QUALITY IMPROVEMENT THROUGH COLLABORATION BETWEEN EDUCATIONAL, RESEARCH AND CONSULTANCY INSTITUTIONS IN INDIA

By
S.K. Mazumder
Advisers, ICT & SWI Pvt. Ltd.
New Delhi
(Former AICTE Emeritus Professor of Civil Engg. Delhi College of Engg.)
242, Sidharth Enclave, New Delhi-110014
Tel: 011-26340052 (Resi.), email: somendrak64@rediffmail.com

ABSTRACT

Quality of educational, research and consultancy institutions in India plays a significant role in meeting the socio-economic goals for the development of our country. Except IITs/ IIMs/IIESTs/IISCs, quality of engineering diploma holders, graduates and post-graduates from majority of the technical institutions in India is not up to the mark. Most of the institutions do not have sufficient qualified and trained teachers and adequate infrastructures. Majority of the bright and meritorious students in engineering & technology leave India for higher education and research abroad due to better infrastructures, higher remuneration and due recognition of their work. Present status and quality of technical education, research and consultancy institutions in India has been critically examined with a view to improve quality of their products Need for collaboration between educational, research and consultancy institutions in promoting quality has been emphasized.

Key words: Collaboration, quality, technical education, research, consultancy, AICTE

INTRODUCTION

Although India has progressed a lot after independence, it is noticed of late that the quality of many of our educational, research & consultancy institutions is not so satisfactory compared to those in other developed countries in the world. While the quality of the products largely determines the health and status of the institutions, it is the quality of education and training that a person receives in educational, research and

practicing institutions that transforms the person to become worthy, efficient and capable to deliver the goods to the society.

Many of the challenging problems being faced or to be faced in future by our country can be solved through demand driven research and its application in design and field application through consultancy. Majority of our engineers engaged in teaching, research and consultancy institutions have little opportunity to upgrade themselves while working and posses very little interest and motivation about the application of the latest technology, research and development.

Developed countries in the world have faced many a challenges and solved their problems through synergistic collaboration between the educational, research, consultancy organisations and other agencies dealing with the problems. Unfortunately, such inter-institute collaboration is very rare in our country. All institutions seem to work in their own water tight compartments and are mostly busy in performing routine type jobs in an isolated manner without pooling of ideas and resources from the neighboring institutions, resulting in inefficiency, lack of quality, cost escalation and time over run.

PRESENT STATUS OF ENGINEERING/TECHNICAL EDUCATION IN INDIA

Engineering &Technical education in our country is offered at various levels by different categories of institutions, namely, (i) Industrial Training Institutes for technicians (ITIs) (ii) Polytechnics for diploma level courses (iii) Engineering colleges mostly for degree level courses (iv) Universities/IITs / IIMs /IISCs / NITs / IIESTs / Govt. & Pvt. institutes of higher education in engineering and technology.

Table-1 (given as Annexure-1) is a zone-wise and state wise list giving the numbers of technical institutions (NOI) in India (up to 2004) at undergraduate (UG) and post graduate (PG) levels approved by AICTE, except IITs, IIESTs, IIScs and IIMs. The

table also gives a break up of the institutes under government/university control and private institutes The last two columns in the table provides sanctioned intake at UG and PG levels..

Today, majority of our engineering graduates prefer IT, software, banking or similar types of jobs where there is very little scope to utilize the technical knowledge and professional training they receive from the technical institutions during the 4-year degree level program. There is a great deal of mismatch between our social requirements and the educational program and what the students learn from the educational institutions and what they actually practice in real life. .According to a survey report, McKinsey multinationals find around 25% of about 4 lac Indian engineers are employable.

Currently, our undergraduate program in engineering/technology is overloaded with heavy dose of theory in diverse subjects of stereotyped nature - often unrelated to the discipline of their specializations. The biggest deficiency in most of the teachers/instructors is lack of any industrial experience. In medical institutions, the doctors receive practical experience while completing internship in hospitals attached with the medical institutes under the able guidance of their teachers. In engineering education, however, no such facilities are available to gather practical experience while learning unless the institute has program of industrial training under the supervision of their teachers during summer and winter vacations.

Many of the institutes do not have requisite infrastructures and adequate number of faculty and supporting staff. There is a mushroom growth of engineering colleges offering degrees by some nearby university which has very little say or control in these engineering colleges as they are neither financially nor administratively controlled by the university with which they are affiliated to. It is to be carefully decided whether

proliferation of private commercial type engineering colleges in the cities is preferred to technical universities for achieving quality of technical education in India. Recently, UGC organized regional conferences of vice-chancellors which culminated in a national conference of vice-chancellors on Oct. 10 and 11, 2007. They have recommended private funding in technical education in areas of priority in rural, remote and underprivileged areas. (The Statesman, 2007). Bhat (2000) narrated some experiences of Public-Private Partnerships in social Sectors through private funding.

Quality of our diploma holders (from polytechnics), AMIEs (from Institution of Engineers) and graduates (from Govt. & private engineering colleges) in India is not satisfactory. They are being engaged by many of the private companies with poor pay and parks compared to graduate/post graduate students coming out from IITs/IIMs/IISCs etc. There is no practical/design classes for AMIE students resulting in an inherent draw back in their concept and confidence which are gradually built up in steps in the engineering colleges through laboratory experiments, tutorials, design classes, industrial training, project works etc. under the guidance of teachers. However, AMIE courses offer an opportunity for those students (from rural and semi-urban areas) who can not afford or compete with city students who attend special coaching classes for entry to engineering colleges. Are the coaching institutes really of any social benefit? Are they not killing our secondary and higher secondary education system?

It is true that the large requirement of our technical manpower can not be met by the government alone. However, it is to be kept in mind that substandard institutions turning out substandard products from public or private engineering colleges will in the long run be damaging many of the good things we are planning for our socio-economic development. (Rediff News, 2006).

QUALITY OF HIGHER EDUCATION IN NGINEERING IN INDIA

From table-1 (see annexure-I), it may be seen that there are 385 technical institutions in India (up to 2004) which offer post graduate courses in engineering with a total sanctioned annual intake of 32,752 students. They offer ME/M.Tech./M.Sc. (Engg.) degrees in different specialties in architecture, engineering, technology, pharmacy and management. Many of these institutions also offer Ph.D. program of minimum 2 years duration (after master's degree) and 3-years duration (after bachelors degree) - both full and part time. Institutes offering PG courses are also engaged in R&D works sponsored by Govt. bodies (e.g. Ministries, CSIR, UGC, DST, AICTE etc) as well as R&D projects referred by industries.

R&D works which act as a nucleus in all developmental activities are performed mainly by post-graduates. Except a few IITs, the faculty position and infrastructures available for teaching postgraduate courses are extremely poor. Most of our postgraduate students join the program as a last choice only when they do not qualify in other all India examinations. or do not get any appropriate job. Under such circumstances, the quality of our post graduate students is far from satisfactory. The present status of our post-graduate education in engineering can be assessed from the fact that against a sanctioned intake of 32,752, actual intake was about 20,000 whereas actual outturn was about 10,000 only (AICTE-1999). The situation has further deteriorated with time since the post graduates have no motivation for higher study and research, principally due to lack of job opportunities.

All the advanced countries in the world have developed professional institutions in the pattern of universities with facilities for teaching, research and consultancy. Except a few IITs, such facilities do not exist in majority of engineering institutions in India. The

teachers are so overburdened with undergraduate teaching and other administrative and examination duties that they have hardly any time for research and development. It is of utmost importance to promote R&D in the educational, research and consultancy organisations as well as in the industries for improving quality - a key to our socio-economic development in a sustainable and environmental friendly manner.

QUALITY OF ENGINEERING RESEARCH INSTITUTIONS IN INDIA

Although a majority of our engineers are engaged in construction and manufacturing industries, research and developmental activities in engineering and technology act as a nucleus around which all other developmental activities take place for further growth and excellence. Sound knowledge, information, initiative, hard work, perseverance and above all a spirit of creativity are essentially needed for pursuing research and development works leading to innovation and excellence. There is hardly any invention in the large numbers of our universities and technical institutions in the country. Unless the quality of our education and research in science, engineering and technology are upgraded further, we have to pay heavily in future for our neglect and the developed countries will monopolize the jobs related to research and development works. The country will be compelled to purchase the foreign know-how and will remain ever dependent on foreign technology and foreign products at an enormous cost.

R&D sector in India is largely dependent and controlled by the government. Unlike Japan where 95% of research funding comes from industries, almost 99% of research funding in India comes from the Government. Basic and fundamental research carried out in our educational institutions mostly end in publication of papers in journals and conferences without much application in the field, mainly due to lack of investment improper co-ordination and indifference by industries. While inventions are mostly accidental and not so costly, commercialization of invention and innovative ideas

require huge capital investment and a great deal of co-ordination and hard work. While USA won many a Nobel prizes in basic sciences/technology, industries in Japan encashed most of these inventions by investing, commercializing and making superior products through adaptive kind research. Universities and research institutes are good in R&D, but poor in delivery of R&D from labs to fields. Although efficient in delivery, Indian private industries are hesitant to invest in R&D due to risks involved. In India, the general trend is to purchase products of superior quality from abroad at exorbitant costs, although there are large numbers of research institutions in the country and there is no dearth of talents in our country.

Govt. controlled research institutes in India are in miserable condition since these institutes appoint scientists/engineers/technologists from the Govt. cadre posts, irrespective of whether they have requisite knowledge, expertise and aptitude in research. There is no proper scheme to improve and update their knowledge after their recruitment. Scientists and engineers engaged in teaching, research and developmental activities have little incentives commensurate to their knowledge, hard work and devotion. Engineers/scientists/technocrats posted in government run research laboratories often consider it as a punishment posting.

After the independence, educational institutions of higher learning were headed by persons of high integrity and character with a sincere desire to develop and excel. To day, many of these institutions are being headed by mediocre with political support or favor from top influential persons on cast/community/regional basis, irrespective of their merit. As a result, the topmost and meritorious brains that are really worthy and capable are leaving the country out of frustration and they are immensely contributing towards R&D in the developed countries thereby enriching the standard .of their institutions. A mediocre or political person will always like to be surrounded by similar brand of

persons resulting in gradual deterioration in the standard and reputation of the educational and research institutions. Present status of research in engineering and technology in a vast country like India can be assessed from the fact that the annual out turn of Ph.Ds in engineering/Technology has decreased from 506 in 1979 to 374 in1996 (AICTE-1999).

QUALITY OF CONSULTACY INSTITUTIONS IN INDIA

Consultancy organisations in India, in both public and private sectors, numbering 10,000 or more now, are rendering very useful services to the society to-day by doing most of the jobs which government departments used to do earlier, in a much more efficient and economic manner in a given time frame. It is, however, unfortunate that many of the consultants in India are reluctant to upgrade and modernize through collaborations with educational and research institutions in India for more effective use of their manpower, time and money. Currently, research and development in our country is generally confined to a narrow circle of academicians and end in conference or seminar & journal papers or reports with very little field application. The main challenge of transfer of such R&D from laboratories to field lies in organizing, implementing and directing the efforts in a well coordinated manner through appropriate collaboration. Collaboration strategies and weaknesses of consultancy organizations in India have been discussed elsewhere by Diwan (1999).

Scope of consultancy services are steadily increasing in our country due to the govt. policy of gradual decentralization and private sector participation. The number of consultants in the different disciplines in engineering and technology are steadily increasing day by day due to the government decision to improve upon urban and rural infrastructures. However, the quality of many of the Indian consultancy companies is not yet up to the mark. The future of consultancy organizations depend on strengthening

their R&D base, increasing use of information technology, improvement in their design capability by use of latest knowledge, software, organizing in house and external training program, quality improvement through continuing education as well as development of business and managerial skill. Analysis and conversion of information into efficient and economic design will be a key element for their success in future.

COLLABORATION BETWEEN EDUCATIONAL, RESEARCH & CONSULTANCY INSTITUTIONS FOR IMPROVING QUALITY

Research and development must have strong linkages with industry for meeting our socio-economic goals. Since university professors and the research scholars working under the professors comprise an enormous pool of expertise and resources, appropriate collaboration must be built up between the educational and research and the consultancy institutions for improving quality. University curricula also must be upgraded to cover the emerging areas in science and technology (Madramootoo, 2000). Inter-Institute collaboration between academic institutions and industries is vitally needed for improving the standard of both the educational and research institutions imparting knowledge and the practicing institutions making use of the knowledge. (Chakrabirty, 1999). This can be achieved through several ways e.g. exchange of faculties, supporting research funding, carrying research and consultancies jointly, exchange of knowledge, information and experience, participation in workshops and conferences; offering short term refresher type courses jointly with faculty drawn from both academic institution and industries, organizing training / orientation program, taking active role in strengthening professional societies; reading journals and contributing papers in the technical journals; writing text books / handbooks jointly; participating in the preparation of codes, manuals and guidelines etc.

Engineers in a consultancy organization or in the field can not keep themselves abreast with the latest research and developments except a few with an academic bent of mind.. Similarly, an academic person has very little opportunity to gather practical experience, although he may be equipped with the latest mathematical tools and computational techniques. Collaboration between field organizations and educational institutions will help in pulling the resources together for the most economic, efficient and time bound solution of the problems being faced in different aspects of planning, design, execution, operation and maintenance of projects .(Mazumder, Jan., 2007). Such collaboration eventually helps in development of innovative methods and inventions, new technology, new software helping further growth of profession for the national development. All the collaborating institutions get enriched and attain a new height to face any challenge posed by the government and the society.

Considering the challenging problems being faced by India, it is of utmost importance to promote R&D in the technical institutions, research & consultancy organisations and the industries for leveraging innovations and inventions - a key to our socio-economic development in a sustainable and environmental friendly manner. Inter-institute collaboration will improve the quality of our scientists, engineers and technicians who have to be equipped with wide technical knowledge based systems integrated with work experience, creative skill and dexterity in tune with the changing socio-economic and technological scenario in the fast changing world with global competition.

As an example of such inter-institute collaboration, author would like to mention about a MoU signed recently by IIT (Roorkee) and ICT, New Delhi, for conducting a joint research on ‘Bridge Scour’. Under the scheme, IIT (Roorkee) will conduct physical and mathematical model study of scour based on field data to be supplied by ICT from 10 different bridge sites. Scour estimated by the mathematical model will be compared with

those measured at bridge sites by ICT for the purpose of validation of the mathematical model and updating IRC/IS codes .These codes prescribe Lacey's empirical (1930) method which over-estimates scour. (Mazumder, Oct., 2006) and there are several limitations of Lacey's method of scour estimation (Mazumder, Dec.,2007).

Post graduate students can carry out the jobs related to the sponsored research and industrial consultancy works - a part or all of which may be included in their dissertations - both at Master's and Ph.D. level. It is principally due to the contributions made by these young and energetic scholars that the department progresses and the laboratories develop. It also helps in creating quality manpower essentially required for teaching, research and consultancy jobs.

A major problem being faced by our educational, research, consultancy and industrial institutions today is how to attract and retain qualified and meritorious persons, A large number of such persons leave the country for higher education abroad for better pay and perks, congenial environment for research, freedom of work and above all due recognition of their achievements. Post graduate study for teaching and research is the last priority in India to-day. If this situation continues, our educational, research and consultancy institutions have no future and we are going to be dependent on foreign institutions for higher education, research and development.

CONCLUSIONS

After independence, India has made significant progress in almost all walks of life. Considering the future challenges, it is, however, extremely important to further strengthen our R&D base. The present status of our educational, research and consultancy institutions is not so satisfactory. Our meritorious students are going abroad for higher education and research in engineering and technology resulting in gradual deterioration in quality of institutions in India. If the current trend of migration of merit

from India is not arrested, our country will be ever dependent on foreign know how and foreign products at exorbitant cost. Collaboration between educational, research and consultancy organisations in engineering and technology through appropriate encouragement, investment and co-ordination is essential for improvement of quality- a key for our socio-economic development in a sustainable and environment friendly manner.

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(Annexure-I)

State-wise Distribution of Technical Institutes & Intake at UG & PG Level, 2004

Regions In India	Different States in India	NOI			NOI		Intake	
		UG	PG	Total	Govt./ Univ.	Private	UG	PG
Central	1. Madhya Pradesh	69	19	88	13	75	20,210	1,897
	2. Chhattisgarh	23	2	25	6	19	4,020	54
	3. Gujarat	24	9	33	8	25	12,965	1,291
	Total ----->	**116**	**30**	**146**	**27**	**119**	**37,195**	**3,242**
Eastern	1. Mizoram	1	0	1	1	0	120	0
	2. Sikkim	0	1	1	1	0	525	18
	3. West Bengal	39	13	52	19	33	15,477	1,300
	4. Tripura	1	1	2	1	1	180	54
	5. Meghalaya	1	0	1	0	1	240	0
	6. Arunachal Pradesh	1	1	2	1	1	210	54
	7. Andaman/Nic.	0	0	0	0	0	0	0
	8. Assam	3	7	10	3	7	750	365
	9. Manipur	1	0	1	1	0	115	0
	10. Nagaland	0	0	0	0	0	0	0
	11. Orissa	32	11	43	2	41	13,014	729
	12. Jharkhand	10	4	14	4	10	3,385	537
	Total ----->	**89**	**38**	**127**	**33**	**94**	**34,016**	**3,057**
North	1. Bihar	7	4	11	3	8	1,905	528
	2. Uttar Pradesh	81	21	102	13	89	28,953	1,769
	3. Uttranchal	11	2	13	5	8	1,440	627
	Total ----->	**99**	**27**	**126**	**21**	**105**	**32,298**	**2,924**
North-West	1. Chandigarh	4	3	7	5	2	800	443
	2. Haryana	39	11	50	9	41	12,785	631
	3. H. P.	5	1	6	2	4	1,260	73
	4. J&K	8	1	9	2	7	1,545	36
	5. New Delhi	11	7	18	6	12	4,330	783
	6. Punjab	41	11	52	11	41	4,880	942
	7. Rajasthan	38	6	44	9	35	15,045	704
	Total ----->	**146**	**40**	**186**	**44**	**142**	**40,645**	**3,612**
South	1. Andhra Pradesh	236	44	280	3	277	82,970	4,216
	2. Pondicherry	6	2	8	1	7	2,370	137
	3. Tamil Nadu	300	92	392	20	372	80,417	7,126
	Total ----->	**542**	**138**	**680**	**24**	**656**	**165,757**	**11,479**
South-West	1. Karnataka	111	42	153	19	134	46,375	3,188
	2. Kerala	89	11	100	40	60	24,413	1,080
	Total ----->	**200**	**53**	**253**	**59**	**194**	**70,788**	**4,268**
West	1. Maharashtra	149	57	206	26	180	48,250	4,116
	2. Goa	2	2	4	1	3	740	54
	3.Daman & Dadar, N.H.	0	0	0	0	0	0	0
	Total ----->	**151**	**59**	**210**	**27**	**183**	**48,990**	**4,170**
	Grand Total --->	**1,343**	**385**	**1,728**	**235**	**1,493**	**429,689**	**32,752**

Source: Complied from AICTE website. List of Approved Institutes up to 2004 only.