

The Brain Drain in Selected African Countries: Determinants, Evidence and Impacts

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The term 'brain drain' first appeared in 1957 in a novel by Ayn Rand called *Atlas Shrugged* to refer to the loss of researchers and talented men for political, economic and social reasons. A Royal Society report also adopted the term to describe the flight of British medical doctors and biologists to the USA, and it is now often used as a dramatized synonym for loss (Galliard and Galliard 1998: 30).

Popularized in the 1960s with the loss of skilled labour-power from a number of poor countries, most notably India, the term brain drain expresses a depletion of human capital affecting developing countries that have invested heavily in training scarce, skilled and qualified workers. As Nadeem and Jahangir (1998: 21) explain:

Brain drain may be defined as the international transfer of resources in the form of human capital. ... The concept of brain drain relates to the loss of skills or human capital to society or to the country from which migration takes place. It is meaningful only in an environment of scarce skills and relates only to those professional skills that require considerable investment and are therefore not easy to replace. Typically, the term is used to describe the loss of professional and technical skills such as scientists, academics, doctors and engineers and others with university training.

The United Nations definition highlights the asymmetric exchanges that a brain drain involves, thus benefiting mainly the developed countries. However, 'a brain drain does not just refer to a loss of skills from developing countries to developed countries, but can also refer to a loss of skills between developing countries. What makes this such a contentious issue is that in today's knowledge-based economy skills are a valuable commodity; therefore any loss of skills can seem quite threatening' (Kaplan: 1998). The OECD classification defines brain exchange (brain drain and brain gain) and brain waste as components of the migration of highly skilled people (Salt 1997: 5).

I see the brain drain, the international migration of highly skilled and

qualified people, as a holistic phenomenon affecting developed and developing countries alike. However, in the context of economic globalization and of the internationalization of education and knowledge, it is essentially a one-way phenomenon. It is linked to issues such as human resource development (education, training and employment), and to economic growth and social development (social welfare and poverty alleviation).¹

The need to cross-fertilize scientific and technological innovations is a critical issue in Africa's insertion into the global market. As Kofi Annan, the UN secretary general, pointed out during a UNESCO international conference on science and technology, the flight of African engineers, professors and medical doctors affects human resource development (IOM-UNECA-IRD 2000: 3). Africa, which suffers from a serious lack of manpower, has been worst hit. The continent is said to have lost many of its best scholars, researchers and professionals. Between 1960 and 1990, it is estimated that Africa lost almost 127,000 highly skilled workers to advanced industrial countries, including medical doctors, university lecturers, engineers and surveyors. The brain drain is considered to be a loss for African countries. The 'virtual migration' of African researchers or scientists, namely those who remain in their home countries while working for industrialized countries' research institutions in fields of endeavour set out by those institutions, is yet another example of the African brain drain. The IOM and UNECA regional conference on the brain drain and capacity building in Addis Ababa (22-24 February 2000) stressed the detrimental effects of the brain drain on science, technology, and social and economic development, and emphasized the need to reverse it into a brain gain through the diasporic option.

The main aim of this study is to provide an understanding of the reality and stakes of the international migration of skilled workers from certain African countries. Its objectives are twofold, namely to analyse the impacts of the brain drain on human resource development and on the capacity building of the scientific and technological institutions and centres of some African countries; and to understand what opportunities and drawbacks the brain drain brings in the context of economic globalization.

My assumption that the brain drain results from a combination of internal and external factors that weigh heavily against the development processes of African countries contains two specific hypotheses: (a) that the brain drain involves asymmetric exchanges and the depletion of human capital; and (b) that it is possible to minimize its negative effects by exploiting the opportunities provided by the process of globalization.

Controversies over International Skilled Migration

After having been considered a one-way concept, the brain drain is at present analysed as a systemic phenomenon that underlines internal and external

factors. Writers hold divergent views on what constitutes a brain drain. It is depicted as 'emotional nationalistic nonsense' (Das 1974: 74–83), as a tragedy for third world countries (Nair 1993 and 1998: 14), and as a result of economic globalization (Stalker 2000). The ideological controversy contains two opposing schools of thought, the nationalist and the internationalist.

Nationalist Approach

The nationalist school of thought sees the brain drain as an opportunity to maximize wages and productivity for the equal benefit of the South and the North. Nationalists buttress their thesis with two postulates. First, there persists an unequal international distribution of expertise mainly for the benefit of developed countries. Second, the brain drain is not of equal benefit to the South and North because migratory policies underline the requirements of receiving countries. Nationalists view international skilled migrants as a loss for developing countries. The United Nations' analytical model derived from the nationalist approach outlines skilled labour mobility as an 'inverted technology transfer' and focuses on calculating the loss and on finding some way of preventing or counterbalancing it (Gaillard and Gaillard 1998: 30–1).

Nationalist scholars approach the international mobility of skilled workers through the centre/periphery duality. From their point of view, the mobility of highly skilled workers had dramatic effects on the social and economic development of the South and perpetuated the pillage of the South by the North. Influenced by the neo-Marxist paradigm, those who adopt this approach regard the brain drain as one of the major causes of marginalization of the Southern countries and therefore focus on restrictive measures to attract and keep highly skilled workers.

Furthermore, some argue against this nationalist point of view, concentrating on the role of migrants in promoting social and economic development, human rights and political stability. The internationalists accuse the nationalists of failing to take into consideration the benefits gained through international skilled migration, and emphasize the diversities of developing countries. For example, countries such as India (Ghosh 1985), with a surplus of computer specialists, cannot be compared with countries such as Burkina Faso, which faces a shortage of skilled workers in science and technology.

Internationalist Approach

The internationalist school of thought disagrees with the dramatic portrayal of the brain drain. From its point of view, skilled migrations are more of a benefit to developing countries than an alarming problem. Thanks to the internationalization of the labour market, highly skilled workers are emigrating in quest of high wages and bright prospects. In return, the search for greener pastures tends to generate remittance transfers from the developed country to the home

country and the internationalization of science and technology for the developing countries. According to the internationalist perspective:

- the brain drain spawns some gains for developing countries, such as integration into global networks;
- the brain drain is an asset for countries such as India, which produces a surplus of highly skilled workers;
- the search for well-being and optimal economic advantage influences the decision to migrate. As pointed out by authors such as Grubel and Scott (1977) and Johnson (1968), who adopt the internationalist model, the participants in the brain drain command high wages and, correspondingly, a brain gain for the receiving countries in terms of high productivity and economic competitiveness, and human security for the skilled migrants from the developing countries (Gaillard and Gaillard 1997: 7).

Co-development Approach

The co-development approach (Nair 1998: 14; Rauner 2001) holds that the international migration of highly skilled workers favours development and provides targets to carry out bilateral and multilateral projects to convert brain drain into brain gain through international cooperation. This approach can be regarded as a remake of the internationalist school of thought. According to 'co-development' authors, international migration of highly skilled workers can be advantageous both to developing and developed countries if its detrimental effects are addressed through coherent North–South migration and development policies.

Magnitude of the Brain Drain in Selected African Countries (Senegal, Nigeria and Ghana)

Data highlighting the Senegalese brain drain are very scarce. However, it is known that Senegal, like many other African countries, is facing a brain drain problem. The main destinations of skilled Senegalese workers are Europe (France, Belgium, Germany, England, Switzerland) and the USA. Moreover, as in many African countries, there is an internal brain drain. Only 21 per cent of Senegalese engineers and researchers are working in the fields of their expertise, while 79 per cent are incorporated into governmental departments or as management and administrative staff (Sall 2000: 8). Table 12.1 documents the number of Senegalese immigrants in the USA by educational attainment in 1990. Their number is quite small. However, Senegalese immigrants in the USA, like other African immigrants, tend to be better educated.

Table 12.1: Senegalese immigrants to the USA by educational attainment, 1990

Primary or Lower	180
Secondary	420
Tertiary	770
Total	1370

Source: Carrington and Detragiache (1999: 15).

It is said that the flight of medical doctors creates a serious shortage of manpower. Some 60 per cent of Ghanaian medical doctors fled in the 1980s. As the *Ghanadian Chronicle* (28 January 2000) put it:

Over the 25-year period, about 1640 medical officers remained practising in Ghana through the University of Ghana Medical School (UGMS) and the ones at KNUST have been constantly producing more doctors. 70 per cent of UGMS graduates work outside Ghana, 800 practising physicians in the US are Ghanaians and that is 50 per cent of the whole doctor population in the country.

An Overview of the Causes of the African Brain Drain

The brain drain is linked to poverty, to the violation of fundamental rights and academic freedom, to lack of job opportunities, to the failure of scientific and technological policy and to the externalities of economic globalization. A combination of factors, such as the search for greater opportunities, better living standards and working conditions, political turmoil and attractive migration policies and colonial ties can lead to a brain drain problem.²

Economic Crisis

Most studies corroborate the substantiality between the brain drain and economic growth (Boothoo and Baksh 1981). Structural adjustment is a major cause of brain mobility because it handicaps most African economies. The failure of economic growth policies in most African countries is visible: low per capita income, severely limited access to fundamental needs regardless of multiple efforts to improve social welfare, high mortality rates, and deterioration of the terms of exchange.

The downturn of economic growth that harms these countries is easily witnessed in agriculture and export crop production, which are their major sources of foreign exchange. Through structural adjustment policies, the balance of payment crisis has led to high inflation and a trend towards decreases in real

earnings (CEPII 1992). Therefore, most highly skilled workers no longer resist the temptation to leave their home countries to obtain higher wages and brighter prospects in developed countries.

The Senegalese international migration of skilled workers is caused mainly by low wages and professional career constraints. The impact of the brain drain is easily identifiable. Most Senegalese are likely to migrate because Western countries' diplomas are more marketable than local ones. Due to poverty, unemployment and under-employment, many people see international migration as a way of ensuring better standards of living for themselves and of helping their families and relatives (Dia 2001: 35–47).

The Ghanaian brain drain of doctors is the result of poor wages, of mismanagement of the health department due to political pressures and of organizational constraints (*Ghanadian Chronicle* 2000). Hospitals suffer from 'lack of trained manpower, lack of affordable drugs for the teeming population of the Accra metropolis (about three million souls) and lack of some basic modern equipment for the personnel to carry out their duties in an effective and efficient manner' (Africanewscastr 2001: 1).

Political Instability and Violation of Fundamental Human Rights

The economic performances of many African countries have been seriously undermined by political instability, violation of fundamental human rights and academic freedom, and conflicts that make it difficult to encourage return migration or to retain skilled workers. Intellectuals are becoming suspicious; there is a kind of intellectual sclerosis. Researchers and lecturers are less motivated because of political pressures, isolation and frustration (Dionf and Mamdani 1994). The arrogance of military governments undermines Nigerian human capital. There is a threat to freedom of thinking, thus forcing many of the best scholars into exile. Corruption and capital flows create an exodus of Nigerian brains. Too much emphasis has been placed on military expenditure instead of on education and social welfare (Emeagwali 2001).

Distortions in the Functioning of the Universities

Multidimensional pressures weigh heavily on the functioning of African universities, which provide skills for the international labour market and for a continuingly saturated and informal local market. The downturn in academic performance is due to a combination of factors, such as scarce financial resources to support pedagogical and research endeavours, an explosion in the number of students seeking entrance to higher education, a special emphasis on 'elitist' curricula instead of on professional education and vocational training, deteriorating relationships between government and teachers, and frequent strikes. The international migration of the highly skilled in response to these multiple distortions is of major concern to African universities and research

institutions. Most African countries are ranked last in human resource development in a list of comparable economies. The reduction in public expenditure that structural adjustment programmes have created dramatically affects the incomes and standards of living of African countries (UNDP 1999).

Table 12.2: A comparison of average salaries in different sectors of the Nigerian economy

Sector	Salary per annum in naira
Public sector (oil)	450,000–600,000
Public sector (iron and steel)	300,000–400,000
Nigerian economy (average)	100,000–200,000
University academic salaries	30,000–54,000

Source: Bankole 2000: 21.

Nigerian universities are in the process of becoming obsolete. An excess of demand and the inability of Nigerian universities to admit numerous students, the privatization of the educational system, a student/lecturer ratio that falls far short of the international standards set out by UNESCO, violation of fundamental rights, lack of documentation and low income are some of the characteristics of Nigerian universities (Yesufu 1996: 207). As Table 12.2 underlines, poor living conditions and low incomes remain some of the main reasons for the lack of motivation among Nigerian teachers.

In a situation of bad living conditions and worsening working conditions, teachers develop parallel activities by applying for jobs in the private sector and becoming government or international consultants. Researchers and lecturers in most African countries also work in government departments as special advisers, consultants and management staff. Given the shortage of researchers and teachers in African universities and the need to ensure the intergenerational transmission of knowledge, this change in occupational status is regarded as an internal brain drain.

Impacts of Economic Globalization

With the onset of globalization and the consequent overwhelming profusion of new information technology, the migration of skilled workers is increasingly becoming one of the main features of international cooperation. Thanks to attractive policies implemented by developed countries such as the USA, highly skilled workers export their professional expertise outside their home country (Stalker 2000: 108).

Migration policies seem to be one driving force of economic growth in

advanced industrial countries. To maximize their productivity and opportunity costs, developed countries carry out selective migratory policies to retain and attract highly skilled workers. Low demographic transition, combined with a rise in the knowledge economy and in new information technology systems, has set off an outflow of skilled migrants (Tapsoba 2000: 14).

Economic and geopolitical changes affect international migrations. As most researchers and scholars point out, human capital is a fundamental feature of the capitalist economy (Salt and Findlay 1989: 181–218).

GATS, NAFTA and APEC are all designed to regulate or gain benefits for human capital. However, these multilateral frameworks focus mainly on the entry, residence, work and recognition of skilled workers originally from the member countries. Policies that aim to facilitate the migration of skilled labour from the South are based on quotas and work permits (Christian 2000).

Failure of Migration Policy

Most African countries adopt a *laissez-faire* attitude to international migration. This is due to a lack of jobs and opportunities for skilled workers at home and a fear 'that one day intellectuals would ... start analysing and questioning the governments they live under' (BBC News, 21 December 1999). As a result, numerous return migrants are disillusioned and frustrated by the unpleasant and unrewarding working and living conditions in their home countries.

International Scientific Networks

African universities are barely able to link their researchers and lecturers to the international scientific community. On the one hand, collapsing structural adjustment programmes, the failure of scientific policy, the inadequacy of the curricula and numerous managerial and administrative constraints provide the academic institutions with poor prospects. On the other hand, African professors and researchers with excellent academic credentials are enhancing the scientific reputations of overseas research institutions. It is important to emphasize how international scientific networks can lead to the brain drain. Attending international conferences or joining working groups can open up opportunities to get a job in an advanced industrial country. The scientific 'extraversion' (Hountondji 1994) of the continent remains one of the causes of the brain drain problem. Colonial and economic ties and a language compatibility with developed countries underlie the African brain drain.

Is the Brain Drain in Africa still an Enduring Problem?

Skilled labour migration is perceived of as a loss and, as such, a threat to the success of scientific and structural adjustment programmes; also, the failure to

implement a coherent human resource development policy has already undermined technological advances in many African countries. In this section I will clarify some of the effects of the brain drain on the labour market, on education and training, and on economic growth.

Distortions in the Labour Market

Labour markets in most African countries are characterized by distortions such as inadequate opportunities for career development, an imbalance between education and training, the collapse of the public sector and the precariousness of the informal sector (Ezeala-Harrison 1995: 249-64). The local labour market loses its attraction. Skilled and qualified African workers abroad are contributing to the intellectual and economic development of the receiving countries and several authors regard the receiving countries as the main beneficiaries of such talent (Körner 1998: 26-9).

The continuing economic crisis has meant that some Senegalese students trained abroad experience similar difficulties acquiring jobs as their locally trained Senegalese counterparts. As a result, the internal market is being threatened and capacity building measures at universities and scientific institutions are being reduced. Therefore, unless more consideration is given to skilled workers (better working conditions, utilization of local expertise, special attention to criteria of excellence and meritocracy), skilled labour mobility is likely to increase. The idea is to lessen our dependence on Western consultants and to provide more opportunities for skilled technicians from developing countries which have had considerable experience in family-planning technology, micro-credit and grassroots economic development projects. ... The idea also is to persuade more developing countries' experts to share their expertise for the benefit of other developing countries' (BBC News 1999: 25).

Retaining or attracting highly skilled workers would improve economic growth, which is handicapped by an accelerating trend towards the exodus of skilled workers. For instance, the shortage of manpower in a number of African countries affects sectors such as information technology, engineering, technical and financial services, sales, management and telecommunications. There is a lack of apprenticeship in enterprises, which makes it difficult to bring about the inter-generational transmission of knowledge and know-how. Most African enterprises cannot afford remunerations that are comparable with those offered internationally (Rogerson and Rogerson 2000: 31).

On the other hand, the brain drain depletes human capital (Mudende 1989: 183; Logan 1992: 289). For instance, J. D. N. Ogina points out that to reduce the shortage of highly skilled workers, African governments often call for foreign assistance that is sometimes expensive and far removed from the realities of African societies (cited by Körner 1998: 27).

The Deteriorating Situation of African Higher Education

The shortage of skills badly affects student standards and university capacities, and consequently weakens economic growth. Because universities basically remain the only scientific pool in African countries, the intergenerational transmission of knowledge and the training of human capital for management and administration are heavily reliant on them. Privatization, economic crises, an absence of management and a general lack of motivation brought about by poor wages undermine African universities and encourage the flight of teachers.

The number of teachers in areas such as agriculture, medicine and mathematics is declining. Indeed, statistics between 1992 and 1995 confirm that Nigeria had lost 883 lecturers. The budget of Nigerian universities is dramatically declining (from 85 per cent in 1990 to 77 per cent in 1993 and 1995). Nigerian universities rely on government financial support and foreign aid, which are subjected to competing economic pressures. Traditionally, universities have no link with the private sector. The outflow of Nigerian teachers has had a severe impact on the functioning of the universities. Many Nigerian lecturers have left the universities, as is reflected in Table 12.3 below.

Table 12.3: The structure of teachers in Nigerian universities by major disciplines, 1992 and 1995

Discipline	1992	1995	Difference	Difference
	(1)	(2)	(2-1)	in %
Administration	461	296	-165	-35,7
Agriculture	1110	960	-150	-13,5
Arts	1736	1631	-105	-6,0
Education	1108	1111	+3	+0,3
Engineering/technology	1102	1087	-15	-1,3
Environmental design	549	452	-97	-17,6
Law	381	327	-54	-14,1
Medicine/health science	1395	1621	+226	+16,2
Pharmacy	211	215	+4	+1,9
Sciences	2730	2751	+21	+0,8
Social sciences	1132	1154	+22	+1,9
Veterinary medicine	329	279	-50	-15,2
Others	673	180	-493	-73,2
Total	12,977	12,064	-883	-6,8

Source: Bankole 2000: 16.

Loss of Investment and Human Capital

An African brain drain can lead to a downward spiral in the capacity building capacities of local institutions. The skills gap cannot be plugged through technical assistance that remains expensive. The erosion of skilled workers leads to a loss of investment that could, for instance, supply limited access to social welfare and education (Williams 2000: 4). Developing countries provide many skilled workers who make a major contribution to science, technology and research in developed countries. The brain drain benefits developed countries by improving their stock of human capital and by attracting large investments.

The brain drain of medical doctors has had a dramatic impact on health delivery and economic growth. Between 1975 and 1981 Ghana lost half its architects (*Jeune Afrique* 1997). The International Office for Migration, therefore, has targeted Ghana and Nigeria as the main countries for consideration in its programme to promote the return of qualified African nationals.

The problem is whether or not skilled emigrants are easily replaceable³ (Gupte Pranay 2000) and whether or not the beneficial effects of their emigration affect their home countries: 'if they are skilled or professional persons, their absence potentially harms the country of origin, which had to bear the costs of educating and training them, by intensifying shortages of skilled labour resources. Moreover, the temporary employment of migrant workers in jobs that are below their level of skills and qualifications leads to wastage of human resources' (ILO 1976b: 131).

Understanding the African External Brain Waste Problem

Difficultly finding a job in one's area of specialization and uncertainty in other professions can lead to brain waste. The downward shift in occupational status generates a 'process of de-professionalization', thus undermining the capacity building of workers and making them vulnerable *vis-à-vis* the labour market in most developed countries. Markets saturated as a result of economic turmoil and high levels of competition disadvantage 'older persons and women's subgroups, which are often the first to opt out of the competition when jobs are scarce' (Shuval and Bernstein 1996: 8).

To some extent, brain waste can place skilled migrants in precarious situations, thus forcing them to implement survival strategies that are sometimes far removed from their skills and competencies. As John Ekaju (2000) explains:

In trying to eke out a living outside the continent, Africans have become victims of debasing treatment ranging from open contempt to verbal and physical racist attacks. Skilled or unskilled, job seeking Africans in the Americas and Europe end up in the worst paid unskilled jobs. They labour through this embarrassment and suppress their otherwise flamboyant egos. Their credentials are taken for non-sensical scribbling on paper with no value whatsoever and university dons are

reduced to simpletons who at best can sing hymns with nursery children. This is in complete contradiction to their training and the potential inherent in them. Usually, odd jobs require a lot of physical work, consume a lot of their energy and time, and do not offer advancement in terms of career improvement or stimulation of cognitive capabilities. Knowledge is not static. These African professionals eventually become underemployed and rusty. Brain drain in the African context thus has a peculiar furtive dimension to it: intellectuals are driven out of their countries by harsh economic conditions and end up as ne'er-do-wells in the West just to make ends meet. Their brains benefit neither their own nor the host country.

From Brain Drain to Brain Gain?

Scientific diasporic networks can make scientists from developing countries more visible in the international arena and make it easier to identify what skills and competencies are needed for economic and social development. Moreover, most migrants help improve the standards of living of their families and dependants through remittance transfers. In this section, I shall highlight the effects of the brain drain on remittance transfers and poverty reduction, and outline the promises of scientific diasporic networks.

Remittance Transfers and Poverty Reduction

Through international migration, men and women tend to improve the standard of living of their dependants and families. Most studies confirm the role of remittance transfers in reducing some of the detrimental effects of poverty. These transfers of funds are used to maintain households and to support small-scale projects. The contributions of migrants are used for building schools, hospitals and supporting families in distress.

Surveys are needed to specify the contributions of 'skilled' or 'unskilled' migrants⁴ *vis-à-vis* remittance transfers and their impact on poverty reduction and social development. As B. L. Lowell (2001: 7) explains:

Unfortunately, researchers have failed to study the remitting behavior of just the highly skilled. We know, for example, that remittances multipliers are greatest in rural areas, not the likely origins of the most skilled emigrants. It is possible that each remittance dollar from an unskilled emigrant yields a greater developmental multiplier than a remittance dollar from a highly skilled emigrant. Then again, skilled emigrants are likely to travel with their families and their more rapid integration abroad may reduce the amount they remit in the first place. One empirical analysis of remittances finds that they do not offset the slowing of economic growth due to human capital loss.

Promises of Scientific Diasporic Networks

Some developing countries tried fruitlessly to mitigate the detrimental effects of international skilled migration through restriction policy, taxation (see Bhagwati 1983: 16) and repatriation for loss of human capital. International skilled migration can be of benefit to science and technology because developing countries cannot give comparable opportunities to those offered by the developed countries to make their scholars internationally competitive. The main motive for the flight of highly skilled workers is the search for suitable working conditions, as Emeagwali (2001) points out: 'There is nothing wrong with Africans studying abroad. America is the motherland of technology and I would not program the world's fastest supercomputers if I had stayed in Africa. What is wrong is that most African students that studied abroad did not return to Africa.'

By building bridges between scientific diasporas and local communities it is possible to minimize the detrimental effects of the brain drain. Researchers are now looking at the positive effects of international skilled migration, thus countering the paradigm of loss. One purpose of diasporic networks is to build partnerships with local scientists in order to integrate them into the international scientific community. SANSa (South African Network for Scientists Abroad) and the Association of Higher Education in Ethiopia provide evidence of emerging African international scientific networks (Meyer and Brown 1999: 15).

Given that the knowledge gap is one cause for the marginalization of most third world countries, UNESCO focuses on the transfer of science. Mainstreaming science and technology in developing countries means creating a 'virtual scientific community' through electronic data. UNDP's TOKTEN programme aims to transfer the knowledge and know-how of national expatriates to sustain critical sectors in their own countries; priorities are set out by a national working committee, which is a network composed of government, local organizations, members of the private sector and UNDP staff. Expatriates are recruited for short-term (three months) training and consultancy. The TOKTEN programme has successfully funded highly skilled workers to contribute towards the scientific and economic development of their countries. The return of skilled migrants originally from developing countries is one of the main purposes of the IOM. Its programme is designed to facilitate the return of qualified African nationals and to ensure their social and professional insertion in their home country (L'Homme 2001).

Some are pessimistic about the input of highly skilled African workers into science and technology in their home countries. There are still some structural problems that can render its application difficult in sub-Saharan African countries. As Gaillard and Gaillard (1998: 43) remark:

The idea may look simple and seductive, but it will not be easy to implement. Major difficulties are how to identify and locate expatriates and how to organize a

network that will last for some time. Finally, in many cases the domestic scientific community is too small and insufficiently developed to allow for joint projects and scientific exchange. In order to satisfy all these requirements, political will and administrative capacity are needed. These, however, are far from being fulfilled in the developing world as a whole and in Africa in particular.

It is important to survey to what extent scientific diasporic communities are strengthening universities and research centres.

Conclusion

The objective of this chapter has been to analyse the scale, magnitude, impact and policy implications of the brain drain in selective African countries with a view to keeping and attracting skilled workers and students. It is assumed that, despite positive outcomes such as poverty reduction and the upgrading of skills and qualifications, the brain drain has had an adverse effect on human resources and on the economic development of African countries.

My main finding is that the international migration of skilled workers creates a shortage of manpower and has a detrimental effect on economic growth and on higher education in most African countries. The erosion of human capital can lead to a loss of taxpayers, a shortage of skills in critical disciplines such as mathematics, computer studies, medical science and engineering, and a weakening of the educational system and of research institutions. Not only do many skilled workers become the victims of brain waste but also the African brain drain expresses asymmetrical North-South relations. However, remittance transfers, personal achievement and the role diasporas may play in the internationalization of science and technology are of some benefit to developing countries.

On the one hand, given the fundamental right of individuals to move from one country to another, the inability of sending countries to restrict emigration flows, and the attractive immigration policies implemented by developed countries, it is impossible to stop the brain drain. On the other hand, there is a need to look at the main determinants of the brain drain problem, which include poverty, marginalization in international trade, the failure of human resource development policies, unemployment and under-employment.

Notes

- Human resource development and social development intersect in that they both require economic development. Furthermore, in the context of structural adjustment policies, economic growth involves some reduction of public expenditure, thus undermining human resource and social development projects.

2. 'Although there may be a strong relationship between the reasons to leave a country and the reason to choose a specific country of destination, they should be distinguished clearly from each other. For example, one leaves the country to get a job (economic motives) and chooses a destination where family members can assist in finding a job (family motives). In another example, the decision to leave is caused by income considerations (economic reasons) while the destination is determined by the possibilities of easy admission (other reasons)' (European Commission 2000: 79).
3. Given the dramatic effect that the flight of doctors (Giardina Society 2001) has had on deteriorating health systems, countries such as Zimbabwe, Namibia and South Africa (Chenault 1998: 17) have had to recruit a number of Cuban doctors to fill the gaps.
4. The term 'unskilled migrant', which implies disrespect, refers to migrants who are regarded as uneducated, namely without any training and mostly in jobs with low salaries and without social protection. The term 'skilled migrant' refers to a highly educated professional who has permanently emigrated from a developing to a developed nation. However, these definitions are problematic because the frontiers between highly skilled and unskilled workers are unclear. For example, brain waste occurs when scientists are forced to work as cab drivers, in other words as unskilled workers. Among unskilled migrants, one might find better-educated people or people with a professional qualification, such as mechanics.

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