

Engineering for the Americas – Focusing on Engineering Education Innovation and Accreditation in Support of Economic Development

Lueny Morell, Wayne C. Johnson and Dan Marcek
Hewlett-Packard University Relations
Mailstop 1167
1501 Page Mill Rd.
Palo Alto, CA 94304-1100

Emails: lueny.morell@hp.com; wayne.johnson@hp.com; daniel.marcek@hp.com

Abstract

Globalization is radically accelerating the pace of change around world's economy. As the World Bank states, it is clear that technology and knowledge will form the basis for meaningful economic development. Countries wishing to develop their knowledge based economies must focus on key issues, largely dependent on the capabilities of people, credentialed in meaningful, consistent ways. If technology is to be the base, engineers, then, are the central group in taking knowledge and generating output that results in sustainable growth. This paper describes a grass-roots initiative called Engineering for the Americas focused on developing plans for enhancing engineering education and practice throughout Latin American and the Caribbean that is being carried out by many organizations and in conjunction with the Organization of American States.

Introduction

In its March 2000 Lisbon Summit, the European Union (EU) set an ambitious target for itself: that Europe "would become during the next decade the most competitive and dynamic knowledge-based economy in the world". Non EU nations who want to be considered for EU inclusion have realized that they need to develop their knowledge based economies. Thus, the World Bank recommends these nations to concentrate all their efforts on four major areas [1]. The basic premise is that knowledge is becoming a primary factor of production, in addition to capital, labor, and land. In fact, many economists now argue that it has become the most important component of production. The result of a knowledge economy is improved quality, reduced costs, better adaptation to consumer needs, as well as new, innovative products. Conversely, there is an increasing digital, scientific and technological divide between developed countries that are exploiting knowledge, science, and technology for economic well being; compared to those less developed countries (and less developed regions within countries) that are not adequately participating in this revolution.

In the *World is Flat*, Tom Friedman [5] suggests how the world is in its 3rd globalization wave, one that is governed by people and communications. He states that the flattening of the world happened at the dawn of the twenty-first century, and that countries, communities, individuals governments and societies can, and must, adapt to the challenges that this

'flat world' presents. Thus, globalization is making both developed countries and those in development think about effective and efficient strategies that will advance their economic and social development agendas. Many countries around the world have made significant strides in the past ten years in laying the foundations for market economies and democratic societies to flourish. For many of them, that progress is now recognized worldwide. Countries like Taiwan, Singapore, and Ireland come to mind.

What are World Bank's recommendations to the countries that want to develop their knowledge-base economies?

1. **Education & Training** - an educated and skilled population is needed to create, share and use knowledge.
2. **Information Infrastructure** - a dynamic information infrastructure-ranging from radio to the internet-is required to facilitate the effective communication, dissemination and processing of information.
3. **Economic Incentive & Institutional Regime** - a regulatory and economic environment that enables the free flow of knowledge, supports investment in Information and Communications Technology (ICT), and encourages entrepreneurship is central to the knowledge economy.
4. **Innovation Systems** - A network of research centers, universities, think tanks, private enterprises and community groups is necessary to tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new knowledge.

Thus, what is being recommended is to 'use knowledge for development'. And people, with the right set of knowledge, skills, competencies and values are the key. It is people in government, academia and the private sector who develop the information infrastructure, the economic incentives and institutional regimes and the innovation systems needed. The US has long set the world benchmark, but the World Bank provides these nations with multiple examples of nations who have addressed these four points systemically and efficiently... Cases like Finland, Ireland and Korea are clear examples, where significant reform and investments have been made in their science and technical education and innovation systems.

And how stakeholders approach these challenges will make all the difference. Johnson [2] states that collaborative engagement will be the norm in the knowledge and information exchange wave. Yet, stakeholders need to figure out all the ways for successfully and easily collaborate on a broad scale.

Indeed, we have seen the emergence of industry, university, government collaboration as a strong basis for addressing issues of systemic change. Over the course of recent history, partnerships have formed the basis for an increasing number of social and economic challenges faced around the world including issues of intellectual property, diversity, women in engineering and other technical fields, technology as applied to education, and basic infrastructure needs of developing countries.

As we face a global future, potentially much different from our nationalistic past, all sectors are beginning to realize the importance of education and collaboration to creating the resources necessary to engage, compete, and win in knowledge-based environments. Only through sincere commitment to solving fundamental challenges will progress be made – all interests must necessarily be included if we are to hope for change that is sustainable.

One area where notable collaborations are underway is engineering capacity building as a vehicle to sustainable economic, social, and human development. Governments, civil society, and the productive sector are working together to find new ways to deliver value to global markets while planning and investing in creating ecosystems based on technical expertise and an ability to evolve invention and innovation as core values of our societies in the future.

Engineering Capacity Building

If technology and knowledge will form the basis for meaningful economic development, given that globalization is radically accelerating the pace of change and raising the long-term stakes, it is clear that success in knowledge-based economies will depend largely on the capabilities of people, credentialed in meaningful, consistent ways. Engineers, then, are the central group in taking knowledge and generating output that results in sustainable growth.

To effectively compete in the knowledge-based economy, developing countries need a large enough pool of high quality, accredited engineering graduates so that the good results listed above can be realized. It must be recognized that there will be some leakage of these graduates to jobs in developed countries, but many will choose to stay where family ties and native country culture provide a comfortable environment. Economic development for developing countries can be effectively stimulated by building the technical capacity of their workforce, through quality engineering education programs. A competent technical workforce base can then provide several paths to economic development: attraction of technically oriented multi-national companies, who can invest effectively in the developing country once there is a cadre of qualified local employees available; effective utilization of foreign aid funds, providing a legacy of

appropriate infrastructure projects and technically competent people to operate and maintain them; and small business startups by technically competent entrepreneurs. Both UNESCO and the World Federation of Engineering Organizations are currently actively engaged in technical capacity building in developing countries [2].

High quality engineering education is a necessary forerunner to such economic development; and quality assurance systems such as peer review based accreditation are needed to promote high quality education programs and establish degree portability and mobility. Such quality assurance systems can then provide the basis for cross-border recognition systems, permitting the flow of services and goods across national boundaries.

In addition to increasing the number and quality of engineering graduates and pursuing strategies designed to meet local needs, developing countries need mechanisms to apply research and development results from local universities and companies for economic gain. Such mechanisms as incubators and small business development financing are also needed in the mix.

Engineering for the Americas

This grass-roots initiative being carried out by many organizations and in conjunction with the Organization of American States is focused on developing plans for enhancing engineering education and practice throughout Latin American and the Caribbean [3,4]. The OAS Ministers of Science and Technology issued a major declaration in support of this capacity building effort at their meeting in Lima, Peru in 2004. A subsequent meeting held in Lima at the end of November 2005 attracted over 200 participants from the corporate sector, universities, national governments, and NGOs from throughout the hemisphere. Funding was provided by the U.S. Trade and Development Agency and several corporations, and was used to support attendance by over 100 of the participants. Results included defining the needs of the sector, steps necessary to enhance and ensure the quality of engineering education, and country-level financing and planning of capacity building efforts. A follow up meeting was held in Puerto Rico in January of 2006 and a steering committee and several action oriented sub-committees have been set up to pursue the recommendations from the November 2005 conference.

Plans for this year and next include offering of regional workshops on engineering education innovation and reform, quality assurance and assessment, and, technology innovation. Engineering for the Americas team is focused on the creation of a comprehensive partnership committed to advancing the Mandate as set forth by Ministers in the Lima Declaration, and is pursuing government, academic, industry, professional societies, accreditation agencies, and a variety of funding institutions to invest in building engineering capacity and sustainable competitiveness throughout the Americas.

Conclusion

Engineering for the Americas focuses on the future, providing a framework and resources for our continued



Figure 1 Engineering for the Americas Leaders, Lima, November 2005

efforts to reform engineering education, economic systems and create the policy frameworks, economic incentives, human capital, infrastructure and innovation capacity that will enable the Americas, and especially Latin America, to compete and delivering benefits to all sectors of society. Engineering for the Americas clearly demonstrates that cooperative efforts can successfully address issues of capacity building through coherent partnership and develop hope for a brighter economic future. This collaborative/federated model will definitively achieve more than a stand alone strategy.

References

- [1] "Knowledge for Development" published by the World Bank Institute, 1998 www.worldbank.org/eca/knowledgeeconomyreference
- [2] Johnson, Wayne C. "Challenges in University-Industry Collaborations", Chapter in Universities and Business: Partnering for the Knowledge Society, Luc E. Weber, James J. Duderstadt, Economica, 2006, pp 211-230.
- [3] Jones, Russ C., "Impact of Capacity Building On the Mobility of Engineers", WFEO Congress on Engineering Education, Budapest, Hungary, March 2006.
- [4] Morell, Lueny, Abreu, Alice, Chelensky, Marta, Jones, Russel C., Marcek, Dan, Scavarda do Carmo, Luiz, Spencer, John, Ramos, Teófilo, Yutronic, Jorge, "Engineering Capacity Building in Latin America", ASEE 2006 Conference Proceedings, June 18-22 2006.
- [5] Friedman, Thomas, L. *The World is Flat*, a Brief History of the 21st Century, Farrar, Straus and Giroux, 2005.
- [6] Scavarda Do Carmo, Luiz, Russel C. Jones, Lueny Morell, *Engineering for the Americas*, 2005 ASEE Conference Proceedings, Portland, Oregon.

Biographies

Lueny Morell, M.S., P.E., is Director of University Relations for Hewlett Packard. She is responsible for relations with universities throughout Latin America and the Caribbean. Before joining HP, Lueny was full professor of Chemical

Engineering at the University of Puerto Rico – Mayagüez (UPRM) where she held positions at the Campus and UPR system level, including director of the UPRM R&D Center. Recipient of the 2006 US National Academy of Engineering Bernard M. Gordon award, and a member of the Pan American Academy of Engineering, her work in curriculum, research, accreditation and economic development activities has been published in more than 40 papers, book chapters and journals.

Wayne C. Johnson is the Vice President for Hewlett-Packard Company's University Relations Worldwide, located at HP Laboratories in Palo Alto, California. He is responsible for higher education programs in research, marketing and sales, recruitment, continuing education, public affairs and philanthropy. Johnson joined HP in July 2001 from Microsoft's University Relations department where he managed Program Managers and administrative staff across a customer base of 50 tier-one universities. From 1967 to 2000, he held a variety of positions at the Raytheon Company in Lexington, Massachusetts, including National Sales Manager for Wireless Solutions, Manager of International Financing and Business Development, Manager of Administration and Strategic Planning for Raytheon's Research Division, and Manager of Program Development and Operations for Technical Services.

Dan Marcek is Deputy Director of HP University Relations, is responsible for development of HP strategy for and engagement with select university partners worldwide. Dan has been involved in managing HP university relationships since 1997 and is responsible for a wide range of institutions – from small, Ivy-league campuses to some of the nation's largest publics. He is also focused on exploring international opportunities for partnership among government, industry, academia, and NGO's to develop higher education systems, based on quality assurance mechanisms, that foster systemic improvements that create new business opportunities for HP.