

Consultancy in Engineering Education: Opportunity and Challenges

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Investment decisions for creating the physical and human resources necessary in engineering education and the strategies for rapidly transforming 'developing' countries into 'developed' countries are two important factors representing the raison d'être for the opportunity and challenges for consultancy in engineering education. The old style and the new style in engineering educational consultancy in India since independence about 45 years ago are compared and contrasted in this paper. Not only has self-reliance been achieved, but opportunities also abound internationally.

ESTABLISHING engineering colleges, creating facilities for research, designing relevant curricula, developing modern instructional resource material, equipping laboratories are all very expensive to implement. Investment decisions require identification of alternatives and careful study of their costs and benefits.

The gradual industrialization process that led to the development of the 'developed' countries has to be transformed to a much more rapid process so that the 'developing' countries become 'developed' in the not too distant future.

The two factors identified above are the *raison d'être* for the opportunity and the challenges for consultancy in engineering education.

THE INDIAN EXPERIENCE

The old style

In India, initial development in engineering education did not take place through input from consultants or for that matter educationists. Engineers active in the profession were asked to establish centres of learning or placed in charge of existing institutions, and these institutions grew from in-house development, relying on the genius of professional engineers to pioneer engineering education.

There are many engineering institutions today that now have the vitality to grow with in-house expertise. For example, the five Indian Institutes of Technology (IITs) or the University of Roorkee are periodically revising their curricula and establishing new centres of research or new departments of study; they are also phasing out subjects, disciplines and even departments. Such self-generating centres rarely require consultancy services.

The style changes

IITs today may not require consultants but the manner in which they were established changed the old style. Each IIT received aid from some international agency or developed country in the form of equipment, visiting faculty and training facilities for IIT faculty in institutions abroad. The visiting faculty were actively involved in planning and shaping not only the infrastructure, equipment, courses, curricula, but also the ethos at each institute. They were the consultants and sometimes more than consultants.

This style, i.e. the use of consultants, was substantially successful. Once the IITs were established, the style was replicated at the national level through the Institutional Network Scheme of the Ministry of Human Resource Development for the purpose of upgrading the facilities at Regional Engineering Colleges and other institutions. The Ministry was the funding agency; IIT faculty functioned as consultants; consultants and faculty at other colleges prepared schemes to establish new laboratories in these colleges, develop new courses and train manpower. The experiment was again successful, limited only by the constraints of resources and the requirements of continuing financial support for sustenance.

The new style

The last decade saw the establishment of a number of new engineering institutions. Some were established by the private sector and financed by charging students high admission and tuition fees; many of these are not recognized by the All India Council for Technical Education, a statutory body empowered to accredit, since these institutions are not concerned about quality and high standards and operate primarily to make a profit. Quite apart from such institutions, others have been established by central and/or state governments with

careful thought and planning. In establishing these latter institutions, a new style has emerged.

This new style consciously utilizes the talent available in India for conceptualizing the nature of the institution, taking due cognizance of the needs of industry and the economy. A team of consultants is constituted who undertake a study of the relevant region; take note of the existing educational facilities; forecast requirements of manpower both in the organized and the unorganized sectors; identify the disciplines for which educational facilities need to be created; determine the number of students required for each discipline; suggest appropriate curricula; delineate the requirements of land, buildings, equipment, manpower; propose a management system; and through such a process prepare a Detailed Project Report (DPR) and a masterplan that also quantifies the required financial resources on a timeframe. Such a DPR provides crucial information, on the basis of which rational decision-making becomes possible. For example, such DPRs were prepared (by Educational Consultants India Ltd) for the following institutions:

Regional Engineering College, Hamirpur, Himachal Pradesh
 Regional Engineering College, Jalandhar, Punjab
 Longowal Institute of Engineering & Technology, Longowal, Punjab
 Indian Institute of Technology, Assam
 Centres for Electronic Design and Technology—five in India
 National Institute of Petroleum Engineering and Technology.

It is on account of this new style that the IIT in Assam will not be just the sixth IIT in India, but will have a unique character. The team of expert consultants took note of the technological needs of India today and suggested a major focus on design so that India can successfully trade in technology on the global market. Noting the locale of the IIT Assam, the consultants recommended new programmes in petroleum engineering, applied biosciences, and safety engineering and disaster management. The Longowal Institute of Engineering and Technology is yet another bold experiment, which in a single campus caters for technical courses at certificate level, diploma level as well as degree level, in recognition of the fact that in engineering and technology, design, execution and maintenance all have overlapping characteristics and there is a need to look at them all holistically.

The new style is not limited to developing DPRs; it can be and is being used for any task and any scale of operation. At one end of the spectrum, it operates in the form of a turnkey consultancy which carries on beyond the preparation of the DPR, to the development of architectural and structural design, to construction, to equipping the building with furniture, the laboratories with equipment and the library with books, to recruitment of staff and faculty and so on, and ends with the

handing over a functioning institute to the client. At the other end of the scale, the consultant may only be employed to assist in any one small component of the total work, e.g. to assist only in the development of the curriculum for a single course or for training of faculty in the use of audio-visual equipment. In professional jargon, consultants can be used for project preparation, project implementation, policy studies, sector studies, evaluation studies, etc.

The new style is, as such, versatile and can be cost-effectively utilized to cater for specific needs.

THE INTERNATIONAL SCENARIO

Consultancy in the field of education is big business now. The social sector is being accorded high priority in the development process. Industrialization, economic growth, population control are all dependent on the level of education of the people, especially women. Attention is being focused on total literacy and universalization of elementary education. International funding agencies like the World Bank, the Asian Development Bank and countries offering bilateral aid are making substantial financial inputs to education. Engineering education is getting some share of the funding.

In creating new facilities in the education sector, the new style is being extensively utilized the world over. Consultancy organizations are flourishing. Their representatives are continuously walking the corridors of the World Bank and other funding agencies in search of work. Effective marketing is essential for the business of education.

India is particularly well placed to provide consultancy in the field of engineering education to developing countries. The sizeable investment made in India in establishing engineering colleges, Technical Teacher Training Institutes, RECs, and IITs has created a vast reservoir of expert and talented manpower who have direct experience of creating engineering education facilities in a developing environment. In comparison to consultants from the developed world, Indian consultants are more cost-effective.

The process of providing such consultancy has begun. For example, Educational Consultants India Ltd have been involved in the following projects

- establishment of an Electronic Design Laboratory at the Chulalongkorn University in Bangkok, Thailand;
- appraisal of the Arba Manch Water Technology Institute in Ethiopia;
- secondment of agricultural specialists to Mauritius;
- training of Nepalese students in civil engineering.

CONCLUSION

The challenge of consultancy in engineering education is of a magnitude that matches the challenge of creating and updating the infrastructure for engineering education in India and in the

developing world. For engineering educationists in India to take advantage of this opportunity, it is necessary to recognize the business aspect of education and to market their capabilities effectively and aggressively.

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INTRODUCTION

The focus of education and training in today's world is to develop the human resources to meet the needs of a rapidly changing and increasingly competitive global economy. The challenge is to provide the education and training that will enable individuals to acquire the knowledge, skills, and attitudes necessary to succeed in this environment. This is a task that requires a paradigm shift in the way we think about education and training. We must move from a focus on content to a focus on process, from a focus on rote learning to a focus on critical thinking and problem-solving, and from a focus on individual achievement to a focus on collaborative learning and social responsibility. This shift is essential for our students to be prepared for the challenges of the 21st century. The role of the educator is to facilitate this learning process, to create a supportive and stimulating environment, and to provide the guidance and resources needed for students to reach their full potential. This is a complex and demanding task, but it is one that is essential for the success of our society. We must embrace this challenge and work together to create a future that is bright and full of opportunity for all.