

Engineering a future

By P B Sharma

Degree programmes in engineering and science disciplines have remained a prime attraction for school leavers in this country, ever since Independence. The enthusiasm with which the student community turns towards engineering and science courses has witnessed a large number of applications that are received for the entrance tests in engineering, such as JEE for the IITs wherein over 1,00,000 applicants compete for approximately 2,500 seats. The same is the case for the highly competitive entrance exam for the Delhi College of Engineering (DCE) and other premier institutions, such as the University of Roorkee and the Regional Engineering Colleges.



One of the main strengths of our engineering education is that it has retained its bias for merit-based admissions, thus encouraging competitiveness. Secondly, engineering and technology education in India has constantly nurtured the science base of modern engineering, alongside core major engineering courses. This has provided avenues for meaningful integration of science with engineering and technology. Modern technologies heavily lean towards scientific analysis for continued improvement in product design, improvements in process efficiency and for an overall increase in the efficacy of the system. A strong component of industrial training and project work forms an integral part of the curriculum, in addition to well-coordinated laboratory exercises in Indian engineering courses. This promotes problem-solving capabilities in students.

With the above backdrop, it is not surprising that engineering education in India has received widespread recognition from the advanced nations. Engineering education in the IITs and in some select institutions such as the University of Roorkee and the DCE, is considered superior to many good universities in the advanced countries. This superiority is primarily because of the focus on quality and strict adherence to merit in admission. The competitive edge which Indian engineering institutions have developed in engineering and technology education, is attracting foreign universities from America, England, Canada, Australia, France and Germany, to India, to seek students for their post-graduate and research programmes. This reflects positively on the competence of our engineering graduates.

I wonder, however, that despite having world recognition for the quality of our graduates and post-graduates, why is it that the Indian engineering institutions such as the IITs, University of Roorkee, Madras University, and Anna University, do not actively seek foreign students? Perhaps we are allowing our territory to be visited by outside universities to take advantage of the competence which we generate in our students. Our own institutions which impart high quality under-graduate

and post-graduate education, are not currently having any policy initiative to take advantage of equally bright students in other developing and developed countries, who could receive quality technical education at an affordable cost in India. Such an initiative will also reduce the burden of fees on Indian students. There is a genuine need to consider this aspect in our future policy plans.

Another point of concern is the multiplicity of entrance exams which prevails. Even in Delhi, one has to appear for JEE for the IITs, CEE for DCE, another entrance examination for Jamia Millia Islamia and a combined entrance exam for the Regional Engineering Colleges. In addition, the students often appear in the various state-level examinations. The multiplicity of entrance examinations is breaking the back of energetic school leavers who turn towards engineering education in great numbers. The students are nearly exhausted while taking admission in an engineering institution. The urge to pursue engineering as a career on completion of the degree programmes gradually disappears, giving rise to an intense desire to become a manager or a computer software personnel. It is high time that we resort to a single entrance examination in engineering and technology disciplines. The task appears to be monumental but is not difficult as the experience of GATE (a common entrance examination for post-graduate engineering courses conducted by the IITs) is already with us.

The science base of modern engineering plays a significant role in the advancement of knowledge and its application in areas like information technology, electronics and communication, instrumentation and control, and computer engineering. In these disciplines, the scientific innovations create an urge for rapid technology change, thus providing for a greater integration of science with engineering. In areas like mechanical, electrical and civil engineering, the scientific innovations also have a role but not at the same pace and speed at which they are currently influencing the areas listed above. Even so, the improvement of system efficiency and modernisation of processes are to be constantly examined from the point of view of a continued improvement in quality and cost competitiveness. A scientific temper in engineering will lead to energy and resource optimisation, thus reducing the cost further. This will also give rise to opportunities for zero waste manufacturing, total quality management and green productivity in production. The scientific basis of engineering is, therefore, required to be embedded in the design of engineering curricula in a way that while the core of engineering is well served, its understanding and application is enhanced by including the scientific tools of decision making.

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Can India Meet the Challenges of Global Competition – Yes, India Can Do It

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ABSTRACT :

With the globalization of Indian economy some ten years ago it was assumed that Indian Industry and business houses will be able to scale the vast international market thrown open by the globalization and liberalization of economies around the world. However, the Indian industry could not shake its inertia nor could create global competitive edge through the development of innovative cost effective products and services. It appears to be loosing the opportunities of the global economic era. The author identifies the gray areas for immediate attention and argues that India can still do it.

1. INTRODUCTION :

The bold initiative to globalize and liberalize the Indian economy was taken by the government way back in July 1991. It was thought that a large nation such as India having its deep rooted tradition of scholarship, knowledge cultivation and business orientation of its economic systems shall benefit immensely by the vast market which shall be reachable in the liberalized economic era. It was also thought necessary to take full advantage of the science and technology developments around the world by working together in the globalized economy. The globalization and liberalization of the economy thus raised high hopes in India to harness the opportunities of a globalized economy to India's advantage. It was thought that the inertia for change with which the Indian industries and the business systems were riddled for a long time would give way to a wave of enthusiasm for improvement of productivity, work culture and overall rejuvenation of economic systems.

However, if we look back at the pattern of development and growth of economy in the last ten years we find that while the opportunities of globalization have ever remained an excitement to date, the threats of globalization have worked much faster than anticipated. The Indian manufacturing industries having low worker's productivity have nearly been crushed by the inflow of foreign goods and products with the opening of the gates through the GATT agreement. The safeguards which were necessary to allow the Indian industry to come up to take the challenge of global competition have been unfortunately forgotten. Compared to India countries with large population such as China have done remarkably well during the last ten years. They have strengthened their manufacturing industry to tune to effective, innovative and highly productive systems. In fact the Chinese manufacturing industry has emerged as one of the strongest in the world, today flooding the markets in USA, UK and India with globally competitive quality products. Countries like Singapore have also taken the best advantage of the global competition and have emerged as one of the frontline leaders in the globalized economy environment. India on the other hand has scored a miserable 49th position among the fifty developed and developing nations in respect of taking advantages of the globalized economy.

2. OPPORTUNITIES OF THE GLOBALIZED ECONOMY :

The globalization and liberalization opened immense opportunities for Indian industries and organizations to respond to the challenges of quality and product innovation. With a strong base of S & T manpower and basic infrastructure for technological excellence, it was indeed a golden opportunity for the Indian industries to emerge out as leading players in the manufacturing sector. But the inertia of the protected economy has not been shaken as fast as was stipulated. **Indian industry did not take its HR competence seriously, and continued to look outside India to outsource its product design and technology requirements.** The net result is quite obvious the Indian engineers continue to be more and more in demand in the advanced countries who took the opportunities of globalization seriously and made strong inroads in the developing countries. In fact the Indian industry lost very heavily in the manufacturing sector to the multinationals from abroad. You may ask as to how an industry ridden with financial crisis can focus on product innovation when it has not enough strength to continue? Product innovation is a process by which

good ideas from both academic, industry and society quarters are channelised to yield new and improved designs, are translated into products, which create a market wave. However, **in India because of a very low or little interaction between the industries and the institutions, the pooling of the minds and synthesis of ideas has not become a reality.** 10 years of globalization have failed to create a real impact on the industries at home to realize the value and worth of industry-institute linkages. What is required is to understand that the industries should go beyond recruitment of the graduates and postgraduates and establish **synergetic partnership with the institutions** so that the rich intellectual wealth of our nation is translated into the strength of our industries. **It is rather disappointing that industries in India during the last 10 years of the globalized economy have only understood the value of alliances and collaboration with the high and mighty abroad and neglected the core-strength which could have been created by such alliances with leading institutions and R & D houses within the country.**

3. THE CHALLENGE OF GLOBAL COMPETITION :

With the globalisation of Indian economy it has become highly imperative for the Indian industries and the business houses to meet the following challenges of Global competitiveness :

1. Offer Cost-effective, Quality products and services.
2. Conform to world quality standards.
3. Conform to world standards for protection of environment such as ISO 14000.
4. Induct a greater use of Information Technology such as to work in the Networked Economy Environment.
5. Rapidly develop systems turned to world class quality services.
6. Create Global Competitive Edge by judiciously managing human and natural resources.
7. Focus on Product Innovation and Knowledge Management.
8. Facilitate creation of alliances and consortiums for technology intensive industries and support services.

No nation, can however survive in a globalized economy unless it identifies its core competence and develop systems both in the industrial well as in the service sector to create global complete edge.

In respect of India, the continued the availability of qualified and trained professional manpower is one of the major strength, if properly exploited, it can provide a major strength to its manufacturing and the service sector. The present low productivity in production is largely due to lack of re-training of the human resources and lack of productivity and quality consciousness in the manufacturing and in the service sector. Indian has to come out of this by systematically revitalizing its services and its manufacturing sector. But then the poor availability of power, basically good quality electricity is one of the major hand : app.

No industry can meet the global challenges if it is crippled by the non-availability of electric supply for hours together during the day and night. The power sector is an area of top priority for India. It is not a problem for the advanced countries such as USA, Japan and countries in Europe and Asia-Pacific such as Hongkong, Singapore, Malasiya and China. India has to discover better ways of managing its power problem. A greater emphasis on energy conservation, energy audit of plant and machinery and innovative ways of managing the transmission and distribution systems could provide some relief. But the problem of energy shortage will be solved by India by paying a much greater attention to the development of alternative fuels such as Hydrogen and by focusing on non-conventional energy sources. Nuclear energy option could help India in the transient period. National mission for environmental protection and a greater awareness of ISO 14000 compliance could help India manage its environmental crisis. Logistics such as efficient transportation, and business support services could further boost Indian Industries global competitiveness.

India is fairly placed in the IT sector in a globally completeive position at present which is largely due to its software export capabilities. But then a total dependence on export to USA for the bulk of software is not a good sign for the IT industry in India. The real strength of IT industry in India shall emerge out of IT industry enhancing its home market by a rapid growth of IT application in industry, business, commerce, banking, education, health, governance and a host of other activities where the IT application could help India to weed out

in-inefficiency and in-effectiveness from its systems and processes. An enabling environment for global competitiveness shall be the net out come of such an exercise India must do it without further delay.

In the area of HRD, India must realize before it is too late that it can not and it should not merely base its HRD policies on creating a surplus capacity to crate advantage for the advanced countries. It should rather create **Advantage India** to ensure that its efforts largely go to strengthen its economy, its industries and its socio-economic systems. Further, India must awaken to realize its global competitive edge in respect of quality professional education including engineering and management education and must target its policies of technical and management education abroad. This calls for a total shift in focus from exporting human capital to exporting technical education and services.

4. CAN INDIA STILL DO IT ?

The question is can India still do it, the answer is “Yes” but India must respond, and respond fast to the following essentials of global competition:

- ✦ **Weed out inefficiency and ineffectiveness** from the systems and processes of economic development.
- ✦ **Establish efficient and effective systems for planning, administration and management** for all sectors of economic activities.
- ✦ **Transform the present highly unproductive industries and utilities into highly productive systems**, not an easy challenge, but given the era of change it is possible to achieve this target in the next 2-3 years.
- ✦ **Recognize the value and worth of knowledge** and prepare human resources tuned to quality and productivity driven work environment.
- ✦ **Improve infrastructure** and pay urgent attention to the essential services such as power, communication and

transportation to create congenial atmosphere for the growth of economic activity.

- ✦ Use IT to create “**Advantage India**” by using IT applications everywhere, in business, commerce, industry, services and also in education and research.

5. CONCLUDING REMARKS :

India's core strength lies in its large populace which if shaped into a human resource tuned to quality, productivity and care & concern for ecology and environment then India could create the most vital competitive advantage and position itself in a highly advantageous position in the community of nations.

Further the enterprising genius of Indian people if properly harnessed in the globally competitive environment, India could emerge as a world leader in managing innovations, managing knowledge in terms of transforming knowledge and innovations into national prosperity.

India's rich cultural heritage and its vast traditional knowledge and matured wisdom of understanding the value and worth of peace, progress and harmonious existence with nature places India in a unique situation to take full advantage of globalized economic environment. India must not lose this opportunity now that the value and worth of India's potential is well recognized the world over.

In conclusion India can meet the challenges of global competition it must however, respond and respond fast to the essentials of a globalized economic environment.

References :

1. Sharma R.C. & Sharma P.B., “ Role of Innovation and Technology upgradation in Nation's Economic Development ”, SAR Economist, November 1993.
2. Sharma P.B. & Garg S.K., “ Application and Strategic frame work for Green Productivity through Value Engineering”, World Productivity Congress, Oct. 1997.

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