

## IMPLEMENTATION OF OUTCOMES BASED POST GRADUATE ENGINEERING PROGRAMMES

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**Abstract:** Outcome based post graduate engineering educational programs are very much needed to meet the fast changing industries. The impact of globalization of Indian economy can be seen in establishing many multinational companies. To accommodate these MNCs many interstate industrial corridors are being planned between Delhi-Mumbai, Bangalore-Mumbai, Chennai- Bangalore, Guwahati –Myanmar-Thailand and in many other regions. Industries look for multi-skilled post graduate engineers to take up innovative engineering design, manufacturing, and maintaining. To succeed in these human capital requirements, the institutions have to plan flexible, cooperative and multidisciplinary engineering programs, and implement them through effective collaboration with the companies in the corridor.

**Keywords:** Postgraduate programme implementation, Consortium of colleges, interdisciplinary programs, QIP for PG faculty of tier II and III colleges

### I. INTRODUCTION

#### **Status of existing engineering programmes:**

Many of the affiliated colleges suffer from the shortage of qualified faculty; outmoded curricula and obsolete infrastructure. Some of

the institutions do not collaborate with the leading industries in the region. They do not revise and update the curricula periodically. They do not offer development programs for their faculty. Under these conditions, the employability of engineering candidates become less and less as the skills and competencies change fast. World Bank published Report No.47 (October, 2011) entitled “Affiliated Colleges in South Asia: Is Quality Expansion Possible?”

Major findings of this report as well as that of various research studies [7 to 13] are:

1. Affiliated Colleges- The ‘Weakest Link’ in South Asia’s Higher Education
2. Weak supervisory and monitoring capabilities in the affiliating universities
3. Weak administration in the government authorities
4. Absence of self-evaluation by the faculty members
5. Absence of perspective planning and continuous monitoring of the implementation of the curricula
6. Funding is provided even if these colleges met the minimum standards
7. Low quality affects the productivity of the work force and economic growth and development of the nation and under employment of the engineers.
8. Even many programs under international development agencies

do not include around 90% of the institutes.

9. The faculty developments programs offered by the central government and Indian Society for Technical Education, in-house programs and AICTE are very insufficient to meet the needs of the faculty.
10. Around 85% of the institutes are owned by private trusts that depend on capitation fees and regular tuition fees for running the institutes.

European Association for Quality Assurance in Higher Education [5] has synthesized the concept of excellence in higher education in 2014. The major focus is on the management, research, and teaching and student performance. The Finnish Higher Evaluation Council (FINHEEC) granted performance based funding to selected institutions which were selected through peer review. Russia instituted best study programs which were implemented by the National Center for Public Accreditation (NCPA). Tao Qiuyan, Gao Lin, and Bao Jie identified key elements to be comparatively analyzed in Technical Vocational Education International Cooperation and Research [1] :

- \* Position and function of TVET in the national economic and industrial structure certificate framework, coordination between industry, government, and TVET partners;

- \* National framework of TVET, including the national occupational;

- \* Philosophy, methodology, and organization of TVET curriculum;

- \* Management and development of TVET teachers/trainers;

- \* Quality assurance and controlling of TVET

Such planned approaches are very much required for planning industry relevant postgraduate programs.

## II. PEDAGOGICAL INNOVATION

Anne Mai Walder [14] identified seven distinct notions of pedagogical innovations as follows:

Novelty

Change

Techno Pedagogy

Reflection

Improvement

Application

Human relations

The faculties of postgraduate programs in engineering have to bring innovations in teaching. The students have to take up design and production of innovative products,

## II. SWOT ANALYSIS

### STRENGTHS

- The Tier II and III engineering colleges have immensely contributed to the success of Indian IT Industry
- Now they contribute to the success of engineering design of MNCs
- They have very good potential for further development

### WEAKNESSES

- They lack modern resources
- They lack qualified faculty
- They lack partnership with industry
- They lack finances
- They lack support from the government

## **OPPORTUNITIES**

- These colleges could contribute to high growth of design and production of innovative products
- These colleges could further contribute to the success of Indian MNCs through production of innovative products

## **THREATS**

- If these institutes are not developed, it will create more societal problems
- Many development opportunities would be lost
- Other competing colleges and universities in Asia would grow at the cost of Indian universities and affiliated colleges.

## **III. OUTCOMES OF THE PhD THESES IN ENGINEERING EDUCATION:**

Considering the findings of various PhD theses in engineering programs ( Tamilarasu [7], Sivanesan [8], Mathew[10], Subbaraj [11], Anita [12], Srividhya[ 13] and Sujatha [4]) the followings suggestions are offered:

- Establish a consortium of group of educational institutes who can plan appropriate postgraduate programs in collaboration with the industries in the industrial corridor and offer them as cooperative programs.
- Offer various electives by the consortium members and exchange students among them and reduce the cost of infrastructure and resources. This will bring effective utilization of various resources of the colleges.
- Get the assistance of the companies to get industrial training and topics for

dissertation programs which will be of great use for the industries

- Establish consultation centers in the corridors and undertake sponsored programs and projects in cooperation with other institutes

## **IV. PLANNING COOPERATIVE PART- TIME POSTGRADUATE PROGRAMMES FOR THE WORKING PROFESIONALS**

This approach is being followed by various autonomous colleges, NITS and State Technical Universities. If such programs are extended to other well performing Tier II and Tier III colleges, it would improve the competencies of the executives of the companies. In addition the partnership between the institutes and industry would enhance. Institutes could offer needed consultancy programs based on their advanced knowledge to the companies located along the corridor.

## **V. NEED FOR INTERDISCIPLINARY AND MULTIDISCIPLINARY PROGRAMMES**

Electronics and electrical engineering branches have brought many interdisciplinary programs successfully. However civil and mechanical engineering branches have to establish many interdisciplinary and multidisciplinary programs. Some of the successful programs are mechatronics, building technology and management, farm machinery, and transportation engineering and management.

## **VI. MODERNIZATION OF POST GRADUATE PROGRAMMES**

Capacity Development, Quality Improvement and Efficiency Improvement project for postgraduate programs in Engineering and Technology are very

much required for improving the Tier II and Tier III colleges.

Many innovations are due to these colleges. Some of them are:

Indian Software Industry Development,

Success of ISRO, and

Engineering design projects in various MNCs located in India.

All these provide ample proof for the achievements of the Tier II and Tier III colleges. Hence, sufficient funds could be allotted under Quality Improvement Program of AICTE so that the faculty of these colleges could be given sufficient opportunities for registering Ph.D degrees in engineering and technology. Hence, the Quality Improvement Program of AICTE could be expanded by considering the enormous growth of Tier II and Tier III colleges.

#### **VII. TAX CONCESSION FOR INDUSTRIES ON THE AMOUNT SPENT ON COOPERATIVE POST GRADUATE PROGRAMMES**

The federal government of USA provides tax concession to the companies for the money spent on the higher education. This encourages their cooperative programs. Such initiatives would be of great use for India in developing competent post graduate engineers and technologists. This would reflect in economy and global market share.

#### **VIII. STATE AND REGIONAL LEVEL COORDINATION FOR POST GRADUATE PROGRAMS IN ENGINEERING AND TECHNOLOGY**

There is a need for sharing the curriculum development process, model curricula, and development of learning materials, case

studies, faculty development programs and industrial training modes.

Hence, the directorates of technical education of the state governments of each region and Ministry of Human Resource Development (MHRD) could create a mechanism for sharing the methodology. This would help the institutes and universities to plan strategic plans.

#### **IX. GLOBALIZATION OF POSTGRADUATE ENGINEERING PROGRAMMES**

To compare and reach excellence, the universities could be encouraged to globalize the programs and network with the international universities. One can plan joint programs and faculty and student exchanges.

#### **X. SUMMARY**

The majority of the existing post graduate programs in engineering need redesign so that they can produce high end design and manufacturing engineers. The curricula have to be based on the desired industrial outcome. Planning cooperative part-time postgraduate programs for the working professionals would help industries to improve the design of innovative products and manufacturing. Modernization and networking with global universities will enhance the competencies of the faculty and students. The central and state governments could fund for postgraduate programs in Tier II and Tier III colleges.

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