2. A SWOT ANALYSIS OF OUR CONTEMPORARY TECHNICAL EDUCATION SYSTEM

*Prof R Natarajan**

Introduction

Our Technical Education system is one of the largest such systems in the world, and is cited to be one of the major reasons for our growth in economy and the rise of the middle class, creating jobs and foreign exchange reserves. Many changes have occurred over the years, especially in terms of numbers of institutions and admission capacity. There are concerns, however, of lack of quality and relevance.

A SWOT Analysis of our Contemporary System

The SWOT Analysis is a powerful tool for strategic planning, and captures the essential details for understanding the anatomy of the system under study. It is undertaken here to reveal the essential characteristics of our Technical Education system. In addition to the conventional Strengths, Weaknesses, Opportunities and Threats, additional details are provided to amplify the current status, in tables 1-4.

Concluding Remarks

Our Technical Education system is currently undergoing several major changes. A number of Studies and Reports have been published, such as the National Knowledge Commission Report, the Yash Pal Committee Report, the Tendon Committee Report, and few Bills have been introduced in the Parliament . No doubt, a fresh SWOT analysis will be required to be undertaken soon.

TABLE - 1

STRENGTHS	REMARKS
1. Engineering is a highly popular option of study for our youth.	1. A consideerable proportion of the graduating engineers prefer not to practice Engineering, but drift to other areas, (characterized as internal Brain Drain)
2. The private sector has created significant capacity in terms of the number of institutions and intake (approx. 80% of total capacity).	2. Several private institutions perceive technical education as a business opportunity.

**Former Chairman, AICTE, Former Director, IIT Madras*

TABLE - 1

STRENGTHS	REMARKS
3. Increasing involvement of Industry Associations (such as CII, FICCI, ASSOCHAM, NASSOCOM) to partner and collaborate with academic institutions.	3. The extent of industrial consultancy (and sponsored R&D) in the majority of technical institutions is very limited.
4. The Accreditation initiatives of NBA (and NAAC) are serving to promote quality improvement in technical institutions.	4. NBA has been able to undertake accreditation of only a small number of engineering programs, in view of the massive numbers involved.
5. The TEQIP World Bank Project has served to enhance the quality in about 100 technical institutions by providing resources as well as mentoring by reputed academics.	5. Both industries and technical institutions are mounting partnership programs to bridge these gaps. "Finishing Schools" are being established to enhance the employability of the graduates.
6. The Quality Improvement Program (QIP) schemes have contributed significantly by upgrading the qualifications of faculty members in technical institutions.	6. The coverage is again inadequate in relation to the total number.
7. There are several central government funding agencies (AICTE, DST, CSIR, ISRO, DRDO, TIFAC ...) for sponsoring R&D projects.	7. It is only a small number of technical institutions (such as IITs, central universities) which makes use of these funds. Most of the other technical institutions have no research culture.

TABLE - 2

WEAKNESSES	REMEDIAL MEASURES
1. While there are islands of excellence, these are rather few in number.	1. Many more IITs, IIM,s Central Universities are being planned to be established in the near future.
2. Lack of interest among graduating engineers to pursue research degree programs or teaching careers (because of the availability of attractive jobs in the IT and ITeS sectors).	2. The Eleventh Five-year Plan (2008-12) proposes several attractive Scholarship, Fellowship and Career Assurance Schemes to attract talented youth to Research and Teaching Careers.
3. Serve shortage of qualified and competent faculty, especially in ICT areas.	3. In view of the immediate and acute faculty shortages, and in view of the time required to generate this high quality manpower, technology-enabled learning and teaching strategies are being put in place, such as, for example, the NPTEL (National Project on Technology-Enabled Learining), EduSat (Educational Satellite), etc.

4. Lack of availability of Ph.D.s in Engineering for faculty positions; the Ph.D. capacity in Engineering is very small.	4. The Ph.D. capacity is being enhanced considerably by measures such as: introducing MHRD Research Fellowships in NITs; increasing the number of AICTE National Doctoral Fellowships and the QIP Fellowships; promoting research culture in the majority of technical institutions, etc.
5. Mismatch between education and training (Knowledge and skills) imparted to the students and the job requirements in industry/business, resulting in employability deficit, unemployment and under employment.	5. Both industries and technical institutions are mounting partnership programs to bridge these gaps. "Finishing Schools" are being established to enhance the employability of the graduates.
6. Inadequate manpower needs assessment and manpower planning.	6. The Institute of Applied Manpower Research has been re0designing its activities to provide timely information to AICTE for quick response to the industry demand. Industry associations, such as CII, FICCI, ASSOCHEM, NASSCOM, are also undertaking surveys of employers to determine the market demand.
7. The widely prevalent affiliating system in our universities precludes timely curriculum updating and introduction of innovative reforms, in the absence of academic autonomy.	7. Several institutions have been accorded academic autonomy, both under the requirements of the TEQUIP Project and under the UGC scheme of "deemed" universities.
8. The recent boom in IT industry has caused a disproportionate and lopsided increase in admission capacity in this area, at the expense of other disciplines.	8. The manufacturing and infrastructure industries are growing rapidly, creating demand for mechanical, electrical, chemical and aerospace engineers.
9. While the admission capacity at the UG degree level has been on the rise, a corresponding growth at the PG level has not taken place.	9. As the UG institutions 'mature' in age and competence, they are introducing PG and Research programs.

TABLE - 3

OPPORTUNITIES	CURRENT STATUS
1. For setting up high-quality Indian institutions - sponsored off-shore campuses.	1. There appears to be no policy framework for settingup IITs/IIMs abroad. Regulatory hurdles and rigid admission procdures are inhibitors.
2. IT tools are becoming available for Technology-enhanced Learning, for widening the reach of Technical Education.	2. The NPTEL Initiative, EduSat ... are gradually making and impact.
3. Distance Education possibilities for Continuing Education.	3. Distance Education has not yet achieved acceptance, as equivalent to Formal Education, for employment.
4. Networking of technical institutions, at different levels, for mutual benefit, sharing of resources, undertaking major projects.	4. The TEQUP, for instance, requires institutions under this scheme to promote networked academic activities.
5. Networking of technical institutions with R&D labs and industry.	5. Such networking is on the increase, with efforts from all partners.

6. Schemes such as TDB, CORE, promoting industry-institute interaction.	6. Needs to be expanded and acclerated.
7. Many alumni are offering substantial support to their Alma Maters.	7. This is now spreading beyond the IITs.
8. The role of Technology and Technology and Technology Education for national development and prosperity is widely acknowledged.	8. The XI five year plan is making significantly greater allocations to S&t, R&D, and Education.

TABLE - 4

THREATS	CURRENT STATUS
1. In the emerging GATS scenario, Quality concerns needs to be addressed urgently.	1. Our Technical Education System resembles a pyramid, with very few institutions of excellence, in the midst of a large number of institutions of variable quality.
2. Competition from international players.	2. The Eleventh Five-year Plan (2008-12) proposes several attractive Scholarship, Fellowship and Career Assurance Schemes to attract talented youth to Research and Teaching Careers.
3. The non-uniformity in the distribution of Technical Institutions in the country, causing regional imbalances, and inter-state migration of students.	3. Several institutions are coming up in regions with low density of technical institutions.
4. The Technical Institutions in the rural and industrially backward areas are not as popular with students, leading to unfilled capacity in these institutions.	4. A possible remedy is to network these institutions.
5. The tendency of our students to prefer IT-related courses, and to shun other disciplines.	5. This is essentially due to expanding employment capacity and higher salaries in IT-related areas. With increasing infrastructure and manufacturing activities, these sectors are also expected to provide attraction to our students.
6. The tendency of research scholars to prefer computer-based research over experimental research.	6. With the availability of computers of ever-increasing power, this tendency is only expected to get stronger.
7. The ration of diploma programes to degree programs is on the decline (much unlike other countries)	7. The situation is not expected to change in the near future, in view of the prevailing perception that the degree is a more attractive option.
8. The science-base in the country is getting weaker, which will have an adverse impact on our capacity for technology development.	8. Programs and Schemes (such as long-term scholarships/fellowships and career assurance programs) are being introduced to attract young students to science.