

**AC 2007-3020: ALIGNING INTERNATIONAL DEVELOPMENT FUNDING FOR
ENGINEERING EDUCATION**

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Aligning Available Development Funding for Engineering Education

Abstract

It may be hard to imagine there is much in common between an engineering department in an American college, a cooperative of female basket weavers in Zambia, a local government-owned utility company, and the World Bank, but there is: the potential to improve directly the lives of the poor in the developing world. And although at first glance it appears that there is too much geographical and cultural distance to forge a meaningful partnership between these players, International Funding Organizations and corporate foundations are making major funding investments to bring world-class engineering training and expertise to the doorsteps of government agencies, universities and training institutes, businesses, and local groups of non-governmental organizations in the developing world.

Spurred in part by global forces and “brain drain” realities, international development agencies are allocating hundreds of millions of dollars annually to support competitiveness efforts in poorer countries, which include cultivating knowledge-based societies through investments in science and technology (S&T), innovation, and productivity enhancements. In fields as diverse as education, infrastructure, and information technology, development funds are flowing to engineering expertise that can work with players in developing countries not only to support concrete projects, but ultimately to build the local capacity of policy-makers, educators, and the private sector, without which the sustainability of any progress is compromised. It is this latter effort – the process of capacity building and the role of the engineering education sector – that is particularly exciting for the American engineering education community.

This paper will outline the confluence of economic drivers and development challenges that today foster international development funds flowing into engineering education. The authors will outline effective strategies that can be adapted by companies and academic institutions to (a) identify initiatives funded by international financial organizations that rely on the expertise of engineering communities and its educators, including from multilateral and bilateral agencies and foundations; (b) forge strategic partnerships with domestic and international stakeholders to ensure successful positioning with the funding institutions and ultimate success in program delivery; and (c) highlight the benefits – financial and non-financial – that accrue to universities and companies who engage in such partnerships.

The Need for Engineering Talent

If science is the building block that investigates, discovers, and demonstrates new knowledge in different fields and disciplines, technological innovation is the process by which new knowledge can be applied to solve real life problems and situations, create new products and services, and produce socio-economic development. Engineers are the “translators” between science and technology to allow for that process to happen.

It is no wonder that engineering talent is in such high demand across the globe. A simple search of the World Bank website, for example, will reveal hundreds of “hits” reporting on the engagement of engineers for Bank funded projects. Indeed, a special Task Force on Science, Technology, and Innovation was specially created by the United Nations Millennium Project Task Force to help advise on strategies to achieve the Millennium Development Goals (MDGs).

Why is this? Engineering talent is needed to meet the most basic of societal needs - such as helping to provide access to potable water and sanitation services. On a larger scale, engineering capabilities are required to build, operate and maintain large and complex infrastructure projects such as ports and power plants and telecommunications networks. These infrastructure improvements directly affect a country’s competitiveness and ability to communicate and access new markets. But increasingly, engineering expertise is also sought to help local and international companies innovate, create and adopt products, technologies and business processes to compete effectively in the global marketplace. Even a country as poor as Rwanda, is striving to “transform (itself) into an information-rich, knowledge-based society and economy by modernizing its key sectors using ICT.”¹

However, it is one thing to engage engineering expertise from New York City to oversee the successful installation of a new medical diagnostic clinic in, say, Luang Prabang province in Northern Laos, and quite another to equip local talent with the ability to maintain and maximize the potential of these technologies. Like with foreign direct investment, development assistance projects face efficiency and sustainability challenges over the long-run unless indigenous capabilities and skills are developed from the onset.

Development Funding Sources and Sample Projects

Increasingly so, the donor community is concerned and taking action on development practices that involve local ownership, capacity building, and systems development. This trend really does represent a “paradigm shift” in the approach of international funding organizations to project design and implementation. And this new, more sustainable approach to development is reflected in the billions of dollars in funding that flow to emerging countries every year.

The World Bank for example supports globally about \$1 billion a year for the education sector alone - with 35% of the funds devoted to tertiary education and related topics. Their definition of tertiary education extends to the range of institutions, including universities and colleges, technical and vocational training institutes, distance learning centers, research and development (R&D) labs, and centers of excellence that constitute the academic node of a national system of innovation. A significant focus for the World Bank is to harness computer technologies to improve access to, and the quality of, education so that the education system can generate the highly-skilled talent that is so in demand.

Box 1 - Project Sample - India - Technical/Engineering Education Quality Improvement Project - \$314 million

This 2002 World Bank project, developed in conjunction with India's Ministry of Human Resource Development, was designed to support the production of high quality technical professionals through reforms in the technical/engineering education system, in order to raise productivity and competitiveness of the Indian economy.

The project is currently in the implementation phase, and the large majority of the funds (\$304.5 million) have been made available for bids (i.e. request for proposals (RFPs)) for both public and private engineering schools to: (i) promote academic excellence; (ii) network institutions to maximize resources and quality enhancements; and (iii) increase the reach of services to the community and the economy.

Additional funds (\$9.5 million) have targeted improvements in management systems and capacity building at the central and participating state levels to: (i) provide training for policy makers; (ii) collect relevant data and statistics to improve decision making; (iii) establish performance and quality indicators; and (iv) conduct project management activities.

Source: Project Appraisal Document of the World Bank, Technical/Engineering Education Quality Improvement Project, 23 September 2002. <http://web.worldbank.org>.

Similarly, the Inter-American Development Bank devotes approximately \$500 million per year to education, of which roughly \$70 million goes to in science and technology and higher education. Like the World Bank, the Inter-American Development supports engineering-related activities in the areas of national science and technology public policies, basic and applied research, technology transfer services, as well as standards and technological services.

The Knowledge Partnership Korea Fund for Technology and Innovation (KPK) was recently added to the menu of options that the Inter-American Development offers its Latin American client countries. With an initial contribution of \$25 million in 2005, this Fund was established to support the development of technological capacity, institutional strengthening, competitiveness and the adoption of new production technologies in the region, with small grants usually in the \$50-\$500 thousand range that require co-financing².

Other regional development banks and bilateral donors also implement programming with similar emphases. The United Nations supports and participates in exciting developing activities of relevance, including technical training, skills development and continuous learning (the International Labour Office) and SchoolNet (United National Education and Scientific Office).

A more pressing question for many is whether pursuing international funding organization opportunities is worth the effort.

Box 2 – Sample Project - Argentina Technological Modernization III - \$510 million

This 2006 Inter-American Development Bank (IDB) project, developed in conjunction with Argentina's Secretariat of Science, Technology and Innovation, was designed to consolidate a broad-based scientific capacity as well as to foster innovation and technological development in the Argentine productive sector.

The project continues to utilize horizontal, sector-neutral instruments based on free competition by firms and research and development (R&D) institutions used in the prior two phases, but it also tries to adopt more active policies, such as promoting cluster development and productive districts, always guaranteeing the use of transparent criteria for the allocation of financial resources.

The project supports consortia networks of public-private partners, promotes innovative approaches like placing researchers in companies to foster industry-academia collaboration, and provides institutional support to Argentina's Science and Technology organizations.

Source: Argentina Technological Modernization III project, Loan Proposal, Inter-American Development Bank. www.iadb.org.

Navigating the International Funding Organizations: Is It Worth the Effort?

There is no question that International Funding Organizations across the globe prioritize investments that improve the quality and relevance of tertiary education, increasingly incorporate ICT into the learning and every day environments, and strengthen science and technology research and development capacity - and that engineering educators have the expertise to successfully get involved. How does one go about securing these opportunities?

It would be misleading to claim that doing work with the International Funding Organizations is easy or straightforward. It definitely takes work, effort, and patience. A few suggestions about how to develop an effective strategy follow:

1. **Knowing one's products, services, and their limitations:** Before seeking opportunities with the International Funding Organizations, a company or university must think seriously about what services it has to offer. In doing so consider it should consider whether its experiences (even if just in the United States) could be logically applied to new geographical areas and new sectors. Too often companies and academic institutions think, for example, that they should compete for opportunities in India or China because "They are Big", even though their products are almost exclusively geared toward small island economies.

2. **Identify the right institution(s) and focus:** It is hard enough to monitor all possibilities in one institution let alone a dozen. It is helpful to review the mandates and focus first in one or two institutions, learning about the various stages in a project's cycle, influencing and advocacy points, and engagement process. Then a "fit" analysis with a company's or university's capabilities is necessary to understand, for example, if its skills most heavily align with project preparatory work and initial studies that are led and outsourced directly by the World Bank or if the organization is more suited to pursuing procurement opportunities at the country level, where the bulk of the funds and projects implementation takes place.
3. **Gathering data and intelligence:** Once a company or university has considered its sectoral and geographical interests and the institutions that best suit its expertise, it is important to fully understand the donor's policies and programming approach. On the websites maintained by the various institutions it is possible to find sector policy papers (such as on Information Communications Technology (ICT) and education) as well as country-specific strategy papers (for example the Country Assistance Strategy; Poverty Reduction Strategy Paper) and projects. These papers will provide valuable insight into how and where specific expertise might be required. When projects of interest are identified, project documents are also available on the banks websites and should be considered mandatory reading when pursuing an opportunity.
4. **Build the relationships:** A good way to start as an American company or university is with the United States Government's Commercial Liaison officers – at least one is attached to every development bank. They are able to provide up-to-date lists of projects that advise of opportunities. Additionally, an organization pursuing these opportunities should meet the donor project managers, who are in charge of preparing the loans and grants, as well as their counterparts in the government, if possible. Over time, it may be important to meet donor specific sector specialists from the key areas of education, science and technology, private sector development and competitiveness, to understand their views and to provide them with information on one's skills and capabilities. Finally, meeting the donor's senior management and building in-country political relationships can greatly influence a successful outcome in a competitive bid or proposal.

Creating the right partnerships

One of the notable and positive changes in international development over the past fifteen years is the growing reliance on innovative partnerships to deliver development assistance. Whereas traditionally, international funding organizations have relied exclusively on national government ministries in recipient countries, players from the private, academic, and non-governmental communities are bringing much needed expertise and on-the-ground experience to development projects. Institutions and firms interested in doing business with the international funding organizations are well advised to consider how their expertise and skill-set could be enhanced through strategic collaboration with others from both the developed and developing world.

Argentina's physicist Jorge Sabato developed the "Sabato Triangle"³ several years ago highlighting the importance of academia, industry and government in affecting a national

innovation system (NIS). As important as the nodes themselves, he highlighted the relationship and interactions between them as a key to producing effective results. In the case of International Funding Organization procurement opportunities, for a very small or narrowly focused project or opportunity, an American company or university may decide to participate on its own. However, the complexity to tackle the challenges related to engineering education, science and technology, will often require a more concerted and integrated approach.

Partners bring together different expertise and capabilities, help fulfill resource requirements and needs, and increase the collective chance of a successful bid or proposal when coordinated appropriately. In some cases, there could be merit in joining forces with a consulting firm or non-governmental organization seasoned in doing business and engaging with the International Funding Organizations. In other cases, the greatest value-added could be gained from a partner located in the country of interest. Still in other cases, the particular opportunity may require counterpart monies – funds that might most easily be found through a private sector collaborator.

There are several examples of how entire International Funding Organization programs have been built around multi-sector partnerships. One program that could be of interest to American engineering educators is the Global Development Alliance (GDA) funding instrument - one of the four pillars of the United States Agency for International Development (USAID). Unlike many other programs, the Global Development Alliance looks to partners from various sectors of society -- corporations, foundations, and non-government organization (NGOs) -- to bring their strongest assets to bear by jointly designing, implementing, and contributing to the financial or in-kind resourcing of “alliance” partnership projects that contribute to broad program objectives in a particular country, but that are not defined in advance by the staff from United States Agency for International Development.

**Box 3 – Sample Partnership - Philippines –
Assistance for the Comprehensive Educational Development of Mindanao
(ASCEND-Mindanao) Project**

In December 2003, the United States Agency for International Development (USAID) invited prospective partner organizations to form public-private alliances to carry out activities in support of its educational program objectives in the Philippines. In response, the Pacific Resources for Education and Learning (PREL - an American not-for-profit), Save the Children USA, the local Mindanao Business Association, and the Philippine Department of Education, alongside Philippine universities, came together to develop and jointly implement the Assistance for the Comprehensive Educational Development of Mindanao (ASCEND-Mindanao) Project.

The goal of this “ASCEND-Mindanao” private-public initiative was to increase learning opportunities for children and youth in some of the poorest municipalities and provinces in Mindanao—the southernmost island in the Republic of the Philippines. In particular, the project sought to enhance the curriculum and instructional materials for English, Math, and Science and secondly to improve the employment opportunities for out-of-school youth. The partners packaged their skills, expertise and knowledge in such a way that the United States Agency for International Development approved funding for this initiative.

Source: United States Agency for International Development, Republic of the Philippines website: EQuALLS project overview. http://philippines.usaid.gov/oed_equalls.php.

Benefits

While just one example, the Assistance for the Comprehensive Educational Development of Mindanao (ASCEND-Mindanao) Alliance illustrates how innovative partnerships can be both professionally rewarding and profitable. For companies and academic institutions willing to tackle the challenge of pursuing International Funding Organization monies, the rewards are numerous:

- Securing additional funding streams and resources: significant monies are flowing into emerging markets in the fields of engineering education and science and technology that can be leveraged for public-private partnerships, creating consortia of academic networks and / or bidding into specific project components and consultancy engagements. Furthermore, given the operational procedures and matrix-style organizational structures of these institutions, there are often opportunities to replicate successful projects.
- Enhanced reputation and branding: although in some cases International Funding Organizations have been criticized and their public image hampered, in many countries they possess significant convening power and a strong reputation for competence and knowledge

when implementing development projects. This in turn can create good-visibility and branding for the associated company or academic institution.

- Identifying and developing strategic new partnerships: since the International Funding Organizations operate in over 150 emerging markets, and deal with a large variety of sectors and issues, their projects encompass a whole range of potential partners like government agencies, other companies and / or academic institutions, civil society organizations (CSO), and others. Working collaboratively with these partners, American academic institutions come away with insight into new processes and improved insight into local cultures and societies.
- Risk reduction: in some cases it may be wise for a company or university to mitigate its exposure to a new market, concept, or approach, and in that sense the International Funding Organization's systemic approach and guidelines can serve as a framework for risk containment and mitigation strategies.

Conclusion

There is a real and growing need for engineering talent in developing economies around the world. In response, International Funding Organizations are dedicating significant funding to address this shortage – through the contracting of engineering services to design and deliver individual projects as well as to build the indigenous human resource capacity in poorer countries. Opportunities to participate in such initiatives are available for members of the American engineering education community who may be interested.

How to pursue such initiatives may not be obvious or easy at first glance. However, there are strategies that can be adopted to successfully secure international development-related involvement. Such strategies center on being selective about the international funding organizations, activities, and/or geographical areas that best suit the skills of each education institute. They also emphasize seeking out creative partnerships with other institutions that may enhance the overall skill set and experience that leads to both a successful bid and project outcome. The positive benefits to the American engineering education community of becoming engaged with international funding organization programming is notable, from a financial, visibility, and learning perspective.

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