroad helped them in their living and working conditions back in the country of origin as it helped them cope with technological and scientific changes, international customs mainly from the U.S.A., U.K. and European countries and deal with the academic sphere. Moreover, they had a feeling of greater recognition of their skills, knowledge and professional experience by their employers and by their colleagues (Khadria, 2004, pp. 13–18).

The majority of the PhD students interviewed said they would return to India after their studies. Many PhD students had a vague plan to return to the country of origin. "Being active in companies" or having "scientific and academic positions" were some of the responses of PhD students interviewed. One respondent who completed postdoctoral studies in microbiology has created an institute of biotechnology back in India:

> I got good exposure in Switzerland. That's why I am going back to India with very good strategies, focused people. I learnt a lot in Switzerland, which is going to help me build a very good institute with international standard. I am going to impact the biotechnology education in my country.
> (Post-doctoral fellow, male)

A sales manager interviewed hoped to set up business on electronics and communication in the next ten years. An IT manager expected to extend his company's outsourcing activities on software development to India. A female scientist intended to develop further bilateral scientific programs between India and Switzerland which enable increased scientific mobility on both sides.

A female respondent expected to make her country of origin benefit from her technical expertise:

> As I mentioned, I would like to support my country of origin…working around awareness raising, disaster situation, child issues, and girls' rights. Possibly being involved in the education issues. Have no concrete plans.
> (Officer, female)

4.1.4 Migration

PhD students who intended to return to India wanted to be part of scientific and visiting researcher programs (short term scientific mobility) that could help them have contact with the international scientific community:

> I will settle in India but it could be nice to find some Swiss collaboration.
> (PhD student, female)

Many respondents wanted to "go and come back" between India and Switzerland. This concerned the group of scientists, researchers and managers holding

Swiss passports and notably, skilled Indians interviewed who were planning to retire shortly. For instance, some respondents gave preference to settling in Switzerland to stay with their family, enjoy the quality of life and visit the country of origin on a regular basis. Another group of respondents wanted to return to India and visit Switzerland more often to see the rest of their families and acquaintances. Some interviewees planned to go and come back for business and professional reasons although the main motivation was the family dimension:

> After retirement, I plan to be half year in India and half year in Switzerland.
> (Chemist, male)

> I might come and look at the children. I don't know. If these people give me a visa… I don't know I might return and go and come back.
> (Economist, male)

The decision to settle in the host country on a permanent basis depended on a range of elements: the quality of life there in comparison with the country of origin, children's schooling, mixed marriage (marriage with a non-Indian national), a desire to live in a multicultural environment, search for greater professional and scientific opportunities, Swiss citizenship, successful integration, etc.

An IT manager interviewed has no doubt about the place to settle in:

> "I don't think there are better opportunities in India. And my family is here [in Switzerland]. They are not Indian nationals. My wife is Romanian. I am not sure my wife and my family will have a multicultural environment like this [Switzerland]. So it will stay as it is.
> (IT manager, male)

A female physicist stated:

> I will definitely stay here in Switzerland. I will work until retirement then we will spend six months in India and six months here.
> (Physicist, female)

The highly skilled interviewed that spent many years outside India faced a dilemma in choosing a place to settle for the next years due to their multiple senses of belonging. They lived in various countries, which shaped an international and multicultural experience and a feeling of a multiple sense of belonging ("being here and there"). This brings up the notion of second generation, transnational identities and the issue of cultural identity.[21]

21 See Peggy, Levitt and Mary, C. Waters (edited by) (2003) *The Changing Face of Home: The Transnational Lives of the Second Generation.* New York: Russell Sage Foundation.

> I am always thinking where I will end up. I wonder whether India will be the place for me to go in 20 years. Even, if I am not an Indian national. I could be if I end up having property in India. It will be double citizenship. It's about finding a place that I could live in. For the time being in Geneva because both my husband and I work here. Probably not going back to India because we don't have the quality of life there. It would depend on many factors. I say not go back to U.K. though I have my family there. Who knows with the global warming? It might be hot enough for me to live in the U.K.
> (Spokeswoman, female)

> For the time being in Switzerland. I may or may not move to Holland. I can't say what will happen in 10 years. Maybe going to India. Maybe moving to Holland. It depends on course of actions. I have no concrete plans.
> (Officer, female)

> I do not have a clear answer. I am toying with the idea of staying on in Switzerland for a few more years. And continue coming and going between country of origin and Switzerland. I have no idea of which third country I might want to settle in. I have property in Ethiopia and I don't know if I want to settle there.
> (Senior specialist, female)

Two respondents, a professor of psychology and a physician asserted that the decision to stay or leave depended on where their husband was posted. This qualitative survey shows that there are female respondents that have stopped or abandoned their personal careers to follow their husbands who relocated to Switzerland. A migration plan, therefore, has gender implications:

> As of now, I see myself here because my husband is here. If he decides to go back, whenever that is, then I am going to follow.
> (Professor of psychology, female)

> We will go back to our country. Because now the situation is changing in India, the environment is more receptive, there are more jobs, more paying. Before people were leaving, now people are returning. Not too sure, depends on my husband's next post and offers he gets and whether families can travel with him.
> (Physician, female)

4.2 Perceptions of the Country of Origin

When asked about their perceptions toward their country of origin, skilled migrants who returned to the city of Bangalore positively reacted to the proximity with family and the motherland country and the "independent environment" (away from cultural alienation, feelings of isolation or even racial diatribes abroad) in the country of origin. Alternatively, they had negative feelings about the slowness of the government in addressing major challenges with regard to Indian society such as the devastating effects the corruption, pollution and scarce infrastructure in Bangalore city. Moreover, they believed their prospective con-

tribution in the development of India could take various forms: sending remittances, improving the health system (donations, medical facilities), strengthening medical organizations in rural areas by improving the capacity of the staff, benefiting the masses in India with the latest medical treatments. Some had negative feelings about the impact of mass Indian highly skilled emigration because of the negative effects of brain drain (Khadria, 2004, pp. 18–25). Our findings are in line with the study of Khadria. As shown in the following sections, there are diverse feelings among the highly skilled Indians living in Switzerland, as though the positive feelings toward the country of origin outweighed the negative feelings.

4.2.1 Social Situation

Poverty and inequalities are some of the fundamental challenges of Indian society. Despite government efforts, there is controversy as to whether poverty declined in the 1990s. Chronic poverty was noted among populations locatedin Uttar Pradesh, Bihar, Madhya Pradesh, Maharashtra, West Bengal, Orissa and Assam. Millions of people chronically living below the poverty line face severe economic and social hardships especially in remote rural areas (South Western Madhya Pradesh, Southern Uttar Pradesh, Southern Orissa, Inland Central Maharashtra, Southern Bihar, Northern Bihar and Central Madhya Pradesh), where hunger is widespread (rural Orissa, West Bengal, Kerala, Assam and Bihar), leading to often appalling suicide due to starvation, as reported by the media. These populations are more exposed to risks such as tuberculosis and HIV/AIDS and infant mortality, which mutually reinforce chronic poverty. Among these populations are historically marginalized groups such as lower castes and tribes, the elderly and the disabled and women. In their attempt to escape bad agro-ecological and socio-economic conditions in rural areas, most people resort to rural to urban migration (Mehta and Shah, 2002).

A respondent insisted that, “The social situation is better than 20 years ago.” It’s a “big country that is going in the right direction maybe slowly,” argued another interviewee. However, “globalisation is not benefiting all equally,” said another respondent.

Indian highly skilled respondents mentioned the huge social and economic divide between the Indian middle class, the rich and the poor that exacerbates living and working conditions of millions of Indian people. They pointed out the following paradox. Despite great potential in culture, arts, science and technology, India faces a serious human resource problem due to widespread poverty, social inequalities and discrimination:

> It continues to have a huge social and economic divide. My fellow nationals have entrepreneurial skills. I think India has great potential in the world, culturally and artistically. I think the divide will be bigger because the Indian middle class and the rich are growing but it doesn't feel the poor are coming out.
> (Spokeswoman, female)

Many interviewees stated that despite unprecedented economic growth, India has the profile of a third world country, as the majority of people, especially in rural zones, face poverty and have no access to facilities and social welfare. One respondent indicated:

> I must say the property is not well distributed. There are rich people and a majority of poor people. The facilities are not available to the majority of the people. I must say the situation is changing. More widespread education, good education for all in terms of general school and higher education is not accessible to all.
> (PhD student, female)

According to respondents, there is a need to increase awareness on castes and religious issues in order to combat discrimination, child sexual abuses and gender inequalities. There are still discriminatory and religious barriers that impede women's rights, child rights, social justice and equality:

> More awareness on castes, religious issues, discrimination. People can be very traditional and structured in their practices. The government has policies and plans. It's about educating people about castes and discrimination. Fighting against child sexual abuses, discriminatory and religious barriers, women's rights. Things have been done. There is still long way to go.
> (Officer, female)

4.2.2 Economic Situation

Several respondents pointed out the rapidly growing economy of India. They argued that the country is big and has great economic potential and is "on the move." They also highlighted the fundamental role of Indian skilled manpower as economic globalisation takes hold and commented on other positive features such as an increase in investment in development and controlled inflation in a context of fast economic growth.

A World Bank report echoed the same optimism vis-à-vis impressive Indian economic growth, highlighting some of the comparative advantages of the Indian economy. These key elements are, among others, its macroeconomic stability, a large scale of highly skilled and qualified English-speaking workers and a prominent scientific and technological diaspora, a dynamic private sector, progress in expanding and diversifying science and technology infrastruc-

ture, the considerable expansion of the ICT sector and a dynamic financial sector (Dahlman and Utz, 2005).

A respondent stated:

> It's a very rapidly growing economy. Everyday in the newspaper there's something new about India. How the Indian community is growing population is growing. We have a huge number 1.25 billion inhabitants. It's moving, it's a big country and it's on the move.
> (Professor of psychology, female)

Compared to other developing regions, the Indian economy has progressed a lot and is competing with other giants such as China. However, the poverty gap is still persisting, "with a large percentage of people facing poverty":

> Growing a lot economically, but unfortunately the poverty gaps have not reduced. When I compare the mobility of people in terms of progress in the past years, there is more progress in India than in Africa, where some areas have even gone backwards. Yet, large percentage of people in poverty.
> (Senior specialist, female)

The huge number of people in software creates a "channelization" and a skill gaps in other fields:

> The problem is, unlike a developed world, India is growing too fast that the infrastructure is lagging behind. So as matter of fact, people have lot of money but nothing creative is done. It creates lot of channelization. Every one is in software. There is a lack of skills in all other fields.
> (PhD student, male)

A couple of respondents agonized over persisting poverty, social inequalities, corruption and bad governance that impede sustainable economic development. They raised concerns about gaps between poor and rich people and urban and rural cities. The economic boom is mainly concentrated in major cities at the expense of Indian farmers and rural areas. The main focus is the rich and middle class. Paradoxically, while India is mostly rural, people from this primary sector seem to be benefiting less from the economic growth.

4.2.3 Political Situation

Several respondents mentioned that India is a stable democracy with independent press, a powerful judiciary and well functioning democratic institutions. The fact that India is a secular country may attenuate the possible negative interference of castes and religious ideas in the functioning of the State. The current democratic system presents promising features with highly qualified and intelligent people in the ruling class coming from minority groups, a moderate government with secular ideas and a broad political vision:

> India doesn't have a fundamentalist government. India is a very secular country. Before that, we had a very pro- Hindu government. We should be ok if we continue to go with moderate government who has secular ideas, broader visions rather than castes or religious ideas. It's good that the government is now ruled by a highly qualified and bright Indian rather than an illiterate as in the past. We have highly qualified and intelligent and educated people to rule the country. The president and the prime minister come from minority groups, something, which is important.
> (Technical Officer, female)

According to most of the respondents, Indian democracy faces similar problems as those hindering other democratic countries. There is a need to enhance secular ideas on Indian politics for a stable future. The political situation of India needs improvement, although there is freedom of speech, independent press and stable democratic institutions. The democratic system is being underpinned by persisting poverty, unequal distribution of wealth and corruption and bureaucracy:

> The political situation is the main problem. The democracy in India is not really efficient. Lot of money is wasted.
> (IT manager, male)

> The political situation is very bad. Corruption and bureaucracy are a big problem. I have the idea that the Indian economy grows when president sleeps. Politicians are no good to the country.
> (Physician, female)

Indeed, there are numerous impediments to the rule of law which underpins governance and the deepening of democracy in Indian society. In accenting awareness raising and judicial interventions on issues such as child labour, bonded labour, women's rights, etc. The Indian judiciary has made efforts toward ensuring democracy and the rule of law. However, there are major issues that fundamentally undermine democracy and rule of law:

> But to exaggerate these achievements in the Indian context, given the scale of inequalities and injustices, would be completely missing the point. The Indian legal system is faced with numerous crises starting with the fundamental challenge of enforcing the rule of law. While the system of governance in India is based on law, this does not necessarily translate into the behaviour of those who govern and the governed to have respect for the law. This lack of respect translates into serious threats to democracy as the legal system may not be able to respond to the growing sense of lack of trust and faith in the institutions. […]There needs to be a fundamental re-examination of the approaches that we have adopted to enforce the rule of law. There is a need to critically examine the effectiveness of Indian democracy, given the fact that corruption is institutionalised in all spheres of governance. (Kumar, 2005)

The Indian democracy is confronted with enduring problems such as rights, governance and the impact of globalisation. The living conditions of the people of India are badly affected by inefficient policies, bad governance, lack of accountability in government, resulting in severe poverty and inequalities of which millions of Indians cannot escape. According to Kishwar, the economic reforms should be more at the grassroots level, addressing the socio-economic needs of poor people. The farm sector and industries could benefit substantially if India conducted effective negotiations with the World Trade Organization (WTO) (Kishwar, 2005).

4.2.4 Scientific and Technological Research and Policy

With 33 universities, 14 national laboratories, 88 research institutes and research centres and 54 associations related to scientific and technological research, India has a growing pool of scientific and technological facilities. While the first five year plan focused on uplifting scientific and technological infrastructure (construction of national laboratories and other research institutions), the second plan related to expanding these facilities and matching the work of scientists, researchers and university professors to various national development objectives. Accordingly, a panel of scientists has been formed to advise the Planning Commission in addressing the number of development related issues in need of scientific and policy oriented studies and investigations. The Council of Scientific and Industrial Research is responsible for the overall management of scientific and technological research including promotion, guidance, coordination and the financing of scientific research projects. The government plans to support universities and scientific and technological research organizations in terms of research facilities and higher technological education by allocating more funds. The Ministry of Education and the University Grants Commission provide financial support to science departments in universities. Indian scientific and technological research associations contribute to the dissemination of scientific and technological results and facilitate networking and exchange of information between scientists, researchers and any other related players. Funds have been allocated for the various development programs of the Council of Scientific and Industrial Research under the second five year plan. The Council of Scientific and Industrial Research is also supporting a few specialized research institutes collaborating with industries. Following the recommendation of the Scientific Manpower Committee, a large number of research fellowships and scholarships were granted to universities and research institutes. Rural scientific centres *(vigyan mandins)* have been established to support villagers' well-being and critical programs on agriculture, health and sanitation have been established by disseminating scientific information rel-

evant to the rural population. The government intends to expand such *vigyan mandins* experience in other rural areas in India by setting up 90 to 100 such centres (Government of India, 2002–2007).

India has more than 50 international scientific and technological cooperation programs and is also active in many regional and international scientific and technological initiatives such as the South Asian Association for Regional Cooperation (SAARC), the Association of South East Asian Nations (ASEAN). India is also involved in various international research projects such as CERN's Spring-8, Electra. In the realm of science and technology capacity building, emphasis is on developing educational infrastructure and promoting scientific exchange which enables highly skilled mobility across nations. For instance, India's participation in CERN's scientific activities has been a long process facilitated by individual Indian scientists' involvement. India, who is admitted as an observer, participates in various CERN programs (Photon Multiplicity Detector-concept; LHC machine-ALICE; CMS). Tata Institute of Fundamental Research (Mumbai), Bhabha Atomic Research Centre (Kolkata), Saha Institute of Nuclear Physics (Kolkata) and Delhi University are some of the Indian participating institutions to these programs (Ramamurthy, 2003).

Most of the respondents were fascinated by the excellent results of Indian scientific and technological research in various domains. A respondent was pleased to note that in space technology, satellite communication and computer science, India has highly skilled and qualified people. An interviewee welcomed the prominence of human capital in scientific and IT fields, making India possibly one of the biggest pools of human resources worldwide and an "Asian tiger." Another interviewee noted the benefits induced by outsourcing, foreign direct investment and delocalising R&D on the Indian economy. The economic growth has a positive impact on scientific and technological research. Leading companies are opening offices there. Indian drug companies are exporting all over the world (low price drugs). The following statement of an interviewee stresses the prominence of Indian scientific and technological research, especially in the IT sector:

> India is coming up with strong ICT. India is the best in computer science. Government is increasing salaries 3 or 4 times to bring good people in research.
> (PhD student, male)

Although there is progress in various scientific and technological areas, India is still a developing country:

> I think the people are just as capable as any development staff. And that is probably reflected in the space technology, satellite telecommunication. But when it comes to common men, India is a real third world country.
> (PhD student, male)

There is a need to identify Indian scientific and technological expertise and make it visible:

> India could do with more visibility on what their scientific and technological expertise is. India is achieving a lot, but we do not hear about all of it. Lots of interesting work going on. Medicines and plants are emerging from India. Contributions of Indian scientists. So good work on this area.
> (Senior specialist, female)

Many constraints should be addressed. These include lack of support for research and development; imbalances between IT and other scientific areas (for example social sciences are neglected) and technological fields:

> Not going very well. The best and brightest go to the IT sector because it is the best paid; other research fields get neglected; there is a lack of encouragement for all sciences; for instance to social sciences which are very important for the history and culture of India.
> (Chemist/scientific project manager, male)

Respondents' views of scientific policy are positive. A respondent reported government's efforts to develop science by increasing funding to higher education and research institutes and augmenting the presence of mass qualified manpower. The government's policy promotes scientific and technological research. To testify to the government's progress in promoting scientific and technological research, interviewees mentioned scientific bilateral cooperation programs signed by India and other countries such as the U.S.A. on civil nuclear energy.

One respondent stated:

> Scientific policy is not bad but there is an overemphasis on IT sector, which is more a social than a political problem.
> (Chemist/scientific project manager, male)

The focus on the IT sector and the neglect of social sciences and humanities is considered by a few interviewees as one of the weaknesses of scientific policy in India.

Besides, one skilled Indian noted:

> It's very myopic. We don't have good people in the administration of scientific and technological research.
> (PhD student, male)

This raises the issue of ensuring that appropriate scientific policies are implemented, encompassing all sectors including social sciences and humanities, which are neglected by Indian policymakers. Another interviewee suggested that more money should be spent on research and that liberalization should be balanced with national interests.

4.2.5 Migration Policy

Migration is one of the hottest issues raising ideological controversies and smacks of emotions, fear and xenophobia. The way migration is managed may depend heavily on public perceptions of migration. There are negative public perceptions often underlying a discourse based on fear and risks associated with migration, whereas positive public perceptions highlight the benefits migration may produce to the country of origin, the host country and to migrants themselves. A better management of migration, underscoring its positive aspects and addressing ensuing risks, can contribute to reversing the negative perceptions vis-à-vis migration (Canoy et al., 2006).

Some respondents were pessimistic about the increasing outflow of skilled Indians which could lead to massive brain drain, whereas other interviewees were optimistic about the positive effects derived from emigration from India. The highly skilled Indians interviewed also stated that a booming economic environment was a pull factor for the return of Indian skilled nationals abroad to the homeland. Some stated that emigrating, gaining scientific knowledge, human and financial capital and returning back helped to create assets for the country of origin:

> People are moving back and bringing wealth, expertise, professionalism and their experiences.
> (Physicist, female)

Others were pessimistic about the effects of mass Indian highly skilled emigration because of the brain drain or loss of human capital. One of the main concerns of the respondents was that India does not allow widespread dual citizenship for Indians abroad:

> That's a problem. They don't allow a second passport. It's a pity. They're issuing permanent visa. I can't call myself Indian. It's funny I have the permanent visa of India. But I am a foreigner now in my country of origin!
> (IT manager, male)

Furthermore, there was a feeling that not all Indians abroad were being given due consideration. The government policies tend to focus more on business and the highly skilled at the expense of other groups of Indians abroad (less skilled, unskilled people) despite the potential they might have for the development of the country of origin:

> They will welcome Indian business to settle deals but common people like me, they don't care.
> (Finance assistant, male)

4.3 Perception of Switzerland: Scientific Policy, Development Cooperation and Immigration Policies

4.3.1 Scientific Policy

Notwithstanding the excellence of Swiss scientific and technological research system, which is among the best in the world, there has been a slowdown in the growth of GDP and productivity. One of the main recommendations of an OECD report of 2006 is to grade Swiss innovative systems to improve the international competitiveness of its economy. In this regard, efforts should be oriented towards enhancing better organization, coordination and quality of Swiss educational research and development (R&D) by addressing problems of accountability and transparency[22]. While most researchers benefit from an excellent professional situation, enabling easier access to funding, new researchers tend to have limited opportunities which may hinder innovative research. The report suggests maximizing the performance of existing Swiss research and development institutions by harmonizing indicators and datasets, improving funding mechanisms, quantitative empirical studies and collaboration with international specialists. There are existing promising initiatives to enhance the quality of Swiss research and development institutions and create a synergy between research and policymaking, notably the establishment of the Swiss Council for Educational Research (CORECHED) and the Leading Houses through the Federal Office of Technology.

A couple of respondents viewed Swiss scientific policy as successful. From the standpoint of interviewees, the key elements of its success was the excellent reputation of Swiss scientific and technological institutes, good funding policy for research, meritocracy, creativity and innovation of the local industries, value given to sciences and R&D and the interesting exchanges developed with countries and people. However, the rigidity and strictness of the Swiss system, especially towards student migration, and the lack of innovative options in comparison with other developed countries were considered by some highly skilled Indians as impediments to Swiss scientific research:

> They are doing good job. I think so. Nothing to complain except they are strict and rigid in screening students. They got very good institutes of technology and medicine, things like that.
> (Economist / Head Education Programme, male)

22 <http://www.oecd.org/document/55/0,3343,en_2649_34269_38014135_1_1_1_1,00.html>.

4.3.2 Development Cooperation Policies

Switzerland, which is one of the most important donor countries, defines its overall development cooperation as small but excellent. The fact that Swiss aid is oriented to low income countries and rural development, poverty reduction and food security are proof that "the bulk of assistance is decidedly oriented toward development":

> Relative to its affluence and capacity, the development policy of Switzerland is actually too small and certainly not excellent in general. Much remains to be desired relevant to trade policy, since Switzerland is even more protectionist in the agricultural sector than the EU states. And the Swiss financial world, despite all its lip service in the wake of the Marcos accounts affair, does not give any indication that flight capital is returned to where it is so urgently needed (Hoffmann, 1994, pp. 24–26).

Many respondents viewed Swiss development programs toward India as supportive. Business and scientific cooperation are being promoted on both sides:

> There is a "Swiss-India presence – an initiative whereby Swiss companies are targeting companies in India, every year there is a fair where Switzerland showcases work and try to attract Indian companies and vive versa".
> (Physicist, female)

However, one respondent voiced constraints faced by Indian companies in gaining access to Swiss market and bureaucratic constraints from the Indian side. Another respondent mentioned the cultural exchanges between India and Switzerland but highlighted the need to question development cooperation policies:

> I have a problem with all development cooperation policies. I feel that they are narrowly perceived and narrowly designed and their ultimate objective is not the countries of origin, their objectives are geared to their own priority areas and agendas. There are lots of linkages between India and Switzerland in terms of cultural exchanges (tourism and film) but benefits are limited "in terms of development".
> (Senior specialist, female)

4.3.3 Swiss Immigration Policy

Swiss immigration legislation and policies strive to create a better balance between the size of the local population and the proportion of foreigners in the Swiss territory, seeking a better balance between the demand and supply on the labour market. Swiss authorities are torn between the admission of the foreign labour force in response to economic needs and the fear of xenophobia. Furthermore, Swiss immigration policies reflect economic and political changes on local and international levels (Piguet E., 2006, p. 67).

One the one hand, there is a feeling that "only white Europeans or millionaires" are given consideration and respect and "they [Swiss] don't allow people [from developing countries] to settle here" (spokeswoman, female). Swiss migration policy is considered by many interviewees as restrictive due to difficulties obtaining citizenship when coming from developing countries and difficulties getting work and residence permits. Recent developments in Swiss immigration procedures and regulations have tightened the entry of citizens from developing countries, making it "harder and strict" for students, refugees and political asylums seekers and leading to increasing stigma, racism, discrimination and abuse against migrants.

One the other, the perception is that Swiss migration policy is screening students from developing countries selectively. A few persons agreed that Swiss migration policy should be more focused on highly qualified people. One respondent argued that selective migration policy is "something normal" as more openness would lead to massive outflows of migrants coming from different parts of the world to a small country such as Switzerland. Another respondent mentioned the inclusiveness (through the naturalization process) of Swiss migration policy, its focus on highly skilled people and its management as positive elements.

5. Conclusion and Policy Recommendations

This research provides an understanding of the causes of international migration from India to Switzerland, Indian respondents' life in Switzerland, the interrelations between skilled migrants, the country of origin and the country of destination, the brain gain mechanisms and initiatives and the ways to maximise the diaspora's contribution to the homeland.

Skilled Indians living in Switzerland present great potential to become assets for development of their country of origin. The brain gain mechanisms identified in this survey (knowledge transfer and scientific diaspora networks, research and experimental development, North – South research partnerships) do not have the same level of importance although they could all be helpful to India. Skilled diaspora networks can play a fundamental role in bringing brain gain activities to India, thus reducing or reversing brain drain. Therefore, competence and resources within the skilled diaspora and ways to connect with Indian local counterparts should be identified.

The highly skilled diaspora in Switzerland could be of great use in the development of one's country of origin by moving from "[…] very mundane,

ship shop cultural events" to "[…] serious talks about diaspora contribution." (Professor of psychology, female)

The role of scientific diasporas in strengthening Indian scientific and technological research could be enhanced by paying more attention to scientific diasporas networks, by involving skilled Indians abroad in local projects and programs and by increasing investment in education, science, technology and R&D.

The first step could be helping the Indian diaspora in Switzerland to organize itself (identifying the needs and developing ideas and initiatives) through a supportive network with various institutions such as embassies. A second step would be to provide funds and resources to further brain gain initiatives for the country of origin. A third step would be a clear identification of diaspora members (skills, qualification, etc.) and key areas where their contributions could benefit India. A fourth step would be establishing ways to bring together scientists, highly skilled professionals and policymakers to identify diasporas skills and qualifications, opportunities and key areas for their practical interventions in the development of the country of origin, especially on scientific and technological research. In this regard, there is a need to develop appropriate migration policy that permits people to move and, equally, allow them favourable conditions for return to the country of origin. Retaining and attracting skills should be one of the policy targets in order to ensure economic growth and competitiveness at the international level.

Policymakers should address the negative effects of brain drain and maximise the positive role of the highly skilled abroad in national development in close collaboration with the migrants themselves and concerned players (country of destination, bilateral and multilateral agencies, civil society, private sector, etc.). Universities, research centres and graduate institutes in the country of origin and the country of destination should also be included in policies aimed at mobilizing the highly skilled diaspora.

Government measures such as providing dual citizenship, mobilizing all persons of Indian origin (PIOs) under a special ministry for migration; short term visiting professor schemes; researcher or scholar programs and diaspora forums are some of the incentives to mobilise highly skilled migrants for development goals and objectives. However, in order for scientific diasporas networks to be catalysts for the development of their country of origin, the Indian diaspora should be included in development policies and in the fight for fundamental challenges that affect India's societies today, such as mass poverty, heath risks, illiteracy, natural calamities, imbalance between economic growth and demographic growth. Accordingly, diasporas associations and other concerned players should be granted sustainable support from the country of origin and the country of destination, for instance, through bilateral and multilateral co-

operation (administrative recognition, financial and institutional support, more involvement in scientific bilateral cooperation).

Furthermore, Indian presence in Switzerland at the scientific, technological and business levels should be sustained. Existing institutional frameworks such as Swiss India Business Forum can play an important role in enhancing bilateral cooperation with India and Switzerland. EPFL as the Leading House for bilateral scientific cooperation with India can serve as a catalyst for the Indian diaspora's greater involvement in scientific and technological research in the country of origin, by providing support to Swiss-based Indian scientific networks increasing their visibility and their synergy with Swiss partners and local counterparts. Existing scientific joint research and student exchange programs are windows of opportunities for sustainable scientific and technological cooperation between India and Switzerland and, therefore, should be strengthened.

Recommendations

Switzerland can play a fundamental role in helping Indian scientific diasporas to create a sustainable network linked to the country of origin through the following measures:

(i) Mainstreaming Scientific Diaspora into development policies through the Leading House and other existing agencies and institutions

Scientific diasporas should be mainstreamed into development policies (agricultural sector, rural cities, and health sector, etc.). In order for India to best make use of its diaspora, benefits resulting in skilled emigration such as remittances and knowledge and technology transfer should be directed to the fight against poor education and health systems which are considered major causes of India's low productivity in labour in the world (Khadria, 2006).

Quoting Khadria (2006, p. 182) in his study about migration of Indians in the U.K., there should be "joint appointments in India and abroad for teaching and research faculty of the best Indian universities" for the Indian highly skilled based in Switzerland. The Indian government should provide some "guarantees of return" whereas research institutions, colleges and universities should be "more accommodating to foreign assignments, so that people are not forced to resign and go."

EPFL as the Leading House for Swiss bilateral cooperation offers possibilities in terms of organizational and funding support with regard to bilateral scientific, technological and business programs. This leading house can also serve as a database of Indian scientific diaspora associations and Indian highly

qualified and skilled people interested in work in the country of origin on a short term basis, as in the case of TOKTEN Programme. Existing institutions and mechanisms such as the SDC,[23] Indian embassy and mission, multilateral agencies, NGOs and academic institutes along with the EPFL could serve as focal points to promote Indian scientific diaspora associations' participation in development projects and programs in benefit of the country of origin. Subsequently, highly skilled and qualified workers should be granted funding and facilities to enable knowledge, technology and skills transfer and the formation of scientific diaspora networks. The Leading House has an important role in strengthening scientific and professional exchange programs and connecting Indian researchers, students, scientists and businesses based in Switzerland with their local counterparts and policymakers. There should be forums or workshops to identify ways to ensure sustainable bilateral cooperation including on science, technology, development and migration. Migrants and scientific diaspora associations should be part of the bilateral partnership program agendas.

(ii) Helping highly skilled abroad organized into associations and organizations

This qualitative research shows that a couple of respondents wanted to be part of scientific associations but were not aware of existing associations and organizations or were not interested in their current programs and activities. Leaders of the Indian diaspora in Switzerland should therefore develop initiatives in order to bring together Indian highly skilled migrants in Switzerland into Indian scientific diasporas associations and organizations by developing attractive activities and programs. Obviously, the above mentioned scientific network or institutional support with the support of Switzerland can help migrants and diasporas associations increase visibility, thus attracting new members.

(iii) Implications for research

The debate on whether international migration is profitable to the country of origin is not over, although there is increasing awareness of the impact of migration on development. Assessing its developmental impact merely on the basis of migrants and diasporas' perceptions and discourses cannot satisfactory explain the complex interlinkages between international migration and development. Therefore, a "country of origin" perspective would be important as it would lead to a better understanding of local communities' expectations, needs and aspirations as well as migrants and diasporas' initiatives' strengths and

23 SDC has a special unit on Migration and Development <http://www.sdc.admin.ch/en/Home/Themes/Migration>.

limits in relation to their homeland. Such research would scrutinize the extent and impact of brain gain mechanisms; the social origin of highly skilled migrants and scientific diasporas; the types of linkages with the country of origin; the demographic, social and economic characteristics of the recipients of the brain gain mechanisms; the country of origin's perceptions about the role of highly skilled migrants and scientific diasporas in strengthening scientific and technological capabilities and social and economic development and policies and measures to maximize their development potential.

Most respondents stated that they wanted to go and come back (between India and Switzerland). An instance of this "go and come back" scheme is research being undertaken to analyse how mobility (immigration, circulation, transit, return, etc.) and professional situation (relocation, retirement, unemployment, visiting program, short term or permanent contract, etc.) could impact the family structure (family reunification, separation, etc.) and the settlement process. The fact that highly skilled women respondents in the sampling correlate their migration plan to their spouse's career suggests that gender relations within the migration process is in need of a better understanding. Research should be undertaken to analyse how the migration process impacts gender roles.

According to the Reserve Bank of India, remittance transfer of Non Resident Indians (NRIs) has increased over the years, especially from U.S.A., which accounted for 44 percent of the total remittance and from the Gulf States. India continues to rank as the leading country in terms of remittance in the world (World Bank). Seemingly, remittances transfer is not a widespread practice among the skilled Indians interviewed. A couple of respondents stated that remittances were not needed or requested by families. The extent of remittance practices among the Indian diaspora in Switzerland needs quantitative research. Further cross-country studies should be undertaken to assess the evidence and magnitude of remittance transfer practices among the Indian highly skilled diaspora in the U.S.A., Europe, etc. and to look at links with the country of origin and the different migration policies in destination countries that might impact remittances transfer.

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Annex 1: Good Practices

Good Practice no. 1: Scientists and Technologists of Indian Origin based abroad (STIOs)

Title of the initiative	*Scientists & Technologists of Indian Origin based abroad (STIOs)*
Type of initiative according to level of involvement	Institutional level
Type of initiative according to kind of brain gain mechanism	Scientific diaspora network
Aims and objectives	The objective is to create a synergy between local Indian counterparts and STIOs. The website is guided by "the Government of India to strengthen this net-working for enhancing India's excellence and global competitiveness".
Authors and actors	This project was initiated by the Indian Ministry of Science and Technology. The Department of Science and Technology (DST) is the responsible of the website (S&T Professionals of Indian Diaspora Website) as part of the overall initiative of Government of India on Diaspora (Ministry of External Affairs).
Geographical scope	Scientists and technologists of Indian origin worldwide
Brief description of the initiative	The STIOs is a network aimed at mobilizing overseas scientists and technologists of Indian origin. It includes a wide range of skilled and qualified personals in industries, research laboratories, universities and scientific departments in destinations countries as well as scientists and technologists of Indian Origin involved in transnational business activities (technology intensive business and venture capitalist).
Main enabling factors	Indians skilled abroad have an array of competences and skills, some being success stories in scientific, technological and business fields. Policy makers in India have increasing awareness of the potential of diasporas. The website includes opportunities to mobilize and make use of the skills and resources of the Indian diaspora.
Contact details; links to further information	http://stio.nic.in/

Good Practice no. 2: The School of Biotechnology at the KIIT University in Orissa

Title of the initiativ	*KIIT School of Biotechnology at the KIIT University in Orissa*
Type of initiative according to level of involvement	Individual practice
Type of initiative according to kind of brain gain mechanism	Knowledge transfer
Aims and objectives	The objective of the KIIT School of Biotechnology is to provide knowledge and skills in biotechnology to master students in accordance with international standards.
Authors and actors	The project was initiated by a former Indian post doctoral student at the Swiss Federal Institute of Technology in Zurich (ETHZ) with support from Swiss agencies and Nobel Prize winners
Geographical scope	State of Orissa
Brief description of the initiative	This institute strives to extend knowledge and skills in the field of biotechnology in India mainly in Orissa which is one of the poorest states in this country. The staff includes Indian local scientists and researchers as well as scientists and researchers abroad of Indian origin (Switzerland, Germany, etc.) including Nobel prizes winners and distinguished professors as a visiting professor and scholar and members of the scientific advisory board. The disciplines are structural biology, environment, and human nutrition, infectious biology. According to the founder of the institute, the main priority is "looking for funds" "because biotechnology is an expansive area". His desire is to contribute to extend biotechnology education, one of the "most neglected areas", in India, his country of origin.
Main enabling factors	Motivation and affective capital: Enthusiasm. Willingness and commitment vis-à-vis enhancing scientific and technological institutes in India in the field of microbiology. Commitment to return to the country of origin in order to use skills, social capital and networks acquired in Switzerland for the benefit of India. Ability to network: Scientific and social networks both on the local and international level. Meeting with lots of Indian highly skilled and academics in the field of biotechnology and related sciences to convince them to teach or support him in his project to create the institute of biotechnology. Hiring Indian talented abroad and local. Support from Nobel Prize awards. Enabling environment and policies: Receptiveness of the fundamental role of scientists and researchers abroad in development, science and technology among policymakers in India. Existence of bilateral scientific programme between Switzerland and India in the field of biotechnology (the ISCB project). Supportive environment thanks to social and scientific networks gained by the director in India, Switzerland, Europe, USA, etc.
Contact details; links to further information	Dr Mrutyunjay Suar, Director, msuar@kiitbiotech.ac.in http://www.kiitbiotech.ac.in/

Good Practice no. 3: The Indo-Swiss Collaboration in Biotechnology (ISCB)

Title of the initiative	*The Indo-Swiss Collaboration in Biotechnology (ISCB)*
Type of initiative according to level of involvement	Institutional level
Type of initiative according to type of brain gain mechanism	North-South Research Partnership and R&D
Aims and objectives	Establishing equitable research partnerships between Indian institutes and their respective counterparts in Switzerland. Mandate is: 1) developing products and biotechnological processes which have an impact on poverty reduction and the sustainable management of natural resources in India; 2) focusing on innovative technologies in agriculture and environmental research; and 3) building capacities and R&D partnerships between Swiss and Indian Institutions and private companies with strong economic, social and ecological relevance.
Authors and actors	Program jointly funded by the Swiss Agency for Development and Cooperation (SDC) and the Department of Biotechnology (DBT) of the Government of India. Overall coordination and implementation of the programme being assigned to a Programme Management Unit located at EPFL, Lausanne. The project implementers are Indian and Swiss research institutions
Geographical scope	Currently the programme involves 23 research groups in India (all over the country) and 13 in Switzerland (all over the country).
Brief description of the initiative	The ISCB program supports joint projects with at least one Swiss and one Indian partner to create synergies across institutes and national borders. In order to enhance the quality of the collaborative projects and to ensure that the research activities lead to product development and diffusion, the ISCB has adopted the concept of the 'integrated value chain', which is widely used in the biotechnology industry, but it is also applied as a planning and management instrument to move research activities to product development and diffusion. The concept is best understood as a chain of events that starts with the definition of a problem and ends with sustained market penetration of a new product, process, or service.
Main enabling factors	Real willingness to enhance scientific bilateral cooperation. Strong support of responsible agency. Good geographical coverage as an illustration of the commitment both from Indian and Swiss side. The ability to mobilise underlines the principle of partnership. By selecting scientists with outstanding experience and background on the basis of scientific competence, this project aims at making more visible Indian researchers and enables them bilateral collaborative research programs with Swiss counterparts.
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