



Higher Education Capacity Building Literature Review (Phase II): Annotated Bibliography EPAR Brief No. 229

Angela Gaffney, Alice Golenko
Mary Kay Gugerty, & C. Leigh Anderson

*Prepared for the Agricultural Policy Team
of the Bill & Melinda Gates Foundation*

*Professor Leigh Anderson, Principal Investigator
Associate Professor Mary Kay Gugerty, Principal Investigator*

December 7, 2012

Research question: What are the best & worst practices for national agricultural capacity building when investing in a country's higher education system or when investing directly into national or relevant global research capacity?

Approach

Our initial agriculture capacity building search revealed best practices including institutional partnership building, cross-border opportunities such as 'twinning,' and views that these practices are most effective when accompanied by appropriate policies and regulatory frameworks to incentivize return on education to home countries. In addition, the literature explained the historical and political context in which some countries successfully built higher educational capacity, suggesting a set of socio-political conditions necessary for a 'surge' in capacity building to occur.

Our results raised questions about challenges *shaping* these best practices (e.g. "brain drain" leading to the need for cross-border opportunities) as well as possible approaches to address these underlying issues. To further examine identified challenges from our initial findings, we re-oriented our search to investigate retention strategies, regional or intra-national network capacity building approaches, and whether there is in fact a need for higher education capacity in all countries through comparative advantage or otherwise.

We searched for academic articles using Google Scholar and the UW Library system using the words "brain drain retention," "retention strategies," "regional higher education," "higher education cooperation," "regional agricultural education," "whole system effects education," "comparative advantage," "specialization," "niche," paired with "Africa," "India," "Latin America," "Brazil," etc. We searched specific organizations' websites for program documents and gray literature, including the World Bank, UNESCO, ILO, IFPRI, ASTI.

Summary of Findings by Country:

Several countries have successfully employed a variety of retention, return, and diaspora strategies to build capacity by capitalizing on the feedback loops of international mobility (e.g. South Africa, Senegal, Tanzania, Egypt, Morocco, Taiwan, and South Korea). In addition, several countries in Africa have employed strategies to address the rural-to-urban "brain drain" by prioritizing education of students with post-secondary rural agricultural work experience and strong ties to rural communities in order to return the benefit of this education to local communities. (Ghana, Ethiopia, Uganda, Tanzania, Mali, Nigeria, Benin, Burkina Faso, and Malawi). The following sections discuss these and other strategies as well as analysis related to the 'whole system effect' of higher education and subsequent 'need' for Higher Agricultural Education (HAE) capacity in all countries.

Retention strategies: Turning 'brain drain' into 'brain circulation'

Several articles discuss 'retention' strategies to address the outflow of educated scientists and academics in order to retain and build domestic higher education capacity. 'Retention' can take various forms, both 'restrictive' (limiting outflow), and 'resourcing' (utilizing external connections, building expatriate networks of knowledge). Available literature tends to

NOTE: The findings and conclusions contained within this material are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.

concur with the findings from our qualitative study on rates of return to agriculture in Africa in that there is a lack of, but need for, local capacity (and local institutions) in rural areas and countries where agriculture is important. However, some articles suggest that, in addition to local capacity building, investment in outward, diaspora-led 'retention' approaches are more cost-effective for building local capacity. The following articles discuss various 'retention' options as they relate to capacity building.

International policies and practices

Tetty (2006) discusses specific mechanisms that can be adopted to enhance recruiting and retaining human capital within African institutions of higher education. These include: increasing sandwich model opportunities through institutional arrangements with other universities, including gender in hiring committees, developing a clearly defined and articulated tenure track for academics, and redefining national investment in spending priorities towards institutions that build growth capacity.

- Tetty, W.J. (2006). Staff retention in African universities: Elements of a sustainable strategy. Retrieved from the World Bank website: http://siteresources.worldbank.org/INTAFRREGTOPTEIA/Resources/Academic_Staff_Retention_Final_2_06.pdf.

Tetty (2003) discusses retention, return, and diaspora options. Return was successful in **Taiwan** and **South Korea** where recruitment drives for skilled labor living abroad included concrete measures to provide "attractive conditions for return." In Africa, similar initiatives have yielded minimal success (e.g. International Organization for Migration's 'Return of Qualified African Nationals' program, which encouraged 100 nationals per year to return 1983-1999). However, many African countries do not offer dual-citizenship, so expatriates can't come home to 'test the waters' before returning. Retention has proven successful in **South Africa, Senegal, Tanzania, Egypt, and Morocco** through national research grant schemes, endowed chairs, and other competitive financial awards. Diaspora approaches make use of nationals abroad through collaborative research projects and networks, treating the skilled knowledge abroad as an asset instead of a liability. Intellectuals abroad can provide coordinated teaching and research expertise virtually, and surveys of scientists living abroad revealed this network arrangement may even encourage them to return in the long-run.

- Tetty, W.J. (2003). Africa's options: Return, retention or diaspora? *SciDevNet*: <http://www.scidev.net/en/policy-briefs/africa-s-options-return-retention-or-diaspora-.html>.

Lowell (2001) discusses the "Six R" policy responses to address and capitalize on the feedback loops of international mobility of highly skilled workers: return (migration), restriction (migration), recruitment (migration), reparation (monetary), resourcing (diaspora option), and retention (opportunities). This article also discusses specific policy examples by country, such as the Return of Qualified African Nationals program, **Malaysian** skilled worker program, **Thai** Reverse Brain Drain Project, **Indian** remittance backed bonds, and UNDP expatriate networks. Appendix 1 in the article contains a full list of specific policy examples by country.

- Lowell, B.L. (2001). Policy responses to the international mobility of skilled labour. International Migration Paper No. 45, ILO, Geneva. From ILO website: <http://www.ilo.org/public/english/protection/migrant/download/imp/imp45.pdf>

Although Saxenian (2005) focuses on the transnational, technological knowledge exchange between foreign-born workers in Silicon Valley and their counterparts in India and China, it implies that cross-regional technical communities have the potential to jump-start local entrepreneurship, a case for the 'resourcing' diaspora strategy.

- Saxenian, A. (2005). From brain drain to brain circulation: Transnational communities and regional upgrading in India and China. *Studies in Comparative International Development (SCID)*, Vol. 40, 2, 35-61, DOI, DOI: 10.1007/BF02686293. Retrieved online: <http://www.springerlink.com/content/a3wplr37wg603hh6/>

Rural retention strategies:

Atchoarena & Gasperini (2002) address one best practice of mitigating the 'brain drain' from rural to urban environments. Attracting agricultural scientists to live and work in rural communities increases the amount of research that addresses the needs and issues of rural small holder farmers. They find that educating people who are already deeply connected to their rural community have high rates of return to their rural community after their degree has been completed. China has an 'employment-oriented admission system' to educate people most likely to return to their rural hometown.

The Sasakawa Africa Fund for Extension Education (SAFE) project creates higher agricultural education programs for mid-career high school graduates with agricultural field work. SAFE builds partnerships with universities and employers with an educational focus and practicum of practical application. <http://www.safe-africa.net/index.htm>

- Atchoarena, D. and Gasperini, L. (2002). Education for Rural Development: Towards New Policy Responses. International Institute for Educational Planning, FAO and UNESCO. Retrieved online: http://www.wis.unam.na/hivdocs/UNICEF/Education/UNESCO_IIEP_2003_132994e_Education%20for%20rural%20development.pdf

Small-country problem: Shared capacity built through regional approaches

- The Zamorano Pan-American Agricultural School is a non-profit private university in Honduras that focuses on developing leadership in agriculture for Latin America. In the last ten years about 90% of their graduates were from countries other than Honduras. However, the only mention of the university in a scholarly article referenced its strategy to overcome a culture of excluding women. <http://www.zamorano.edu/>
- "In South Asia, Sri Lanka's Council for Agricultural Research Policy (CARP), India's ICAR, the Nepal Agricultural Research Council (NARC), and the Pakistan Agricultural Research Council (PARC) have entered into agreements to run long- and short-term training programs at the regional level. Training within the region is considered advantageous given the focus on local conditions; it is also more cost-effective than training in developed countries. Furthermore, regional training increases the likelihood that trainees will return home after they attain their qualifications." <http://www.slcarp.lk/>

Intra-country and regional network approaches:

Regional networks are an option for countries that lack the independent financial and human capital to increase educational capacity on their own. The following examples are all within a single country (India). Program coordination, political agreements, and funding are easier within one country compared to networks spanning multiple countries. However, the cooperative model could be applied throughout multiple countries.

Eicher (2009) notes that the African Economic Research Consortium (AERC) is experimenting with a Pan-African graduate program granting Africa-wide Ph.D.'s in various fields, including agricultural economics.

- Eicher, Carl K. "Building African Scientific Capacity in Food and Agriculture". *Review of Business and Economics*. Vol. 54, 3. <http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCEQFjAA&url=http%3A%2F%2Fpreview20.bluematrix.co.za%2Fsystem%2Ffiles%2FBuilding%2520African%2520Scientific3%2520Eicher.pdf&ei=k9SIUKSslcbiiAKn84GQBA&usq=AFQjCNGcsyZkCUq24F-fkYkCi8Bj2exEsA&sig2=floCr6UOT8Qc8g557dRqBA&cad=rja>

Eicher (2009) illustrates a case of higher agricultural education cooperation within India. The Indian Council of Agricultural Research (ICAR) directs the National Agricultural Research System which coordinates 53 state agricultural universities (SAUs). SAUs receive funding from several sources, including their state government and the central government. ICAR set up a monitoring unit to enforce national norms and standards in agricultural education. ICAR also implemented a system of rewards and incentives to speed the adoption of norms and encourage self-improvement in educational standards in SAUs and among students. ICAR has also adopted the National Agricultural Technology Program (NATP) to improve coordination between institutes to organize and increase accessibility of information. The NATP is associated with an increase in published research, and the SAUs are an important component of ICAR's research capability.

- Eicher, Carl K. "Building African Scientific Capacity in Food and Agriculture". *Review of Business and Economics*. Vol. 54, 3. <http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCEQFjAA&url=http%3A%2F%2Fpreview20.bluematrix.co.za%2Fsystem%2Ffiles%2FBuilding%2520African%2520Scientific3%2520Eicher.pdf&ei=k9SIUKSslcbiiAKn84GOBA&usq=AFQjCNGcsyZkCUq24F-fkYkCi8Bj2exEsA&sig2=floCr6UOT8Qc8g557dRqBA&cad=rja>
- Maguire, Charles. (2002). Reforming India's State Agricultural Universities. *Agricultural Innovation Systems: An Investment Sourcebook*. World Bank. <http://siteresources.worldbank.org/INTARD/Resources/335807-1330620492317/8478371-1330712129614/Module2-IAP1-revised.pdf>.
- Raabe, Katharina. (2008). Reforming the Agricultural Extension System in India. IFPRI. Washington D.C. <http://www.ifpri.org/sites/default/files/publications/ifpridp00775.pdf>.
- Pal, S. and Byerlee, D. (2002). India: The Funding and Organization of Agricultural R&D--Evolution and Emerging Policy Issues. IFPRI. <http://www.ifpri.org/sites/default/files/pubs/pubs/books/oc51/oc51ch07.pdf>.

Vega Alarcon (2005) discusses the Foundation for Agricultural Innovation (FAI) developed in Chile. The FAI coordinates actors in the public sector, academic institutions, private firms, and other entities to understand and meet the innovation needs of different industries and agricultural activities. Although the private sector is an important force for innovation in agriculture, well-funded public agencies are arguably as vital to complement private investments. In many cases, agricultural innovations may not be easy to patent or otherwise commercialize, but they may be critical to the development of the sector. The FAI has created Territorial Innovation Programs, which are regional initiatives led by stakeholders and representatives of an agri-food chain in a particular region or territory.

- Vega Alarcon, Rodrigo. (2005). Chile's Foundation for Agricultural Innovation. *Agricultural Innovation Systems: An Investment Sourcebook*. World Bank. Retrieved from World Bank website: <http://siteresources.worldbank.org/INTARD/Resources/335807-1330620492317/8478371-1330712114326/Module1-IAP3.pdf>
- China carried out a large scale plan in 1998 to merge universities and research institutions to make administration and other relevant functions more efficient. Atchoarena, D. and Gasperini, L. (2002). *Education for Rural Development: Towards New Policy Responses*. International Institute for Educational Planning, FAO and UNESCO. Retrieved online: http://www.wis.unam.na/hivdocs/UNICEF/Education/UNESCO_IIEP_2003_132994e_Education%20for%20rural%20development.pdf

'Worst' Practices to avoid when building 'small country' capacity:

The practice of employing Ph.D. graduates at the university where they trained is commonly called "academic inbreeding." Horta et al (2010) show how data from Mexico suggests a dominantly inbred environment stifles scientific productivity. "Small countries" should be mindful of this cautionary study if they seek to build a local or regional capacity of PhD students with just one or few institutions in their country.

- Horta, H., Veloso, F., and Grediaga, R. (2010). Navel Gazing: Academic Inbreeding and Scientific Productivity. *Management Science*, Vol 56, 3, 414-429. Retrieved online: <http://mansci.journal.informs.org/content/56/3/414.full.pdf+html>

Comparative advantage: Should countries specialize in their HAE offerings?

An example of comparative advantage in HAE is the shift from teaching tropical agricultural education in universities in Western Europe to universities in Southeast Asia (Eicher 2009), where they have a comparative advantage. Aside from this example, we found no concrete evidence that there is a clear, recommended academic field in which African capacity building efforts should specialize, nor did we find any literature suggesting that Africa (or other developing regions) should NOT develop their own local higher education capacity. On the contrary, the literature suggests that there are 'whole system effects' and local benefits to having local universities and HAE capacity.

Whole-system effects of local HAE and the case for local capacity

'Whole system effects' implies the assumption that there are externalities from having local higher education capacity. While we found no literature quantifying the loss to a local society from the absence of a local university, we did find descriptive sources that illustrate the unique benefits the presence of a local university can produce. Most literature supports the assumption that there is a need for HAE capacity in Africa citing human capital theory without explicit or quantitative justification.

- Partnership for Higher Education in Africa (PHEA) is an example of a partnership of foundations dedicated to improving SSA higher education. <http://www.foundation-partnership.org/index.php>

Local university relationship to local rural development

Atchoarena & Gasperini (2002) recommend that local universities form outreach projects with their local communities to provide students an opportunity to gain practical experience and serve as a catalyst for community development. Local universities are also more likely to attract students from rural communities who want to and will return back to their rural community as opposed to non-local universities that tend to attract students less interested in returning to their rural communities. Thus, the return on higher education for local, rural communities is greater through the presence of a local university. Highly educated people living and working in rural communities are an important source of community development.

- Atchoarena, D. and Gasperini, L. (2002). Education for Rural Development: Towards New Policy Responses. International Institute for Educational Planning, FAO and UNESCO. Retrieved online: http://www.wisis.unam.na/hivdocs/UNICEF/Education/UNESCO_IIEP_2003_132994e_Education%20for%20rural%20development.pdf

Local university relationship to development of NARS

Gora (2002) suggests that local universities directly supply graduates to their country NARS. While we found no direct measure of local university graduates and subsequent employment by their country NARS, a 2002 FAO report indicates that 70%-90% of African NARS staff are nationals. Despite the fact that nationals make up the majority of staff, Gora does not indicate whether staff were educated in-country or from which region of the world the expatriate staff come. Gora recommends local universities should collaborate with NARS for research and extension projects to capitalize on resources and learning opportunities for students.

- Beye, Gora. (2002). Impact of Foreign Assistance on Institutional Development of National Agricultural Research Systems in Sub-Saharan Africa. Rome. Retrieved from FAO website: <http://www.fao.org/docrep/005/Y4349E/y4349e05.htm>

Private industry funding of HAE: Potential path forward?

Much of the literature has raised the issue of seeking higher education funding from private industry sources, which is currently a trend in many countries including Thailand, Canada, and various countries in Africa. In assessing whether this trend of industry funding is a 'best practice,' the literature discusses the potential opportunities and limitations from aligning higher education with industry.

Atchoarena & Gasperini (2002) suggest reframing the purpose of higher agricultural education from high-input/output production agriculture to focus on society and sustainability. Industry funding can increase higher education funding and, in turn, build capacity in a financial sense, but it can also shift the focus of education from society to industry. Although decreasing government funding is *causing* HAE institutions to increasingly look to industry partnerships to cover their costs, this shifts capacity away from small farmer agriculture development and places agribusiness as the primary focus of education.

- Atchoarena, D. and Gasperini, L. (2002). Education for Rural Development: Towards New Policy Responses. International Institute for Educational Planning, FAO and UNESCO. Retrieved online: http://www.wisis.unam.na/hivdocs/UNICEF/Education/UNESCO_IIEP_2003_132994e_Education%20for%20rural%20development.pdf

Traimongkolkul & Tanpich (2005) summarize key recommendations from a nation-wide study of the agricultural education system in Thailand. Thailand is the largest agricultural exporter in Asia, and their HAE capacity was built largely through industry funding. However, the authors conclude that industry funding of HAE has actually had a negative impact on smallholder farmers. While contributing to agribusiness, human resources, and technology, it has not yielded a social impact. The authors make several policy recommendations including reforming degree programs in agricultural science to respond to the needs of society; creating a balanced disciplinary orientation combining conventional agriculture science with integrated knowledge; and balancing 'social-driven' vs. 'market-driven' models of education.

- Traimongkolkul, P. and Tanpich, T. (2005). Lessons Learned and Present Prospects: A Critical Review of Agricultural Education in Thailand. *Association for International Agricultural and Extension Education*, Vol. 12, 3. Retrieved from AIAEE website: <http://www.aiaee.org/attachments/article/309/Traimongkolkul%2012.3-5.pdf>

Torres & Schugurensky (2002) focus on Latin America but put trends in the context of globalization, relating them to experiences in Africa and Asia. As public funding for higher education has declined, Latin American universities have experienced immense pressure in the past two decades to reform their curricula and research agendas to orient toward neoliberal policies and cater toward the needs of corporate businesses that provide funding.

- Torres, C. and Schugurensky, D. (2002). The political economy of higher education in the era of neoliberal globalization: Latin America in comparative perspective. *Higher Education*, Vol. 43, 429-455. Retrieved online: http://download.springer.com/static/pdf/773/art%253A10.1023%252FA%253A1015292413037.pdf?auth66=1354471827_2679109f967cb5395f72a5748f3eec97&ext=.pdf

Future Research Direction for Phase III:

- Comprehensive list of successful regional education models
- Examples of university network hubs (e.g. South Africa as a hub country that focuses on access for smaller, neighboring countries)
- The best places/systems for undergraduate and master level studies and whether or not these differ
- Metrics to measure the quality of the University
 - Teaching staff qualifications
 - Bibliometric analysis

Please direct comments or questions about this research to Leigh Anderson or Mary Kay Gugerty, at eparx@u.washington.edu.

APPENDICES

Appendix 1: Policy responses to the international mobility of skilled labor, by country

Source: Lowell, B.L. (2001). Policy responses to the international mobility of skilled labour. International Migration Paper No. 45., ILO, Geneva. From ILO website: <http://www.ilo.org/public/english/protection/migrant/download/imp/imp45.pdf>

Table 2. Return of nationals abroad: Selected policy examples

Policy	Description
IOM African return program	The International Organization for Migration (IOM) manages the program for the Return of Qualified African Nationals (RQAN). IOM aids countries identify areas that would benefit from the experience of expatriates who must satisfy certain criteria. The program helps émigrés and their families resettle in their country of origin or in another country designated as “target” country.
Irish Christmas recruitment	The Irish Ministers of Enterprise Trade and Development are recruiting expatriates to return to build the software industry; targeting those returning home for Christmas (Belfast Telegraph 1999)
Malaysian return incentives	Malaysia hopes to provide incentives for return by giving out tax exemptions, permanent resident status for spouses and children, and relaxed immigration policies (Hamid 2000; Hong 2000).
Mexican student loan forgiveness	The Mexican government program Becas CONACYT grants loans to students who study abroad, if they return much of the loan is forgiven, and if they go on to work at a Mexican university the loan is forgiven (Verhaal 2000).
Canadian tax incentives	Now discontinued, Canada for a short time gave federal income tax holidays for up to three years to its emigrants who returned for employment.
Malaysian internet job postings	Created on an exploratory basis with hopes to expand, Malaysia’s JobsDB.com lists domestic high-skill jobs to inform expatriates about positions available back home (Boey 2000).

Table 3. Restriction of international mobility: Selected policy examples

Policy	Description
Malaysian freeze on low-skilled admissions	The Malaysian government intends to freeze the hiring of foreign workers in 138 categories of skilled and semi-skilled jobs (as many as 100,000 positions) in a bid to increase the skill composition of the labour force (see Malaysia’s plans to recruit highly skilled workers below; Wong 2000).
U.S. “J” cultural exchange visa	This class of temporary visa is issued primarily to persons whose primary purpose is to gain U.S. experience and to return home. As a result, the visa imposes a 2-year return requirement before the individual may apply for another temporary (other than visitor) or permanent visa.

Table 5. Reparation for loss of human capital (tax)

Policy	Description
Expatriate tax schemes	Tax schemes were developed in the 1970s, but never implemented, to recompense the source countries. Either the receiving country would directly pay the source country, or tax the immigrant and pool those taxes with the United Nations, or the source country is encouraged to tax its expatriates.

Table 4. Recruitment of international migrants: Selected policy examples

Policy	Description
Malaysian skilled worker program	Malaysia plans to attract 5,000 skilled workers a year as part of their “knowledge-economy master plan” for 2001 as announced by Prime Minister Datuk Seri Dr Mahathir Mohamad (Wong 2000).
South Africa loosening restrictions	President Thabo Mbeki recently announced plans to make immigration laws less restrictive, hoping to address the difficulty of getting short-term work permits for skilled foreign workers. Already, in 1998 a program placed 404 Cuban doctors in rural clinics and hospitals (Chenault 1998; Agence France Presse 2001).
USA skilled temporary visas	Hot growth for information technology jobs helped fuel demand for temporary “H-1B” visas. The U.S. Congress responded by increasing the numerical cap from 65,000 in 1992, to 115,000 in 1998, to 195,000 in 2000. Employers must sponsor these skilled workers who stay for up to 6 years.
Canadian permanent skilled worker targets	In the 1990s, Canada raised the number of immigrants and those admitted for skills to more than half the inflow. Now it plans to target skilled immigrants workers from China, India, Pakistan, Philippines and South Korea, increasing the intake by 4.4 percent through 2002 (Batcho 2001)
Australian permanent skilled worker targets	Australia’s Migration 2001 program has set aside 76,000 places for these skilled migrants who qualify; and increases the “skill stream” by 5,000 persons. Most are admitted on points for education or talents, a smaller number for employer recruitment.
Australian temporary medial workers	With difficulties finding a sufficient number of doctors, Australia addresses the problem by granting temporary work visas to doctors trained overseas in to work in “areas of need.”
German temporary ICT “green cards”	Germany announced in 2000 that it would grant up to 30,000 special work visas to foreign information, communication, and technology (ICT) specialists. Workers from India are sought, although thus far a small number of Eastern Europeans have applied (Islam 2000).

Table 6. Resourcing expatriates: Selected “Diaspora options”

Policy	Description
UNDP expatriate networks	The United Nations Development Program pairs expatriates with particular skills with suitable projects that range from a few weeks to months. Governments provide assistance to expatriates during their stay; it is more cost effective than hiring outside consultants.
Thai Reverse Brain Drain Project	The Thai Reverse Brain Drain Project (RBD) facilitates technical linkages between institutions and Thais living overseas to collaborate in mission-oriented projects. Serves as a coordinating information centre, including an internet bulletin board exchange (see http://rbd.nstda.or.th/).
Indian remittance backed bonds	The Indian government solicits its professional expatriates to invest in remittance-backed Indian bonds. The bonds are offered by Indian banks that fund them based upon future receipt of remittances (Orozco 2000).
Foreign currency accounts	Many countries permit their expatriates to save their earnings at home in foreign currency accounts; i.e., most often the more stable currency of the developed country where they work or U.S. dollars (Orozco 2000).

Table 7. Retention through educational sector policies: Selected policy examples

Policy	Description
Indian university budget increases	The National Association of Software and Services Companies (Nasscom) proposes setting up information technology-focused universities or courses throughout the country to meet the forecast demand for information technology workers in India. (Asia Pulse 2001)
UK loan forgiveness	Britain attempts to retain teachers educated in country by writing off student loans of graduates who enter the teaching profession. (Smithers and McGreal 2001)
German foreign academic scholarships	Germany provides scholarships to foreign scientists who establish research groups in Germany, for the purpose of preventing the loss of German postdoctoral scientists. The Kosmos Award, a prize of DM 750,000 is given to establish a group of young researchers in Germany (Metzke 2001)

Table 8. Retention through economic development: Selected policy examples

Policy	Description
Indian non-profit website information	The National Association of Software and Services Companies (Nasscom), a not-for-profit organization, though a website provides information about companies and the industry. A chief goal is growth in education, employment, entrepreneurship and the economy in India (www.nasscom.org)
Malaysian ICT initiative	Malaysia's Budget 2001 is structured to lead to globalisation and the liberalization of the e-economy through tax and other incentives for the information communication technology industry (Hamid 2000).
Philippine centre for technology	Philippine's "Investment Priorities Plan" seeks to attract foreign investment and domestic employment at its Virtual Centre for Technology Innovation, a project of the Department of Sciences and Technology and the Information Technology Foundation of the Philippines (Businessworld 2000)
Indian expatriate investment outreach	Indian universities are soliciting former graduates and entrepreneurs to establish more programs at the university to prevent graduates from leaving. Entrepreneurs are also being asked to invest in Indian-based "dot.coms" (Dugger 2000 and Ghosh 2000)