GLOBALISATION LINK : INDUSTRY-ENGINEERING EDUCATION-RESEARCH

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Abstract

There is no doubt that the challenges presented by globalisation are great and the drive is exponential. Competition in the advancement of science and the conversion and application of science into technology is very fierce. It has become a race. With the implementation of GATT, more scientists and technologists will be working towards globalisation; working locally and thinking globally, particularly when marketing these technologies, is going to be the name of the game as we approach the next century.

GLOBALISATION : NEW CHALLENGE TO ENGINEERING EDUCATION

Universities will increasingly compete in two areas. The first is in the quality of education – the quality of their graduates – because the opportunities for graduates will be global. Big corporate will be hunting worldwide for the best graduates to incorporate into their organizations. In a global market, the competition will be fierce indeed. Secondly, competition will be in research and development (R&D). Research scientists will be increasingly involved in competing for R&D, for quality of research, which has a target. A target could become what I call an edge in a competitive market.

Human development will be vital in order to harness science and technology for sustainable development. We should not forget that the preparation of human resources to meet the challenges of the future is a MUST, a top priority in any scheme, because development in the future will be knowledge-intensive, brain-intensive. It is not going to be, as in the past, when natural resources and wealth were the most important factors. The most important factor is the mind of the human resource, how to invest in these minds in term of higher education learning, and how to develop industry, which is brain-intensive.

As we approach the 21st century, mobilizing science and technology for development appears to be the very way to endogenous capacity building of human resources for generating wealth and ensuring the quality of life for all citizens. The current century of this millennium, which we are about to turn the page on, has been characterized by explosive growth of information and knowledge gained through scientific research. As a result of the technological application of this knowledge, we have witnessed evolutions of new materials and a revolution in informatics and in electronics. The 20th century has been the atomic age – a disaster, whether, for pro or con. It has been the new biology age; after the discovery of the Helical Structural of DNA, a new genetic engineering came into the picture. And it has been the space age, and the age of understanding of the

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organization of the universe.

With the depth of scientific research, many fields of distinct disciplines, which were in the past regarded as separate, are increasingly coming together to give birth to interdisciplinary science and research. Like the fall of the Berlin Wall, the walls between disciplines will fall. And new disciplines will emerge where physics, mathematics, biology merge in application; new engineering fields will emerge, just as the field of genetic engineering recently has. The drive towards the interdisciplinary is fuelled by market forces, because dealing with new materials has to be addressed by an interdisciplinary approach. Mathematicians, engineers, business people and chemist sit together on the same laboratory bench to discover, to invent, and to innovate.

The scale of advancement of science during the last three decades has exploded beyond one's imagination. There is no doubt that with the end of the Cold War, economic competition has replaced defence interests as the major force pushing basic scientific and engineering research. This economic, or market force is going to continue into this millennium, and it is going to expand, and we think it will govern the evolution of engineering education, in particular the linking of engineering schools with industry. This obviously will dictate a restricting of many schools, and of science, with an emphasis on the interdisciplinary for problem solving.

The clear message for institutions of higher learning is that in this increasingly global market they must think globally in terms of their two main areas of operation. R&D and the production of human resources. To become competitive, academia must work closely with its primary client, industry.

ACADEMIA – INDUSTRY LINKS

Cooperation between universities and industry is a useful strategy for technological capacity building in industry. The strategy is based on the fact that universities and research institutes generate knowledge through research, while industries utilize this knowledge. Thus, an industrial development strategy must, of necessity, foster collaborations between those who generate knowledge and those who utilise it. Such a cooperative effort, in fact, enables universities to perform their traditional roles of providing service, education and research results to the community.

The second objective is the stimulation of research in universities and other institutions of higher learning. There is an obvious tendency on the part of both sponsors and researchers to lose interest if the products of their work are not utilized. At the same time, stimulating contractual research generates income for universities. As you are aware, many universities are faced with budgetary problems, with budgets barely sufficient for teaching purposes. It is necessary to find funds to buy equipment, to facilitate laboratories, and to support Ph. D. candidates and graduate students. Industry is extremely important in providing the extra dollars for the university – to upgrade Professors' salary, to facilitate the equipment and teaching facilities, to help teaching staff attend conferences, to help them publish, and to help to get assistance for graduate students supported by research grant.

The third and final objective of the transfer of research results to industry is the enhancement of the technological capability of the industrial sector, and consequent increase in economic activity. We think it is extremely important that industry benefits from this marriage, otherwise it will not continue to contract the university for research purposes. If industry does not benefit, whether in the long term or in the short term, then the whole linkage of academia with industry will fail. It is extremely important for the academic researcher to orient himself-though not entirely – toward making industry happy. This obviously will lead to better cooperation and also to better competition in a global market.

RESTRUCTURING R & D

Throughout history, academic institutions contributed to breakthrough in scientific achievements. This was led by the intellectual curiosity of scientists. Science has always been universal, and new knowledge has flowed freely across the frontiers of the globe. With the birth of market economy, new knowledge became extremely important for commercialization. Patents of innovations of new knowledge started to expand at the expense of free knowledge available in literature. It is our expectation that the number of publications in the next century will decrease and the number of patents will increase driven by market forces.

Increasingly, with the global expansion of the free-market economy and increasing dominance of industry as the principal source of funding for research which generates knowledge, more trends toward secrecy of research are expected; there will be a cap on the free availability of new knowledge through the corporate contractual funding of research with academic institutions, or through the expansion of corporate R & D centers. The drive of competitive markets will result in less R & D done by governments and public institutions, and most R&D done by the funding private sector. Any knowledge, which may have an application in the future, is going to be patented, or if not patented (because knowledge cannot be patented until it has an application), it is going to be kept secret. This represents a challenge to international corporations in terms of their provision of knowledge. Universities always were the centers of knowledge in the past, and we hope that universities will continue to be the center of free knowledge, although we are aware that the academia link with industry will dictate some rules and restrictions. So there is also a negative aspect to this otherwise positive linkage of academia with industry, in terms of the availability and dissemination of knowledge, which is generated by universities through the support of industry.

CONCLUSION

For better or for worse, the world does not go forward in the linear clock time manner, but rather by instabilities and eruptions. We must reach a point of no return where democratic values and the culture of peace subsumes our societies. To this end, the universities are essential. They are at the heart of the generation of knowledge. And they should stay that way. No matter how we develop and construct research in the university for industry, a large part of the work of the researcher should be disseminated free of charge. And this is where we have to strike a balance between how much of our research should be contracted to industry, in which case it ends up in secret files and patents, and how much of our basic research should be directed towards scientific publications in the journals, where knowledge is freely disseminated. It is extremely important that universities plant the seeds of peace in the minds of men. This is our objective at Engineering Education Foundation, Pune, to plant the seeds of peace in the minds of men through education and through development; to save future generations, to stop violence, to stop hatred and to stop wars and conflict among nations.

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