

9. TECHNOLOGY UNIVERSITY: SHIFTING FROM THE WRONG CONCEPTS TO THE RIGHT PHILOSOPHY

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Abstract

This paper presents the need of establishing a large number of corporate-culture based Technology (Technical) Universities in India. The paper briefly takes an overview of philosophies related with education and university. Aims and objectives of education and university like transforming man in to a total human being, national prosperity, etc., are discussed. An account of ancient Indian universities and universities before and after independence is presented. The challenges before the Indian university education system are also presented and the efforts made to overcome these are briefly discussed. On taking an overview of the history of development of Technical and Management education in India, the functioning of some Technical Universities abroad is highlighted. And need of shifting Technical University based on the concepts of conventional university, to the right philosophy based on national interest is discussed. Present universities do not generate autonomous learners but, it is pointed out, these have remained the glorious high schools. A few recommendations, like, run university as corporate, global talent search. PBL approach, R & D emphasis, tenure for faculty, recruitment criteria, Process and Performance Management model, no tuition fees, degrees as "social" goods, etc., are made. The paper, it is believed, will of interest to all concerned.

1.0 Introduction

Ignorance is a curse, knowledge is a boon. All creatures undergo some sort of education through training and coaching, training their senses and mind. From time immemorial, man has realized the vital role played by education in leading a quality life, prosperity, comfort, happiness and eternal peace. The golden pages of history unfolds that the countries whose people are well educated dominate the human race. And Technical and Management Education in particular contributes to this is a widely accepted notion. Technical and Management education includes several certificate programmes, Diploma, UG/PG, ITIs,

MCVC, and other vocational and professional courses including medical. We have three tiers system of education primary, secondary, Higher Secondary and Higher Education (tertiary). University education is accepted as the prime mover for national economical development. Agriculture University, Medical and Health Sciences and general universities are the broad classifications of universities. These may be in the form of central, state, deemed, open or UGC approved universities. We do have autonomous IITs, IIMs, NITs and other institutes of national importance funded mostly by Central Government. As a result of National Education Policy or policy of National Knowledge

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Commission or Planning Commission, India has been witnessing an unprecedented expansion of Technical and Management Education. Cities like Chennai, Mumbai, Bangalore, Pune, etc., run engineering colleges in a large number varying from 30 to 70 or more. Even in rural and remote areas, engineering colleges are functioning. India has over 350 universities, and Japan and USA have universities over 4000 and 3600 respectively [1]. In university world ranking, India's achievement is not noteworthy. However, the surge of engineering colleges that are affiliated to one or the other university has almost paralyzed the university functioning as the universities are finding it difficult to operate effectively due to several obvious reasons. To unburden the university that is required to manage over 300-400 colleges, almost all States in India have established State Technical (Technology) Universities barring a few States like Maharashtra (see Table 1). Managing a university with such a large number of affiliated colleges is more complex and complicated than running a global MNC. More or less universities are bound to adhere to the principle of utilitarianism service industry. Why? The answer lies in one's reflection to the queries: What is Education? Who will deliver it? When will it be delivered? To whom will it be delivered? And how will it be delivered? This paper is an attempt towards this and recommends why Technology Universities are a must for India.

2.0 Education: What is it?

Education, the term used since time immemorial, is a very wide and all encompassing notion. The great personalities look at education as:

- In Chapter Shikshavalli of Taittiriya Upanishad, the Guru exhorts to the departing disciples (valedictory ceremony) that he has trained them for some faculty, habits, skills, etc., that may be useful to them in life hereafter, but mind well speak truth, behave yourself, respect thinkers, elders, teachers, be a man of character, you being

a human beings try to be being human, pro-social and pro-humanistic, that is my fees.

- Education must make the individual aware that intellectual freedom is identical with the rational or the self-discipline. It must prepare such citizens and human beings as would be fit to enjoy liberty.
- Education is the manifestation of the perfection already in man. Education is not the amount of information that is put into your brain and runs riots there, undigested all your life. We must have life-building, man-making, character-making, assimilation of ideas. The end of all education, all-training, should be man making.

"Every individual is potentially divine, and this divinity can be manifested by controlling the nature both internally and externally [2]".

- Swami Vivekananda

"Education in India today has to be not only national but also nation making [3]".

- Sister Nivedita

"Progress in every country depends mainly on the education of its people.

"When a young man leaves the institution after a course of training, he should be clean in speech and habits, with a correct sense of patriotism, loyalty to the country, aptitude for initiative, love for self-help, appreciation of the value of time, respect for law and order, and knowledge of the value of right thinking and right living, sufficiently well-equipped to fall into a position in some business or other calling and be able to support himself [4]".

- Bhararatna Sir M Visvesvaraya

- Only life is education. 'Calorie' cannot be calculated properly on paper, but only as their effects are seen in the body. True education, therefore, is one that is experienced, tasted and digested, so that it becomes one with the blood. Education cannot be doled out; it cannot be weighed

and measured, that the single purpose of all education is that the whole nation should become skilful craftsman and clear thinkers,

In essence, the education means training of both human senses and mind so that ultimate well-being and welfare of human race is achieved. However, being path dependent, ways and means of education are subject to changes, suitable to a particular point of time and environment. And location for facilitating education may be anything, formal place like Gurukul, beneath a tree, temple, coaching classes, primary/secondary/tertiary education institutes, informal like Open University, and for that the whole world is a class. Man relies on formal and distance education for the good of masses and university is one of the right means for imparting higher education.

3.0 University as the temple of knowledge

University is the very temple of knowledge and the Vice-Chancellor is the peak of intellectual level in the region. Knowledge, an outcome of education, is of two types: "useful" knowledge and knowledge for the sake of knowledge. In other words, it may be "Atmavidya" and "Paravidya" as Vedant says. Establishment of universities has been well accepted from the time immemorial. Their functions change from time to time. In the rapidly changing contemporary world, universities are undergoing profound changes in their scope, functions and organization and are in a process of rapid evolution. Their tasks are no longer confined to the two traditional functions of teaching and advancement of knowledge. Their principal object is, therefore, to deepen man's understanding of the universe and of himself-in body, mind and spirit, to disseminate this understanding throughout society and to apply it in the service of mankind. Universities are the dwelling places of ideas and idealism, and expect high standards of conduct and integrity from all their members. Theirs is the pursuit of truth and excellence in all its diversity-a pursuit, which needs, above all, courage and fearlessness. Great

universities and timid people go ill together.

Pandit Jawaharlal Nehru, in his convocation address to the University of Allahabad in 1947, thus summed up the basic objectives of the university and its role in national life: A university stands for humanism, for tolerance, for reason, for the adventure of ideas and for the search of truth. It stands for the onward march of the human race towards even higher objectives.

3.1 Universities in India after independence: Growth and Status

For Henry Cardinal Newman [9] "a university is a place of universal education, and provides fundamental and well-thought ideas concerning what that excellence is from different angles (in view of- university is a "center of excellence" is one often-quoted truism). The university education must aim at the cultivation of the mind to the highest possible degree".

Prof. Chopra unfolds that in India there are over 390 universities (Table 1), including 160 deemed universities, 1650 engineering colleges and numerous IITs, NITs (RECs), and IIMs that are today short of qualified faculty [1]. mind well; Japan has 4000 universities and USA has over 3600). As reported, the premier Institutes like IITs are facing paucity of faculty as good as 30% [10]. Prof. Chopra further states that in India we have 12 science and technology parks compared to 75 in Israel and 400 in China, and advocates the equation $E = mc^2$ where, c stands for creativity and m for number of creative workers. Indian students, students of the land of gold, have been loading the pockets of foreign universities, settling over there and feel proud being foreigners or NRIs [11]. Globalization has added a new dimension to this. Foreign universities are opening their shops in India, use Indian facilities and infrastructure, award dual degrees and charge heavy (a perception of an ordinary Indian) fees which is shown to be much cheaper than foreign education costs (a perception of elite class). Most Indian colleges are waking up to the benefits of the dual degree arrangement-

Table 1 : Universities in India

(http://en.wikipedia.org/wiki/List_universities_in_India)

Sr. No.	State	No. of Univ.	No. Tech Univ.
1	Tamil Nadu	45	7
2	Uttar Pradesh	39	10
3	Andhra Pradesh	36	7
4	Madhya Pradesh	30	8
5	West Bengal	29	8
6	Rajasthan	26	6
7	Karnataka	22	7
8	Orissa	21	6
9	Gujarat	20	4
10	Bihar	18	4
11	Uttarkhand	18	5
12	Chhattisgarh	14	3
13	Delhi	13	4
14	Kerala	13	3
15	Maharashtra	12	3
16	Punjab	12	3
17	Himachal Pradesh	11	2
18	Haryana	10	2
19	Jammu&Kashmir	10	2
20	Jharkhand	10	3
21	Assam	9	2
22	Nagaland	4	0
23	Goa	3	0
24	Meghalaya	3	1
25	Pondicherry	3	0
26	Sikkim	2	0
27	Arunachal Pradesh	1	0
28	Chandigarh	1	0
29	Mizoram	1	0
Total		390	46

no separate infrastructure, faculty or course material. Such colleges operate from a small area in their campuses charging fees like Rs 3-6 lakhs pa [12]. There are no national directives in the matter in a true sense [13]. On the other hand, there is an Indian company setting up an RM450m international university at Gua Tempurong. [14]. India is coming up with a large pool of qualified teachers at the global

plane with classrooms without borders [15]. These few islands can hardly contribute to the sustainable development of the country.

As mentioned later, Indian universities and the affiliated colleges have turned to be glorious high schools and have limited success in national development. Admittedly these conventional universities are overburdened, too

centralized and can hardly cater to the needs of technological society. Many of the states in India barring a few like Maharashtra have established Technology Universities bringing uniformity in instruction, assessment and fee structure, working in an planned. Like Agriculture University, Technology Universities are introduced all over the world, based on the principle of utilitarianism.

Indian universities after independence are required to carry special responsibilities: must learn to strive to serve as the 'conscience of the nation', as assessors of the national way of life, and this becomes all the greater in the absence of an enlightened public opinion. Several Commissions like Radhakrishnan, Kothari, Yash Pal and New Education Policy 1986, etc., are the attempts towards this. Several organizations like AICTE, UGC, Councils like MCI, Architecture, Pharmacy, etc. along with IITs, IIMs, NITs, have been added. Table 1 presents the status of Indian universities (data subject to omission and commission). As a call of the day India from time to time have been establishing such need based universities like Agriculture, Medical and Health Sciences and Technology. Today India has different types of universities like central, state, private, deemed, and autonomous institutes. But India has to march a way to be a developed nation, to fulfill the objectives of university education in India, e.g., Radhakrishnan Commission on University Education, 1948-49 puts it as:

"The most important and urgent reform needed in education is to transform it, to endeavor to *relate it to the life, needs and aspirations of the people* and thereby make it the powerful instrument of social, economic and cultural transformation necessary for the realization of the national goals. For this purpose, education should be developed so as to increase productivity, achieve social and national integration, accelerate the process of modernization and cultivate social, moral and spiritual values."

As such, India could hardly handle

effectively such educational issues as greater access, equal access (or equity), quality and excellence, relevance and promotion of social values in spite of the facts that during the period 1947-2005 there is thirteen-fold increase in number of universities, increase in the number of colleges twenty-six-fold and increase in GER from 0.7% to over 10% [16]. According to a recent estimate India's GER 12.4% that is lower than the average of developed countries. For instance, average GER of developed countries is 45%, and 22% of China. [16-18]. According to another estimate GER values are: India: 11%, world average: 23%, countries in transition: 36.5% developed countries: 55%. The UGC Annual Report 2007-08 aspires for 15% GER by 2012. If India wants to achieve 15% GER by the end of the 11th Five Year Plans, increase in institute-capacity needs to be 13% to 20%. The Center has set GER target of 30% by 2020. The UGC in its meeting held on 30th November 2007, identified the Action Plan strategy for implementing the strategies of the 11th Five Year Plan. Goals of 11th Plan can be summarized as [19]:

1. Expansion of education, enhancing enrollment ratio by 5%.
2. Promoting equity and inclusion principle.
3. Quality and excellence in higher education.
4. Academic and administrative reforms.
5. Public-Private participation.
6. Internationalization of higher education.
7. Financing of higher education.

UGC has proposed Action Plan strategy that includes eleven points so that the goals set can be achieved. Indian Technical and Management Education system will have to wait and watch how it is going to be deployed.

Even going to 15% GER needs huge intake capacity building, a large number of institutes, faculty, infrastructure etc. Indian education

system is thus facing serious issues related with easy access, equity and quality because diversities like linguistic, cultural, interstate, haves and have not, digital divide and many more predominately prevail. Hence, mere quantitative expansion in higher education without quality and excellence may not bear the desired national fruits. Then perhaps "more is worse" seems to be right. Indian Universities so far have remained to be glorious high schools only, and added a limited value for the economic development of the country, especially unto the last man in the society.

In view of the above discussion, it is pertinent to note that Technology (Technical) University, like, Agricultural and Health university, is a call of the day, destined to play a certain role in the national economical prosperity and alleviation of poverty, taking fruits of technology unto the last man in society, and transforming nation into technology and knowledge society. Many of the States in India have recently established Technology University (see Table 1) barring a few States like Maharashtra. The next section deals with the need and status of Technology (Technical) Universities in India.

4. Technology University in the Indian context:

The oldest engineering colleges in Asia are College of Engineering, Guindy, 1794, now University, Roorkee College 1847, now IIT, College of Engineering, Pune, 1854, now autonomous since 2004, and Bengal Engineering College, Shibpur (Calcutta) 1856, now a State university. From the Bishop's College in the British Raj, established in 24th November 1856 occupying three rooms in Writers' Building to meet the requirement of trained Engineering personnel for Public Works Department as Civil Engineering College, was affiliated to the Calcutta University in May 1857 to Bengal Engineering College, Shibpur, to a Deemed University to a State University of Science and Technology is a long journey.

Indian Institutes of Technology are specific elite institutes which were based on post WWII recommendations for industrialization. Those are highly regarded full chartered universities with a long history. Nehru started building elite institutions of research and higher education like IITs. Roorkee College established in 1847, rechristened as the Thomson College of Civil Engineering in 1854, then Roorkee University, the first technical university in India, in 1949 and converted to IIT, Roorkee on September 21, 2001. China took a similar move in 1990s with full speed and came on world map. China's poverty rate and infant mortality rate are now less than half of India's, the fundamental measures of a nation's economic well-being, Singhal puts forth some valuable suggestions, like, continuing promise of IITs, self-support, autonomy and accountability, research on sustainability, private and public partnership, R & D driven integrated solutions for rural and slums, etc [31]. Critics of education-philosophy and objectives of university argue that universities can have a different educational philosophy and goals but their common elements are like promote humanity, civilization and culture, nurture social capital and cultural capital, etc., but it is too utilitarian, practical tools of objective designs, curriculum and evaluation standards are very harmful and needs from a long horizon to reflect the limitations of our university education [32].

Mike considers universities as glorified high schools. He says university is meant for autonomous learners, to be weaned from the dependency and passivity of high school pedagogy and student is expected to take charge of their own education, self-reliant or independent. Why do the bells ring every hour? Why classroom Time Tables? All days working? Little or no time for reflection, absorption or, most importantly, extended reading and research. See the classroom architecture, slightly glorified compared to high schools but hardly serves the purpose of university education. Faculty has high school mind set. Instead of a standard rules-based orientation,

students need to be shown how to carry out research, take notes, deal with textbooks and homework assignments in a manner that befits a tertiary institution (or at least prepares them adequately for the rigors ahead). This is a worthy first step away from the shackles of a high school mentality but there is still a long way to go [33].

India possesses world class policy documents for university education generated by Radhakrishnan Commission 1948-49, Kothari Commission 1968-69, NEP 1986, Program for Action Plan 1992, etc. AICTE, UGC, NKC, Planning Commission and other bodies are struggling hard to bring university education to world-class level (see the Foreign Education Bill). If India with determination, dedication and diligence adheres to the path set/shown by these visionaries, India can cater world class Technical and Management Education, achieving easily her goal of 15% GER set by the end of 11th Five Year Plan.

It is, therefore, pertinent to note that Technology University, like, Agricultural and Health university, is a call of the day, destined to play a vital role in the national economical prosperity, alleviating poverty, taking fruits of technology unto the last man in society, and transforming it into technology and knowledge society. To meet the challenges of the future, India needs to shift Technical Universities from the wrong building of the present day conventional university to the right philosophy of Technical and Management Education, meeting the aspirations of people. Though several States in India, barring a few states like Maharashtra, have established Technology Universities (see Table 1), but their number needs to be increased with all due care for easy access, equity, quality and excellence in research with moderate (or no) fees treating degrees as "social" goods and not as "private" goods [34]. The next section is an attempt making some recommendations how to achieve this end.

5.0 Technology University: Few recommendations

This section presents a few following suggestions to turn Technology University more fruitful, productive and effective, meeting the aspirations of the people and country:

1. To decouple the Technical and Management education from (conventional) university, shifting it from the conventional university building to a new location establishing a separate Technology University in each state with a location preferably at the center of the state away from urban area.
2. To build corporate culture in Technology University, run it technology and ICT based with Kaizen approach, lean-Six Sigma based functioning, no stagnation at any level including curricula.
3. Technology University will be autonomous and follow PBL approach, cafeteria, flexible, need based and market driven.
4. Polytechnics need to be run by Technical University. This will save time and cost, afford more coordination and uniformity and quality can be maintained.
5. Open Universities are almost functioning on the same line of university, running similar courses in engineering, management, library sciences, architecture, etc., offering same degrees offered by university for full time courses. The author is of the view this has kept aside the very purpose of open universities. This may increase the number of graduates with inappropriate quality, a ground reality.
6. In order to meet national requirements, for minimizing inter-state or inter-Technical University disparity, and for world-class quality assurance, constitute a Central Advisory Board, an autonomous body.
7. Sixty percent syllabus throughout the country is uniform, world class, and 40% in

the hands of Technical University faculty that will design and execute the courses that are market driven.

8. Faculty-tenure is of five years, on appraisal will be continued for next turn of five years. The appraisal-criteria are relevant R & D contribution, industry association and fund generation. Abolish classroom teaching within five years; replace it by seminars, tutorials/assignments, R & D, lab work, etc. Adopt PBL approach, faculty to work as facilitator/integrator meeting Boardroom needs. Set life-long learning motto for faculty. A globally rolling (roaming) faculty gathers mass!
9. Mere obtaining a degree should not be a criterion for initial recruitment, continuation of next tenure or next higher post. The measure is the contribution done in the area of specialization in terms of R & D, consultancy after obtaining degree.
10. To have faculty pay package of global standard, at par with private industry sector, performance based with teaching, R & D and consultancy work based incentives. Employer's EPF contribution will be 20%.
11. To abolish provision of vacation. Faculty and students need to get involved in industry life, a mandatory provision.
12. To educate the youth is the national responsibility, it is the investment for future. Hence provide tertiary education free. But the students after obtaining degree will be required to pay 3% cess of income during their lifetime to the country.
13. Establish Education Bank of India, give soft loans to faculty, staff, students and institutes and also establish Indian Technical Faculty Training Institutes state-wise.
14. To constitute a Talent Management Committee under the control of Central Advisory Board for talent management, search and acquisition from all over the world.
15. Assessment of students needs to be an integral part of teaching.
16. Deploy Lean-Six Sigma approach for maximizing productivity, effectiveness and quality of education (else why to call it a Technical University?). At present hardly 30% time of the year is used for actual teaching.
17. The model for technical institute/university will be (Fig. 1):
18. Process Management and Performand Management need to be rigorously deployed in the functioning of the institute (Fig. 2)
19. Faculty is the main actor (actress) in the drama of education that needs to observe certain code of conduct (Fig. 3).
20. Accreditation of university/institute by the third body must be mandatory [35]. Several

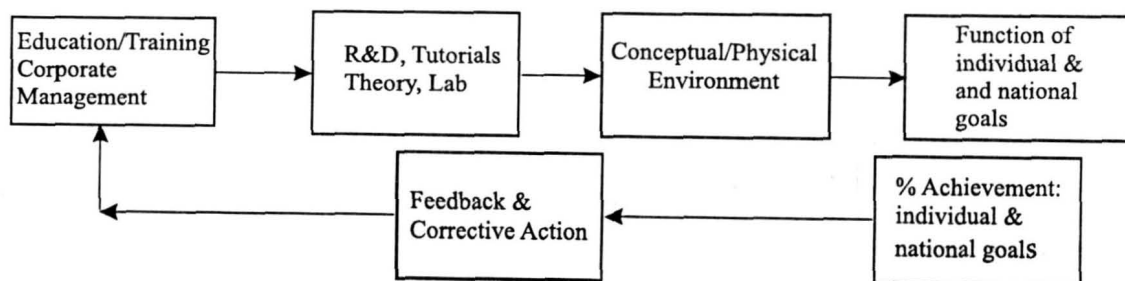


Fig. 1: A model for institute

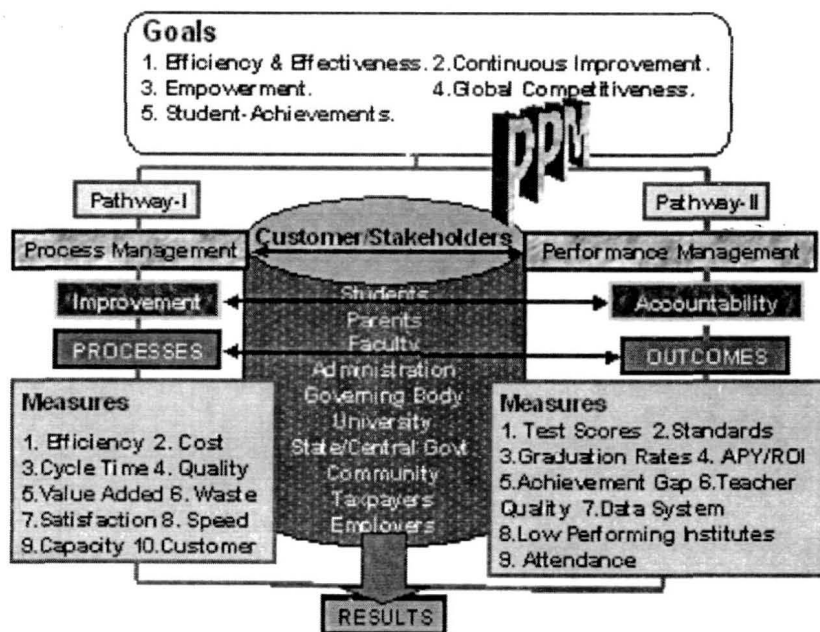


Fig. 2: A model for process management and performance management

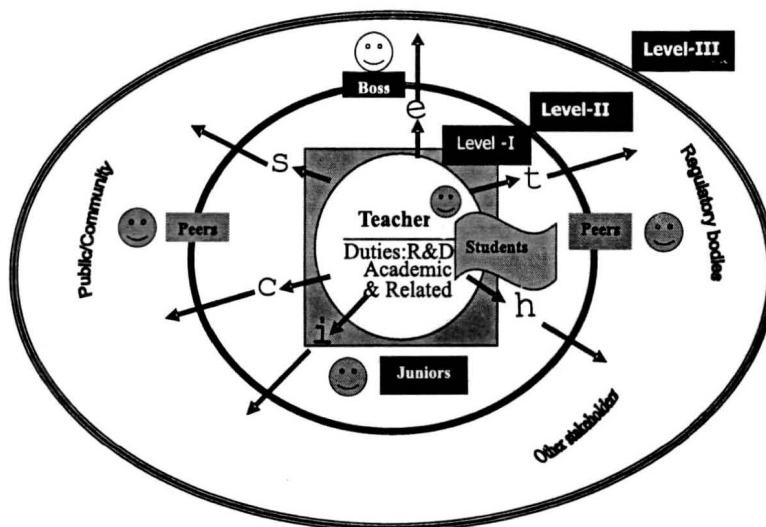


Fig. 3: Ethics Your Eyes (EYE) Model proposed: Deontology & Professional ethics

accreditation models like NBA, NAAC and ISO 900 are available. The preferable one is the Malcolm Baldrige National Quality Award, introduced in USA in 1987, based on performance excellence criteria, a framework that any organization can use to improve overall performance. Seven categories make up the award criteria:

1. **Leadership:** examines how senior executives guide the company and how the company addresses its responsibilities to the public and practices good citizenship.
2. **Strategic planning:** examines how the company sets strategic directions and how it determines key action plans.
3. **Customer and market focus:** examines how the company determines requirements and expectations of customers and markets.
4. **Information and analysis:** examines the management, effective use, and analysis of data and information to support key company processes and the company's performance management system.
5. **Human resource focus:** examines how the company enables its workforce to develop its full potential and how the workforce is aligned with the company's objectives.
6. **Process management:** examines aspects of how key production/delivery and support processes are designed, managed, and improved.
7. **Business results:** examines the company's performance and improvement in its key business areas: customer satisfaction, financial and marketplace performance, human resources, supplier and partner performance, and operational performance. The category also examines how the company performs relative to competitors.

Reliability, frequency and speed of accreditation are important. It is a good practice that some third party like an NGO be allowed

to carry out accreditation, the practice followed in developed countries, instead of by a government led agency, the practice followed in India.

6.0 Scope for future work

In sequence with the technological development in India from the ancient time to the end of 17th century, India started well in the 18th century to meet the challenges of the First Industrial Revolution by establishing technical institutes of world repute. In spite of the hard efforts of stalwarts, Technical and Management Education in India has to go a long way. Establishment of Technical University appears to be a good solution to come out of the present pass. But Technical University needs to be run like a corporate body if India desires to achieve goals like economical prosperity and growth in foreseeable future. This opens up a vast field for research in several areas like application of Six Sigma, Lean philosophy, generating autonomous learners, enhanced R & D activities with social reference, etc.

7.0 Conclusions

This paper argues that Technical Universities need to be established in a large number, shifting from the conventional university to the right philosophy that will take India a long way. The status of technology and other faculties in the ancient India and thereafter unto the late 17th century was of global standard. Though British Rulers eliminated craftsman and introduced an education system meant for slaves, it is argued, India started excellently in 18th century by way of establishing prestigious technical institutes, oldest in Asia but mostly meeting the British ends. After independence, in spite of very good policy documents generated by Radhakrishnan, Kothari, NEP 1986, Action Plan 1992, etc., several countries like China, Japan and other developed countries left India far behind. On having taken an overview of ancient Indian global universities like Nalanda, Taxila and others, philosophy behind education, university

and Technical University is presented. The history of development of technical education in the world in general, in India in particular, is highlighted. In spite of the unprecedented expansion of Technical and Management Education in India after independence, the Technical Education system in India has been facing several such issues as regarding easy access, equity, quality and excellence, poor R & D activities, low GER, etc., adversely affecting the national prosperity. The move of establishing state-wise Technical (Technology)

University, i.e., shifting Technical and Management Education from the wrong concepts of conventional university to a new location and form, with right philosophy; the principle of utilitarianism, is most well come but some states like Maharashtra has not positively responded to this national policy as yet. A few recommendations have been made, the paper, it is believed will be of interest to all concerned.

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