1. ROLE OF TECHNICAL UNIVERSITIES AND INDUSTRY IN FACILITATING ENHANCEMENT OF EMPLOYABILITY: A ROAD MAP

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Abstract

This paper brings out, the role of technical universities and the industry in working together to enhance the employability of graduates of Engineering Colleges. This has become necessary, due to exponential growth of engineering colleges and enrollments therein, leading to acute faculty shortage. A technical university helps in providing a common standards and quality filters, through which all colleges affiliated to that University have to pass. This, however, does not give any assurances unless industry is actively involved in hand holding and provides a pro-active support. This is possible, if industry views the academic institutions as the nursery of their future talent pool. A technical university can enforce this through a policy initiative which all colleges affiliated to it, will have to implement.

Concept of a Technical University

A state technical university is an umbrella organization to which all colleges / institutions awarding degree, post-graduate degree and research degrees, are affiliated in a subject spectrum covered by the AICTE's definition of technical education. The rational was that a technical university in a state, will be able to provide a common standard for admission; curricula, examinations, training and other policy interventions to reduce the variability of quality attributes of a graduating batch, affiliated to that University. Here, it is important to understand that a technology university which awards its own degrees but does not affiliate other colleges in the state, is not a state technical university. For example, Delhi Technological University (earlier Delhi College of Engineering) is not a state technical university.

The concept of a technical university is a relatively recent in India. Earlier engineering colleges in a state used to get affiliated to university closer to its location. Affiliation to a general university had problems of wide scope and special attention that technical education required, could get diluted due to that. Increased private investments in technical education, led to an exponential growth in the number of colleges and their enrollments. The emergence of need of technical university can be felt for having an entity that could regulate quality of large number of institutions which have to pass through a common filter of admission, curricula and examination system conducted by the state technical university.

Current status of state technical universities in India

Perhaps, the first state technical university in India was Jawaharlal Nehru Technical University (JNTU) in the state of Andhra Pradesh.

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This has, now, been split into three campuses at Anantpur, Hyderabad and Kakinada, looking after affiliated colleges in their respective geographical regions. After a substantial time gap, other states too either created a new entity or empowered an existing entity to perform the role of a state technical university. Currently 14 states have the state technical universities as given in Table 1. It is seen that still Assam, Goa, Haryana, J & K, Jharkhand, Kerala, Maharastra, NCT Chandigarh, Meghalaya, Mizoram, Nagaland, Tripura, Arunachal Pradesh, Sikkim, Pondicherry and Manipur do not have this concept in place.

As the size of enrollments and number of colleges grew, some states split the state technical universities into multiple campuses. JNTU has now three campuses; Anna University has five campuses at Chennai, Tiruchirapalli, Madurai, Coimbatore, Thirunelveli. But, at least, all these campuses are tied with a common brand entity – JNTU or Anna University. Erstwhile UP Technical University was split few years back into two technical universities with different names – Gautam Budhha Technical University at Lucknow to take care of engineering / technical colleges in eastern UP, while Mahamaya Technical University (MTU) at Noida, is to take care of technical institutions located in the western UP.

Role of Technical University in Enhancing Employability

Increased intake, coupled with faculty shortage, has led to erosion of quality. Many have raised concern on the low quality and employability of students in technical institutions. NASSCOM has even given the opinion that only 20-25% engineering graduates in IT sector had skill sets to make them employable by the sector. This has led to serious debate on the issue of enhancing employability. Employability is a composite concept and both academia and industry have a role to play in enhancing employability. Prem Vrat (5) has given a model of measuring employability using the following model:-

$$E = A. [\alpha .K + (1-\alpha)S]$$

Where E = Employability

A = Attitude

K = Knowledge

S = Skill

α = Relative importance of knowledge over skill which depends upon the nature of job.

If A, K, S and are normalized to be measured between 0 and 1; then employability will also vary between 0 and 1. These can be measured as a ratio of (actual / optimal) for each.

It is obvious from these that a technical university can play a major role in enhancing employability by imparting knowledge and to some extent skills and in shaping attitudes by influencing the mindsets of affiliated colleges through curricula review and redesign; by introducing soft skills, personality development and value added courses and incorporating course on human values and professional ethics. Erstwhile UP Technical University (now GBTU and MTU) introduced a compulsory audit course on "Human Values and Professional Ethics" for all its academia programs. Such a strategic intervention is possible only through the technical university.

Technical Universities can pro-actively influence employability enhancement by promoting the concept of employability rather than % placements as the objective of teaching learning processes. If the graduates are employable; they will get employment, but if they are not; they may not be able to sustain the employment, even if they have succeeded in getting it. Thus, an affiliating technical university can play a major role in converting the colleges' mind-set from employment to employability. It can then involve experts, practising managers and engineers from industry to contribute to the process of employability enhancement.

Table : 1

List of State Technical Universities in India

Sl. No.	Name	State	Number of Campus (s)	Location of Campus (s)
1	Jawaharlal Nehru Technological University	Andhra Pradesh	3	• Anantpur • Hyderabad • Kakinada
2	Swami Vivekanand Tech nical Universty	Chhatishgarh	1	• Bhilai
3	Gujarat Technological University	Gujarat	1	• Ahmedabad
4	Himachal Pradesh Technical University	Himachal Pradesh	1	• Hamirpur
5	Vishvesariah Technological University	Karnataka	1	• Belgaum
6	Rajiv Gandhi Prodyogiki Viswa Vidyalaya	Madhya Pradesh	1	• Bhopal
7	Biju Pattnaik University of Technology	Odisha	1	• Rourkela
8	Rajasthan Technical University	Rajasthan	1	• Kota
9	Anna University	Tamilnadu	5	• Chennai • Tiruchirapalli • Madurai • Coimbatore • Thirunelveli
10	GBTU (Gautam Budhha Technical University)	Uttar Pradesh	2	• Lucknow
11	MTU (Mahamaya Technical University)	Uttarakhand		• Noida
12	Uttarakhand Technical University	Uttarakhand	1	• Dehradun
13	W.B. University	West Bengal	1	• Kolkata
14	GGSIP University (Guru Govind Singh Indra Prastha University)	Delhi	1	• Delhi

*Assam, Bihar, Goa, Haryana, J & K, Jharkhand, Kerala, Maharastra, NCT Chandigarh, Meghalaya, Mizoram, Nagaland, Tripura, Arunachal Pradesh, Sikkim, Pondicherry and Manipur still do not have a concept of state technical university in place.

Current Status of Quality of Technical Education

Over past two decades or so, due to private equity participation in technical education system, there has been near-exponential growth of engineering and management colleges leading to so-called "mushroom" growth. Educational Institutions should not be analogous to 'mushroom' which have a small life span and are perishable. Instead, these should be like "Banyan Tress" which would last over centuries. Unfortunately, this long-term vision is not very widely seen in the growth of technical education because of differing perspectives of various stake holders. Private investors in technical education expect quick and high return on investments made.

While the private participation has enormously improved the reach and accessibility of technical education to large section of population, which was not possible by the governments' budgetary support alone; the negative side-effects have been, reduced quality – of students, faculty and the teaching-learning processes, eventually leading to reduced immediate employability of technical graduates.

Although state technical universities provide a uniform quality regulatory framework in addition to AICTE, still there is enormous quality variations among various colleges affiliated to the same university. Thus, under the same umbrella of a state technical university, there could be various quality levels of technical institutions ranging from 'World Class' to 'Third Class'.

Figures 1 and 2 present histograms of number of colleges and % of their graduates who have completed their B.Tech and MCA programmes in the minimum mandatory period of four years and three years respectively of various colleges affiliated to a state technical university. This validates the observation of wide quality variation despite a technical university.

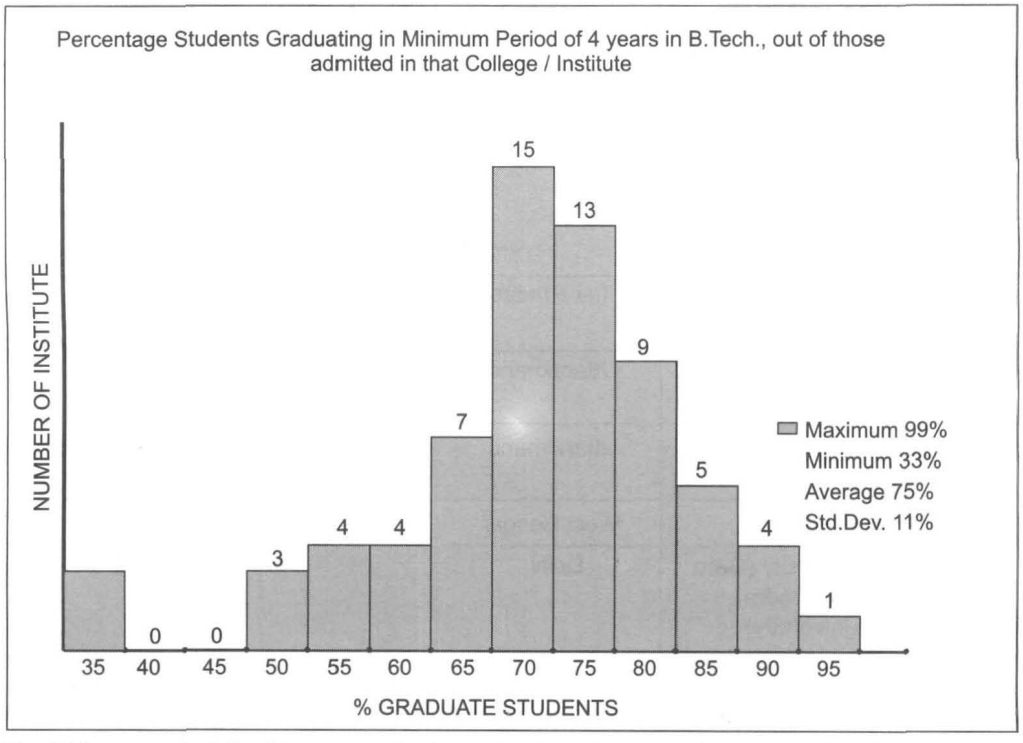

Fig. 1: Histogram depicting the number of colleges and % of graduates completing their B. Tech. degree in minimum period of 4 years graduating batch in Technical University

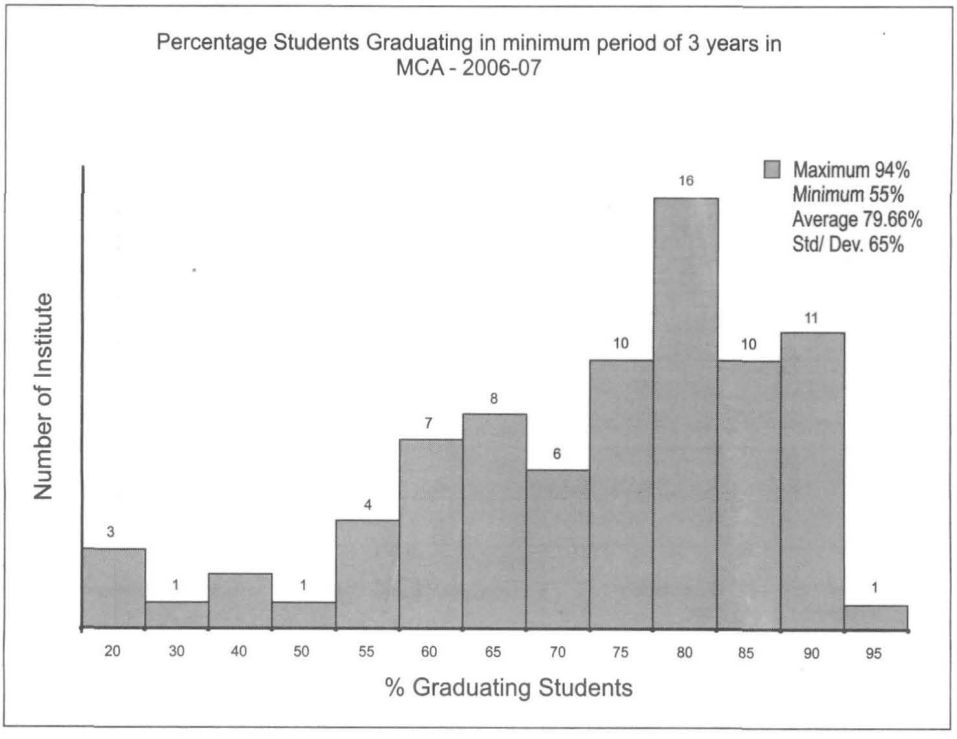

Fig. 2: Histogram depicting the number of colleges and % of students completing MCA in the minimum period of three years in Technical University

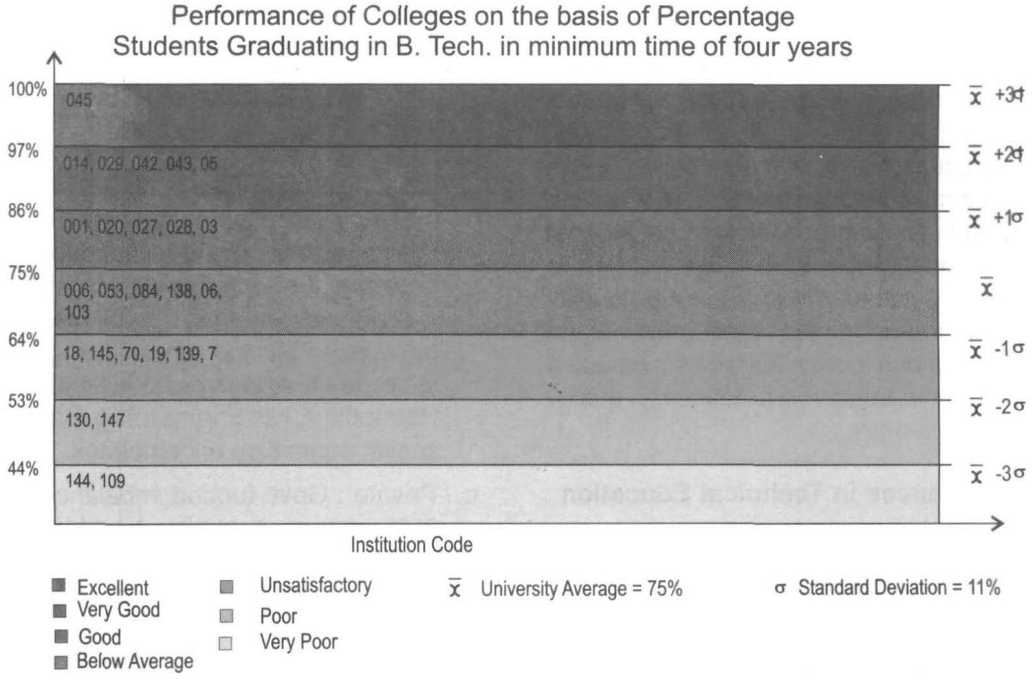

Fig. 3: Performance spectrum control chart of Institutions based on % students graduating in B. Tech in four years

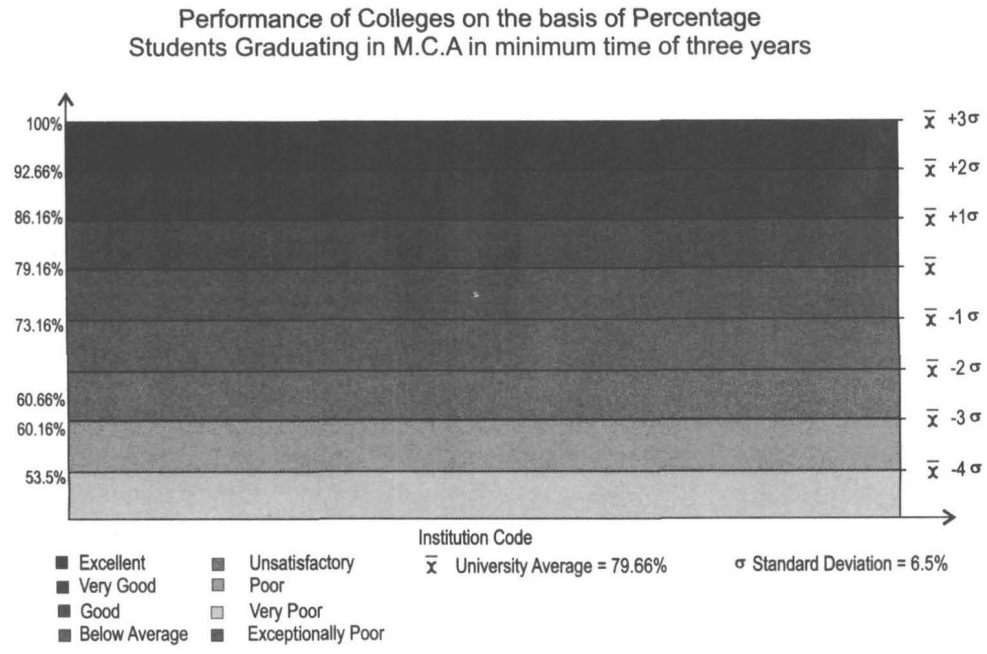

Fig. 4: Performance spectrum control chart of Institutions based on % students completing in M.C.A. in minimum period of three years

Figs. 3 and 4 show the ***'Performance Spectrum Control Chart'*** of B.Tech and M.C.A. students giving the code number of the institution falling in 'performance range' in the spectrum. This validates the hypothesis of highly variable quality standards of the engineering colleges. This is unacceptable performance standard from industry competitiveness point of view. Indian industry cannot become globally competitive with this kind of quality spectrum. Hence, it has to take proactive initiative in nurturing the quality of engineering and management graduates to enable institutions to train talent, who can be a major source of enhanced productivity, quality and competitiveness.

Major Imbalances in Technical Education System:

Rapid quantitative expansion, mainly through private participation in past 20 years, has resulted in the following imbalances in our technical education system.

a. Regional imbalance :- acute regional imbalance in the locations and clusters of engg./management institutions inter-state as well as intrastate.

b. Branch Imbalance :- Nearly 70-80% enrollment in newly created capacity is confined to 20% branches-majority of these hovering around the CSE/ECE/IT field. Thus many core engineering subjects are suffering due to lack of private investment in those branches. Tendency is to avoid high capital intensive engineering disciplines. This will adversely affect industry in finding technical talent for those core areas in times to come. Recently, Civil Engineering Branch has shown some sign of comeback.

c. Private : Govt. funded imbalance : Nearly 95% of the expansion has been in the privately funded institutions with very few new colleges established under govt. funded category. Student intake in govt. colleges is much less in each branch as compared to the private colleges.

d. Faculty : student imbalance :- while

students are increasing, there is acute shortage of faculty and particularly highly qualified and experienced faculty. In most privately funded colleges, we see extremes of either 60 plus or 25 plus faculty in terms of their age-profiles. This is a very serious constraint in quality and employability of technical graduates. Ph.D or even M.Tech degree holders are very few. Only recently, M.Tech became a minimum qualification for entry at faculty level.

e. Compensation package imbalances :- There are tremendous imbalances in financial compensation of faculty in academics and those of industry. This is leading to tremendous scarcity of talented faculty. Even in the private colleges, there are tremendous inter-institution and intra-institution imbalances in the packages.

These imbalances impact on quality and employability at the national level and should be the cause for concern.

Scenario of Talent crunch in Industry:

There is an acute shortage of technical talent in Companies. Advanced placement exercises in 3rd year of B.Tech is a manifestation of such a phenomenon. Instead of treating symptoms of a problem, industry needs to analyze the causes of the problem. True cause is the lack of 'employability' of our engineering graduates. Hence, industry should pro-actively nurture this talent in colleges, visualizing these institutions as the **'nursery of their future talent pool'.** This perspective will change their entire mindset on academia-industry interaction because the industry-as an important stakeholder, simply cannot afford to be indifferent or unconcerned about interaction with academia because **academia is the custodian of their future talent.** Hence, proactive, strategic, tactical and even operational support from industry to ensure that the people we train in the colleges are nurtured to become immediately employable by acquiring the requisite skill-sets of Knowledge, Skills and Attitudes (KSA) including soft skills of communication, leadership, teamwork, time and project management etc. Industrial inputs in teaching-learning process, experiential sharing can be very effective in this process. This role of industry is to be perceived, as mentoring, facilitating and nurturing role and academics must wholeheartedly accept that role in their faculty development process. Developing faculty will have multiplier effect in enhancing the quality of our students in these colleges.

Cost of Quality Model for 'un-employability' to industry

In the context of TQM, the opportunity cost of non-quality can be examined by constructing the 'Cost of Quality (COQ). The two models of COQ are:- PAF model and POC-PONC model. in the PAF model :

COQ = P+A+F

= Prevention + Appraisal + Failure costs

In the Crossby's model :

COQ = POC+PONC

= Price of Conformance + Price of Non-conformance

It is a known fact that about 80% of COQ is either failure costs or PONC in the COQ models while POC or prevention and Appraisal costs are only 20% in classical non-quality organizations. To reduce COQ, we need to cut-down PONC or failure costs. 'A stitch in time, saves nine' goes the adage. Preventive (Proactive) investment by industry in academia, can save ten times the cost of 'failure to get quality'. Hence, it can be convincingly argued from COQ point of view, that it is nearly one tenth cost to nurture proactively the academic institutions by industry, by way of academic investments, handholding, nurturing and facilitating to get quality 'right first time' in academic institutions as the nursery of their future talent pool, rather than to accept sub-standard quality output and low employability of these graduates. Thus, it is ten times cheaper for the industry to support academia to prevent

poor quality of these colleges than to let it happen and face the effects of that poor quality later on.

To validate this assertion, let us examine the alternatives to preventing low quality and employability of our graduates by facilitating/ nurturing role as follows:-

A_1 : If we select only the best 20% out of those graduating and do not compromise with quality of recruitment, then we accept the shortage of talent as a constraint and put a cap on the growth and development of the Company in India. The opportunity cost of curtailing growth due to paucity of talent is enormous to the company and the country.

A_2 : If we compromise with quality of recruitment and hire unemployable graduates to grow and expand business in India, then it has two sub-options:

$A_{2(1)}$: Tolerate substandard performers and live with low quality, productivity and competitiveness in the highly competitive environment and loose market share, profitability or even business.

$A_{2(2)}$: Train, retrain these 'unemployable' graduates for few years to sharpen them and make them employable, then the opportunity cost of training while they are on the job and tolerating low/no value addition by them while they are being retrained.

A_3 : Multinational Corporations from India or operating in India could hire quality expatriates from developed countries for employment in India. Apart from their problems of adjustments in new alien environment, their availability and cost at which they will be available makes this alternative also very costly.

A_4 : Proactively nurture all technical and management institutions through support, help and guidance in course development, faculty development, project guidance and support through equipment, softwares, guest faculty support and other handholding to increase the quality of technical education, so that almost all those who are studying become employable. This appears to be the least cost proposition.

Role of Industry in Enhancing Employability

State technical university, affiliated colleges and the Indian industry have very significant roles in enhancing employability of the technical graduates of a state technical university. Preceding section proved using 'Cost of Quality' as an opportunity loss if industry does not pro-actively support the academic institutions. Thus, synergy of these three important stake holders is needed for the quality and employability scenario to improve. The current apathy, on the part of all to work as a team towards talent nurturing processes, needs to be overcome, if technical education quality in the country has to be improved. Industry, perhaps, needs to take a lead in breaking the ice pro-actively because its own competitive advantage depends on the talent, it hires. This makes industry as a major stake holder. Thus, in the spirit of hand-holding; Indian private industry must come out of its indifference to technical education quality- except occasionally voicing concern at various form. They need to pro-actively help the process in their own enlightened self-interest and survival.

Thus, it is obvious from the foregoing analysis of opportunity cost of un-employability, that it is in the best interest of the industry as a major stake holder, not to remain indifferent to the interaction-with the academia and do not let the 'business as usual' scenario prevail. Recognizing that industry has much more at stake, if the quality of education deteriorates, they must step in on their own, even if academics are not very enthusiastic about their involvement. Industry associations like NASSCOM, CII, FICCI, ASSOCHAM, MAIT etc. must take a lead role in promoting such a proactive initiative and positive support to the academic world.

Roadmap of support expected from Industry

The industry could consider the following types of initiatives to support and nurture quality and employability in the technical institutions in the country. These suggestions are only indicative and not exhaustive.

A. Strategic Initiatives

1. Some enlightened and very successful business houses with internationally recognized brand equity and known for their quality, should themselves consider entering into the technical education business instead of small group of traders, SME's, considering it as a diversification strategy of their business. The spirit behind this proposal is that such educational investors who have earned a brand name will appreciate the role of quality better and will balance their short term and long term interests better. They also have the patience to wait, till return on investments start, taking place.

2. Initiate strategic alliances with existing institutions through MOU's with support through equipment, chair professorship, labs, library support and faculty sabbatical, adjunct professorships etc.

3. Adopting colleges for Mentoring purposes like recently taken initiative by NASSCOM.

B. Tactical :

1. Support through Fellowships, scholarships, financial support to talented students who could be potential employees of the company.

2. Offering faculty sabbatical during summer vacation for industrial exposure. This could be in the form of faculty fellowships, local hospitality etc.

3. Offering seats for projects to be undertaken by students in final year with co-guide from industry.

4. Facilitating faculty training and faculty development through support and inputs from industry under 'train the trainer program'.

5. Sponsoring seminars, conferences, tech-fest, etc. to develop students' event management skills and leadership qualities and forge bonds and linkages for future.

C. Operational Initiatives

1. Special experience based lectures to be delivered by engineers/managers for the benefit of students and faculty in colleges in the vicinity of their place of work.

2. Involvement in RDC, BOS, other committees for inspection, monitoring, faculty selection etc. in the affiliated colleges. This will help in curriculum up- gradation and make the courses relevant and up-to-date.

3. Co-writing case studies/books etc. jointly with eminent professors sharing best practices of industry.

4. Participating in project evaluation, panel discussions, alumni affairs related activities in colleges/institutions in their neighborhood.

5. Facilitating industrial visits, tours of students to their premises to enable them get a feel and exposure of industrial environment.

Concluding Remarks

This paper provides an economic justification for the industry to be proactive in nurturing and supporting the quality enhancement initiatives in academic institutions. The alternatives to that route are costlier, if perceived from the point of view of price of non-quality, the industry has to pay, if they remain reactive or indifferent to academia. It provides a roadmap for strategic alliances and policy options which are win-win. If seen in this perspective, the academia-industry interaction process may progress beyond debates.

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