Quality Accreditation System for Indian Engineering Education Using Knowledge Management and System Dynamics

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ABSTRACT

The engineering education system of India is becoming increasingly complex due to reasons like unmanageable numbers of colleges affiliated to universities, wide spectrum of student quality, multi-boss system in management and conflicting interests of stakeholders. Since the Accreditation board of engineering and technology (ABET) of U.S., Malcolm Baldrige National Quality Award (MBNQA) of U.S. and European Foundation for Quality Management (EFQM) of UK have been established; many other countries have developed their own version of national quality award (NQA) and accreditation systems. These NQAs and accreditation systems tend to follow the same general framework with different emphases on criterion. Since MBNQA has a prominent knowledge management (KM) component in it and EFQM has a strong mechanism of measuring outcomes/results, it’s attempted to develop a robust framework for Knowledge Quality Management (KQM) by integrating KM and outcome components into it using systems theory. The system dynamics (SD) approach is proposed for the visualization and analysis of quality assessment of undergraduate engineering education in India. Towards this, all possible attributes and indicators to study the interaction and interrelationship of various enablers and results have been identified. Causal loop diagrams (CLDs) and the integrated CLD for the entire proposed model enabling development of a system dynamics (SD) model is presented.

Keywords: Accreditation, Casual Loop Diagrams, Knowledge Management, Quality Management, System Dynamics

INTRODUCTION

Higher education in general, and engineering education in particular has been proliferated especially in countries where the economy is under fast growth rate, as this division of higher education has direct bearing on the economy of a country. This is especially true as far as India is concerned. But maintaining a balance between supply and demand is always a challenging task. Unless the engineering institutes
produce engineers who are employable in the market or be entrepreneurs, most of the engineering institutes will be agents for enhancing the population of unemployed engineers.

Engineering education system is of paramount importance in generating the technical manpower required for building a strong nation. The demand for engineers has been growing in India during the last few decades. This has resulted in various kinds of people setting up of a large number of colleges in India, offering a variety of programs to meet the demand. This process has been more or less motivated by financial gains. With the ongoing liberalization and globalization of the economy, more and more foreign universities/institutes are also trying to find foothold in the Indian educational space by entering into joint ventures with Indian universities/institutes. All these attempts no doubt have helped in improving the quantity side of the output, forcing the corresponding quality to suffer.

As Vishwanadhan (2008) pointed out, the following issues may lead to deleterious effects in the Indian Engineering Education system (IEES).

- Wide spectrum of student quality.
- Lack of experienced faculty and their quality.
- Mushrooiming of colleges.
- Location of colleges in remote places with non-proximity of industries.
- Unmanageable number of colleges affiliated to a single university.
- Multi-boss system-AICTE, state government, university and management.
- Lack of appropriate performance measures.
- Conflict about indicators of quality among experts.
- Lack of proper methods of collecting, storage and analysis of information.
- Inadequacy of accreditation process to:
  - Make consensus about the validity of the process.
  - Encourage continuous improvement.

The society, the policy makers and the employers are really worried about this trend and there have been many attempts by the government and various other agencies to remedy the situation. The approaches and methods adopted to resolve these issues are very important in this situation, for the maintenance and improvement of quality standards of engineering education. One of the most commonly accepted procedure is accreditation based on objective assessments.

A study of the present assessment methods of engineering programs such as Accreditation Board for Engineering and Technology (ABET) of US, National Board of Accreditation (NBA) of India, Malcolm Baldrige National Quality Award (MBNQA) of US, European Foundation for Quality Management (EFQM) of UK was carried out to analyze and compare their capabilities in promoting quality in engineering education. The methods based on the linear thinking and mental models of policy makers and administrators are insufficient to analyze the performance related issues of Indian engineering education system. The insights gained helped to understand various important issues on accreditation processes and also the quality award excellence models of various other countries such as ABET, MBNQA, EFQM etc. motivated us for research towards KM based Quality Management. Vishwanadhan (2008) has also presented the analysis and assessment capabilities of present NBA process of engineering programs to strengthen this argument.

An attempt was made to identify effective knowledge performance measures, corresponding enablers and inhibitors. Engineering education system is a growing field and to strengthen the system there is a need to effectively assess various engineering institutions. The identification of strong and weak functions (components) is important for quality education to achieve higher standards through continuous improvement. The integration of Knowledge Management (KM) and quality in engineering education seems to be critical.

It was felt appropriate to develop a self assessing tool for quality in engineering education by incorporating systems theory and integrating...
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