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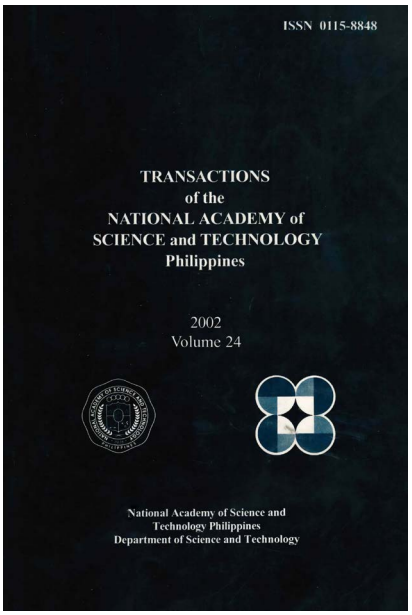

Confronting Global Challenges in Engineering

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CONFRONTING GLOBAL CHALLENGES IN ENGINEERING

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ABSTRACT

Challenges in engineering in the field of telecommunications include: (1) the growing complexity of the network of telecommunication with requirements for engineering resources in radio, transmission and switching and more importantly in IT and systems integration fields; (2) high content of proprietary technology or software; (3) the privacy of information and communications, and security of systems. Concomitantly, there is always the pressure to get the best talents in electronics, communications and software engineering fields. To remain competitive, the widening gap in knowledge between developed and less developed countries must be addressed, ensuring that the latest trends and technologies are immediately available and understood in the country. The needs of the industry in terms of number and quality of graduates of appropriate engineering disciplines must be met. The number of engineering programs especially in electrical engineering and computer sciences should be increased. To assist in improving engineering education and research, the tools of digital age such as distance education and the internet should be maximized. Alliances of local schools with leading universities and industry leaders abroad should be explored. Government and industry should work together to improve the quality of education and the quality of teachers at the primary and secondary levels.

Keywords: engineering, telecommunications, IT, proprietary technology, software

INTRODUCTION

Within our own company and our industry, we have seen many challenges in engineering that have far reaching implications for our competitiveness. For example, four global trends that have already reached popular headlines will have

direct influence on our country: (a) nano scale technologies, (b) the rise of IP or the Internet Protocol, (c) genetics, and (d) environmental engineering. Work in these fields has the potential to radically transform electronics, communications, medicine and our environment. Allow me to focus on my industry, telecommunications.

THE CHALLENGES

The collapse of the dot-com craze and the severe debt burdens on telecommunications companies worldwide have led to sharply lower purchases of equipment as well as a dramatic slowdown in research. In our own country, we have been fortunate that telecommunications has continued to be a key driver of economic growth, especially with the intense competition for customers among the GSM operators. The resulting pressure to grow networks and cover as much of the Philippines as possible has led to requirements for engineering resources, at the very least in radio, transmission and switching, but as importantly, in IT and systems integration fields. Today, this pressure to get and keep the best talent in electronics, communications and software engineering fields remains.

In addition, new telecommunications technologies have resulted in increasing demands of our engineers. The growing complexity of the network, the high IT content in network dollars (we estimate, for example, that as much as three-fourths of our capital expenditure in dollars is spent on intellectual property (IP) or software) and more demanding customers puts a significant burden on our engineers to ensure that networks continue to grow yet meet high quality and availability standards.

More specifically, our traditional voice networks are giving way to emerging technologies such as the increasing or sole use of IP in the network. This requires a totally different paradigm in communications, and completely different disciplines for our engineers. Understanding IP in the network continues to be a challenge for our engineers even as our customers and the underlying economy benefit from reduced costs and rapid deployment arising from these new technologies.

Traditionally, while smaller start-up companies drive the cutting edge of technologies, the bigger and more established companies such as Cisco drive the large scale, global deployment of such new technologies. We operate in a world of dilemma between the need for inter-operability, and the introduction of proprietary technologies by such big companies.

Finally, a specific engineering challenge in telecommunications relates to the privacy of information and communications, and security of systems. Unless engineers, schools, the industry, or we squarely face these challenges, we run the risk of creating an entire generation of engineers who do not have the needed knowledge and skills to be competitive in today's world. Our engineering talent is the envy of all, and global companies continue to poach our engineers to be put to work where their creativity, hard work and troubleshooting skills are second to

none. More than at any time in our history, a legion of engineers support, among others, railways in Europe, semiconductors in California, automotive plants in Japan and software shops here and in the U.S., reinforcing the country's reputation in creating a skilled engineer class.

HOW DO WE REMAIN COMPETITIVE IN ENGINEERING?

Allow me to state the key challenges that I see in engineering from a different perspective. First, we must address the widening gap in knowledge between developed and less developed countries, and between the Philippines and the U.S. We all must ensure that the latest trends and technologies are immediately available and understood in our country. The gap in knowledge is the result of distance, less resources and lack of initiative. Second, matching the supply of engineering degree graduates to demand is vital to ensuring that engineering continues to be an attractive profession. We have to match numbers, which itself is a challenge because there is typically a two-year gap between demand from industry and the response of universities. But we also have to match the appropriate engineering disciplines and the content of student learning. Third, we do not have enough depth or numbers in our MSc and PhD programs. Such advanced programs, either in the Philippines or in cooperation with schools overseas, are important in creating an environment of creativity and problem solving necessary for our engineers. Fourth, research money is almost non-existent compared to our neighbors, much less compared to developed countries. Finally, we have a low level of math and science proficiency in our primary and secondary education.

I urge our universities and educators to always benchmark engineering programs against those programs that compete with engineering, such as math or sciences programs, and to benchmark such programs across universities and countries. Also, specifically to improve our country's competitiveness, I urge all of you to significantly increase our electrical engineering and computer sciences or engineering programs. This is very much in line with your theme this year, "enhancing Philippine science and technology through information and communications technology, or ICT."

To confront such challenges requires a long-term view of education and development, but at the same time creativity in our response. First, we should maximize the use of tools offered by the digital age. For example, knowledge can be better disseminated through distance learning, and research facilitated by the Internet. Second, we must explore deeper relationships and alliances with leading engineering schools and laboratories overseas. Such alliances today already occur with industry and specific companies, which has enhanced training and exposure, but we should broaden cooperation into all levels of the educational and research systems. Third, we should encourage faculty and students who have creative ideas during their work to "spin off" such ideas into companies. This will ensure that entrepreneurial spirit is alive. I am sure that industry would welcome valuable

opportunities to work with such spin off companies. In Globe, for example, we work with various companies who offer interesting content for our mobile subscribers. Such companies are typically small start-ups whose genesis are ideas. Fourth, we must pay attention to the quality of teacher preparation and continue to set high standards in our programs. Finally, we must have government and industry work together to significantly improve our math and science curriculum and standards at the primary and secondary levels. We cannot solve all ills of education and must concentrate resources where they can create the biggest impact. The best way to do it is to provide resources to those who at an early age demonstrate aptitude and willingness to devote their studies to math and sciences, because it is from these students that we will draw tomorrow's engineers.