

CHALLENGES FACING THE CIVIL & STRUCTURAL ENGINEERING FRATERNITY IN INDIA

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Prof Mahesh Tandon received his Bachelor degree in Civil Engineering IIT Roorkee & Masters from University of Hawaii, USA. He was appointed Distinguished Visiting Professor at the IITs @ Kanpur, Roorkee & Gandhinagar (2005-2015) by the Indian National Academy of Engineering (INAE) and the ALL India Council for Technical Education (AICTE). Currently President, Indian Association of Structural Engineers.

1.0 Introduction

Many challenges face the engineering profession in India. Two mountains which have sprung up in our path concern the “unemployability” of a large percentage of our engineers and lack of statutory recognition of our profession. By seeking divine intervention to remove these mountains from our path would not be the appropriate “engineering approach”. The objective of this paper is to examine their contours and make an attempt to cut a path across them.

2.0 History

A Committee under the chairmanship of S. G. Barve was set up by the Planning Commission in February 1966 to study the problems relating to technical consultancy services. The Committee’s Report submitted in 1970, recommended that “in order to develop the profession on healthy lines and to avoid undesirable elements/practices there should be an All India Institution/Association on the lines of the Indian Institute of Chartered Accountants to lay down proper standards of education, experience, capability, capacity etc”. The Chartered Accountants Act had already come into being in 1949. The Report further recommended that “legislation could be undertaken to make it (the Institution) a legal entity parallel to the Institute of Chartered Accountants”.

It is a sad commentary that even after half a century this important piece of legislation has not seen the light of day.

We cannot ignore the fact that India has a high vulnerability profile from the point of view of natural disasters like earthquake, cyclones and floods. To complete the profile we must add man-made disasters, such as pollution, unsafe buildings, haphazard planning and over-crowding in cities and road accidents (400 fatalities *per day* in 2015). These calamities threaten India’s economy, the safety and security of its population as well as its sustainable development. Engineers, by education, training and experience are well-equipped to make a significant contribution to ameliorate these hazards.

After the Kutch earthquake on 26th Jan 2001, the State of Gujarat felt the need for regulation of Engineers and as a consequence the Gujarat Professional Civil Engineers Act, 2006 came into being. The need of the

hour is to have a similar, but improved, enactment on a national scale, to ensure the safety and security of the general public as well as the physical assets of the nation.

3.0 Some Statistics

In most countries, e.g., Australia, Canada, Japan, Malaysia, New Zealand, Pakistan, Sri Lanka, South Africa, Singapore, Tanzania, USA, etc. professions such as Engineers are invariably governed by an Act of the Government. In India too, some professions, like that of Chartered Accountants, Doctors and Lawyers are indeed governed by Acts of Parliament, while the Architect's Act is for governing the 'TITLE'.

The engineering population in India has reached an estimated 7.5 million and is increasing at the rate of 1.5 million per annum. While the Government brought Acts of Parliament after Independence for the regulation of other professions like Chartered Accountants, Doctors and Lawyers. The ratification of regulation for Engineers by Institution of Engineers (India), established though Royal Charter in 1935, seemed to have been inadvertently overlooked. Incidentally, the total numbers of Chartered Accountants, mentioned by the Barve Report are but a small fraction of numbers of Engineers, i.e., 240,000 out of which only about 50% are in practice.

The first ever Global report commissioned by the *Queen Elizabeth Prize for Engineering* makes some startling revelations. While just 20% of 16 to 17 year-olds from the UK and 30% from the USA are interested in an engineering career, in India the rate is as high as 80% - the highest in the world. India also has the distinction of having closed the gender gap (85% men and 79% women) for engineering aspirants in 2015.

A Research Report titled "Real Estate and Construction Professionals in India by 2020" published by the Royal Institution of Chartered Surveyors (RICS) mentions that the Built Environment contributed 18.9 % of GDP of US\$ 756 billion in the year 2008-2009. The GDP is forecast to reach US\$ 2080 billion in 2015-16 and the demand for Civil Engineers in the same year would exceed 4 million as against the meagre supply of 640,000 thereby resulting in a huge shortage of Civil Engineers.

From the above discussion it can be concluded that

- Engineering, undeniably tops the list of professions seen as most vital for economic growth.
- Given the potential of a "knowledge economy" our country must develop in an organised fashion to absorb the young but growing talent pool.

Coming to the quality of engineers, the position is worse.

Based on the National Employability Report – Engineers: Annual Report 2016 available on the website of "Aspiring Minds" less than 20% engineering graduates are employable. The Report is based on survey of 150,000 engineering students from 650 engineering colleges across the country.

Considering non-IT jobs in the "Core Engineering" category such as mechanical, electronics/electrical and civil engineers the employability comes down drastically to a mere 7%.

Technical (including engineering) education comes under the purview of AICTE, which has been set up by the Government of India. This statutory body has the objective of the coordinated development of the technical education system as well as the regulation of its quality.

Worried about quality, AICTE is reported to be considering the reduction of seats in engineering by one million, from the existing capacity of 1.67 million seats. This is a good move to prevent "fly by night" operators who set up shop without proper facilities and staff. However, some of the established courses like AMIE run by the Institution of Engineers should be encouraged.

4.0 Why Now ?

The Prime Minister's initiatives have resulted in the launching of several schemes for a safe and sustainable environment like 'Smart and Amrut cities', 'Make in India', 'Housing for all by 2022', 'Swachh Bharat Abhiyan' and the target of constructing National Highways at the rate of 42 km/day and supplementing them with inland waterways . We can add to this the long list of cities where Metro project constructions are in progress or are in an advance planning stage, as well as high speed train corridors and development of ports.

The inevitable conclusion is that never before in India have such ambitious investments in construction and infrastructure been envisioned. Such projects require skills of the highest order from Civil Engineers and those from other engineering disciplines. These schemes need big ideas, ideas that will make a difference, ideas that will open doors and result in breakthroughs. We need an organised work force which can visualize a better world beyond the status quo, which will need new levels of technical excellence. To exploit the inherent inventiveness of engineers for these schemes we require a cohesive and cogent planning at a national level by the Government and an active commitment which will come only by a statutory stamp.

5.0 The Need For Engineers Bill

The need for Engineers Bill is best answered by asking if there is an authorised body (association or institution) which has the legal mandate to:

- Take up issues concerning engineers with any Authority?
- Uniformly decide across the country on the qualification, competency and experience requirements of engineers for a particular work.
- Grade engineers based on their qualifications, competency, experience and demonstrated capability and certify them?
- Direct and monitor that each and every engineer continuously updates knowledge and skills?
- Bring in accountability and responsibility and lay down Code of Ethics
- Regulate entry of foreign professionals and also have reciprocal arrangement for acceptance of Indian engineers in other countries?
- Restrict the usage of the title and style of “Engineer”?
- Initiate a mentoring program for the next generation of engineers?
- Lay down rules for election to the Council?

The answers to all these question is NO!

6.0 Road Ahead

There is a dire need to regulate the profession of Engineering, an Engineering Council needs to be set up that can then eventually be made “a legal entity parallel to the Institute of Chartered Accountants” as suggested in the Barve Report.

In the interim, an existing Institution such as the Institution of Engineers (India), IEI, which was established by Royal Charter in 1935 could be made *de facto* the legal entity. IEI has approximately one million members in 15 engineering disciplines in 125 centers or chapters located in India and overseas; it is the world's largest multi-disciplinary engineering professional society. They also hold examinations for Sections A&B of AMIE (in all the 15 disciplines) which is considered equivalent to an Engineering Degree. The IEI represents India at the International Professional Engineers Agreement (IPEA) which provides for recognition of equivalency of standards and quality assurance systems used to establish the competency of engineers for independent practice in most parts of the world. Given its extensive reach and diversification IEI is well suited for the role. It can also be given the primary responsibility of Registration of Professional Engineers.

Other Institutions like Consulting Engineers Association of India and Engineering Council of India have also started the process of Registration of Professional Engineers. These are symptoms that are indicative of the dire need felt by the fraternity for a regulatory and registration mechanism. However, before these energies dissipate in various directions, all institutions need to come under a single umbrella for this common cause. Failure to do so on a previous occasion does not justify the pessimism surrounding the futility of another whole-hearted attempt.

Coming to the quality of engineering education, which is one of the main reason for the large number of engineers being “unemployable”, AICTE seems already seized of the problem as indicated earlier. The 1.5 million engineering graduates being released into the job market every year, could become a major sociological issue apart from hindering development of country

At least part of the answer lies in making the education more “job centric” in some respects, and, more importantly, work with AICTE to have vigorous academia-industry interaction and engagement. This would be possible more easily once the profession of engineering has a regulator with statutory status.