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FLEXIBILITY IN ENGINEERING EDUCATION: AN EMPIRICAL STUDY OF INDIAN INSTITUTES

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ABSTRACT

Recent trends in liberalization and globalization, and the corresponding domestic and global competitive environment, has necessitated a strategic shift in terms of educational goals, the delivery system and process of teaching and learning. Many Technical institutes in India, at present, are not fully in a position to cope with the demands of fast changing environment. Therefore there is an urgent need not only to identify various issues related with technical educational institutes where flexibility may be incorporated, but also to make an assessment of flexibility of Indian technical institutes. In this study, a brain storming session was first arranged with the key stakeholders of selected technical institutes in India to explore the issues of flexibility. Based on brain storming, thirty flexibility issues related with technical institutes have been finally identified. Questionnaire survey was then arranged to assess the standing of Indian institutes. Respondents were asked to map their own institutes on identified flexibility issues. The result indicate that state engineering colleges are very rigid whereas national level institutes offer more flexibility. Overall results confirm that private engineering colleges are rigid on teaching-learning process and evaluation system whereas they are flexible in management of institute. The paper concludes that there is an urgent need of flexibility in every aspect of academic life. The paper provides guidelines to the institutes to assess and work out suitable strategy for them to adopt flexibility. This will help them in delighting their internal (students) and external (industry) customers, which will help in survival and growth of the institute in the long run.

Keywords: *Flexibility, Education, Indian Institute*

Introduction

There is a well-organized structure and a wide network of technical institutions in India offering different types of programmes i.e. technician (diploma) courses, graduate and post- graduate courses, etc., catering to the various levels of knowledge, skills and competences required by the country. Broadly three levels of institutes exist in India offering technical education for graduate and post-graduate course and doctorate work. First level institutes are Indian Institutes of Technology. These are apex institutions for engineering education and research. Each institute conducts a Bachelor degree course and Master's degree course in a wide range of subject fields, and also offers facilities for Research and Doctoral work. The main emphasis at the institutes is on the Post-Graduate studies and Research with an inter-disciplinary approach. Indian Institute of Science, Banglore may also be kept in this group. In addition to IITs, there are 20 National Institute of Technology (NITs). They are fully funded institutes of the Central Government and granted deemed university status. These institutes are expected to be at par

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with other national level technical institutes and be able to fulfill the demand of high quality undergraduate and postgraduate level of education in engineering and technology. Recently, an Act, namely the National Institute of Technology Act 2007, has been passed by parliament so as to provide a common statuary framework for all NITs. IITs and NITs are kept in one group for this study. Second level of institutes are State Engineering Colleges. There is wide network of such engineering colleges established and administered by the State Governments. Third level institutes are institutes run by private agencies and societies. They are also affiliated to the nearby universities, and offer degree courses in a variety of subject fields. Many of them are making significant contribution in the field of technical education.

The four decades (1950-90) of Indian industrial scenario is characterized by the predominance of public sector with social welfare orientation, policy of protection from foreign competition, granting of generous subsidies, less foreign interactions, entry barriers to MNCs, etc. Accordingly industry required manpower which had a general exposure to all functional areas of engineering business. Consequent to adapting to the new economic policy in 1991, vast changes have taken place both in the policy and orientation concerning the industrial sector. The resultant phenomena of such a strategic shift from regulation to liberalization and from protection to openness has resulted in free competition. Having continued with the reform process over last 16 years, this is high time now to produce the best of human capital up to the expectation of emerging industries worldwide. With changes in the socio-economic and cultural framework, commensurate with recent trends in liberalization and globalization, and the corresponding domestic and global competitive environment, there has resulted a transition in terms of educational goals, the delivery system and process of teaching and learning. Against this setting, newer demands have been placed upon the technical educational system, resulting in shifting of focus from quantitative expansion to one with emphasis on quality. The technical education system in an attempt to react to the demands and ever increasing pressures from its stakeholders, finds itself in a market oriented environment, with internal and external customers, wherein 'delighting the customer' is the rule for survival and growth in the long run. The past few years have seen few changes in technical education system, in terms of education goals, the education imparted, the educational process and the very paradigms of teaching and learning. These changes have actually been forced upon the internal and external environment. With the increase in size and diversity of student population, the increased quality expectation by stakeholders, greater accountability of academic functions and increased emphasis on efficient and effective management, the educational system has been witnessing new realities and challenges. The system shall continue to face challenges in terms of being more accountable and professional with limited and scarce resources. Therefore, there is need to identify every aspects of academic life requiring flexibility i.e. to teaching- learning, evaluation and administrative activities.

Flexibility is the ability to change or react with little penalty in time, effort, cost or performance. It implies openness in thinking, adaptiveness to the environment, responsiveness to change, versatile of action, non-rigidity, multiplicity of process setting, freedom, liberalization, informal attitude, autonomy of function, agility in actions, customized or tailor made solutions (Sushil;1997). The concept of flexibility in an organizational context, refers to the ability to precipitate intentional changes, to continuously respond to unanticipated changes, and to adjust to the unexpected consequences of predictable changes (Bahrami,1992). He states that flexibility is the ability to do things differently or to do something else, should the need arise.

Flexibility is the ability of an organization to change as per the needs arising out of changed environment. A flexible organization has an informal atmosphere where the employees have freedom to work. There are more interactions among the various work groups and the

management is participative in nature. A flexible organization is open to new ideas. It is more responsive in nature and is prepared to adapt itself to the change. A flexible organization is dynamic in nature and has learning attitude. Its focus is on customer's satisfaction and it pro-acts at the required speed to meet the needs of the customers. Sushil (2001) argue that requirements of various stakeholders external to the organization are changing over time. Customers, for example, are becoming more aware and demand more variety, service and value from the organization. Therefore, organization will have to adapt and respond to the changing requirements, be more open to lead to transformation of the organization i.e. creation of higher levels of enterprise flexibility. Sushil (2001) defines enterprise flexibility as creating options at various levels in the enterprise, developing ways and means of change across the range of options, and providing freedom of choice to various actors in the enterprise to make this change happen with minimum time and efforts.

Recent trends in liberalization and globalization, and the corresponding domestic and global competitive environment, has necessitated a strategic shift in terms of educational goals, the delivery system and process of teaching and learning. Knowledge is the result of dynamic process of thinking. Many Technical institutes, at present, are not fully in a position to cope with the demands of fast changing economic environment. Importance of flexibility in technical education system has also been highlighted in a study conducted by National Science and Technology Management Information System (NSTMIS) of the department of Science and Technology. Against above background, there is an urgent need not only to identify various issues related with technical educational institutes where flexibility may be incorporated, but also to make an assessment of flexibility of Indian technical institutes.

Methodology

The study is carried out in two phases.

- Brain Storming
- Questionnaire Survey

'Brain Storming', a creative problem solving technique, is applied to generate ideas. It is devloped by Osborn (1963) and is generally carried out in groups. It is based on considerable divergent thinking resulting in lot of alternative solutions to a given problem. In this study, objective of arranging brain storming session is to explore flexibility issues related with technical education system. The brain storming is arranged with twelve faculty members and fifteen students of government and private engineering colleges of Chhatissgarh, Madhya Pradesh and Maharashtra state of India. After thorough discussion on education system and flexibility concepts, views were invited regarding relevant flexibility issues of technical education system. The Brain Storming has generated following flexibility issues along with extreme ends of continua. The explored issues have been then grouped in three broad groups as given below.

(A) Teaching-Learning Process

(i)	Place of Learning	Fixed——————————— Anywhere
(ii)	Teaching Schedule	Fixed——————————— Anytime
(iii)	Course Content	Fixed (Defined)————Variable (Choice of teacher)
(iv)	Knowledge Imparted	Theoritical——————————Practical
(v)	Subjects offered	Fixed (Compulsory) ———— Optional (Choices)
(vi)	Teaching/Counseling	Mass ——————————— Individual
(vii)	No. of Credits/semester	Fixed——————————————— Variable

(viii)	Teacher available	Permanent ——————— Part-time/Guest lecturers
(ix)	Library timings	Fixed ——————————————Any time
(x)	Curriculum	Conventional———————--Multi-skill

(B) Examination/ Evaluation System

(i)	Performance Evaluation	One time———————Continuous (Multiple)
(ii)	Evaluation method	Exam. based ——————— Project based
(iii)	Exam. Question Pattern	Theoretical ———————Numerical/ Case based
(iv)	Exam. System	Close book ———————— Open book
(v)	Exam Schedule	Fixed ———————— Variable (customized)
(vi)	Exam. Duration	Limited (2 or 3 hrs.) ——————— Unlimited (variable)

(C) Management of Institute

(i)	Mission/Objectives	Not defined Explicitly ———————— Documented
(ii)	Record keeping	Manual ———————————— Electronic
(iii)	Institute Subsystem	Isolated ——————————————Networked
(iv)	Access to Inst. Resources	Fixed time access ———————————Any time
(v)	Revenue Generation	Single source (fees) ———————Multiple source
(vi)	Institute- Industry Partnership	Weak——————————————Strong
(vii)	Institute orientation	Profitability——————————————Social service
(viii)	Management Strategy	Inside-out ——————————————Outside-in
(ix)	Students treated as	Raw material ———————— Customer
(x)	Magmt. Working style	Rigid ———————————Functional autonomy
(xi)	Decision making (Authority)	Centralized ———————— Decentralized
(xii)	Faculty work content	Teaching ———————————— Research/projects
(xiii)	Top Magmt. Attitude	Autocrat———————————Participative
(xiv)	Planning	Reactive———————————Proactive

After exploring the above flexibility dimensions, a questionnaire survey is arranged in the second phase of research. The purpose of questionnaire survey is to assess the standing of institutes on identified flexibility dimensions. In the survey four state engineering colleges, fifteen private engineering colleges and three national level institutes (NIT/IIT) were involved. Names of institutes are not mentioned because of confidentiality reasons. Respondents were asked to map their own institute on 1-5 scale on identified flexibility dimensions. Responses were obtained from faculty members of the institute having experience more than five years in the same institute. One hundred and thirty six responses were obtained. Finally mean of the individual perception is determined separately for each segment of institute i.e. state level institute, private institutes and national level institutes. The mean perceptions are then plotted as given in Appendix1.

Conclusions

With the rapid changes in the socio-economic and cultural framework, commensurate with recent trends in liberalization and globalization, and the corresponding domestic and global competitive environment, the need and urgency of incorporating flexibility in technical education system can

not be overlooked. Therefore, in this paper, an attempt is made to explore the flexibility dimensions related with academic life. Thereafter, with the help of questionnaire survey, mapping of institutes is done on all such flexibility dimensions. Comparison of state run engineering institutes, private institute and national level institutes is also done on various flexibility dimensions. Comparison suggests that national level institutes are more flexible in all aspects. This indicates that perhaps, this is the reason for them being apex institutes of the nation. Overall results confirm that private engineering colleges are rigid on teaching-learning process and evaluation system whereas they are flexible in management of institute. In this study, limited questionnaire survey is conducted. Future study may be conducted to obtain more responses and to get more realistic picture. The paper provides guidelines to the institutes to assess and work out suitable strategy for them to adopt flexibility. This will help them in delighting their internal (students) and external (industry) customers, which will help in survival and growth of the institute in the long run.

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Appendix 1: Mapping of Institutes on Flexibility Dimensions

(A) Teaching-Learning Process

1. Place of Learning

2. Teaching Schedule

3. Course Content

4. Knowledge Imparted

5. Subjects Offered

6. Teaching

7. No. of Credits/sem.

8. Teacher

9. Library Timings

10. Curriculum

(B) Evaluation /Examination Systems

11. Performance Evaluation time

12. Evaluation Method

13. Exam. Question Pattern

14. Exam. System

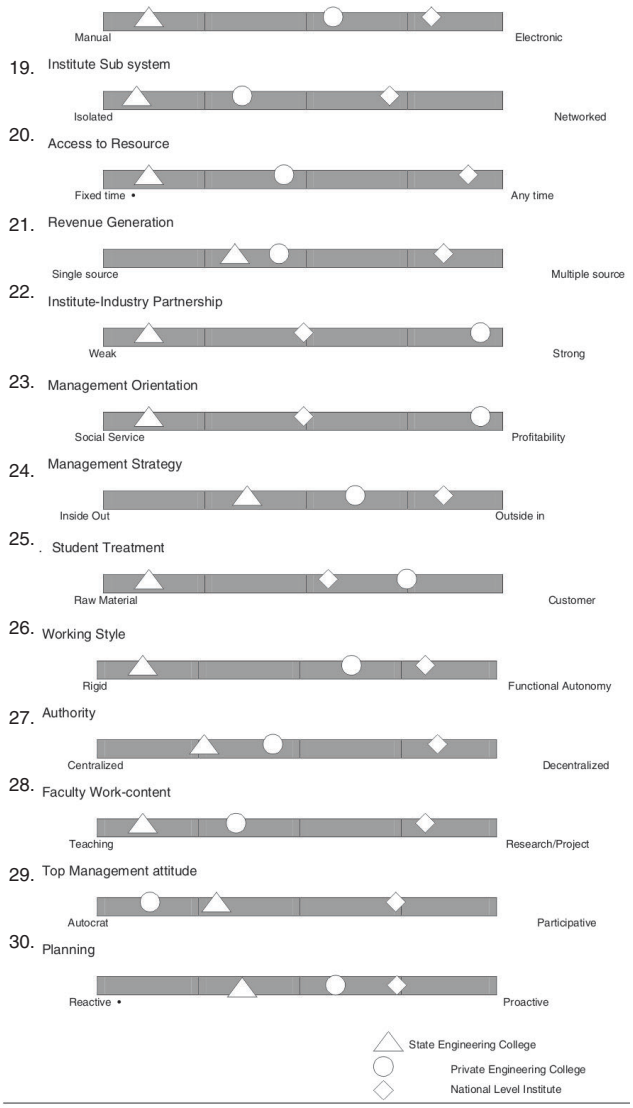
15. Exam Schedule

16. Exam Duration

(C) Management of Institute

17. Mission/Objectives

18 Record Keeping


Manual
Electronic
19. Institute Sub system
Isolated
Networked
20. Access to Resource
Fixed time
Any time
21. Revenue Generation
Single source
Multiple source
22. Institute-Industry Partnership
Weak
Strong
23. Management Orientation
Social Service
Profitability
24. Management Strategy
Inside Out
Outside in
25. Student Treatment
Raw Material
Customer
26. Working Style
Rigid
Functional Autonomy
27. Authority
Centralized
Decentralized
28. Faculty Work-content
Teaching
Research/Project
29. Top Management attitude
Autocrat
Participative
30. Planning
Reactive
Proactive
State Engineering College
Private Engineering College
National Level Institute