(Technical) Colleges: Technical Education in India – The Strengths and Challenges

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1 Introduction

Any educational system promoting knowledge, skill and competency delivers many desirable outcomes. The best quality of education offered in any country creates a competitive edge over other countries. India, traditionally referred as a guild of possessing century old technical knowledge and skills like carpentry, smithy, foundry, weaving etc., has been also a forerunner in experimenting educational system to suit the modern industrial world. Thus, various educational reforms have been introduced, especially after the country gained independence in 1947. Such reforms are being attempted to bring few fundamental changes in education particularly on improving overall school enrolments thereby increasing literacy level of population[1] and very recently to create more technically qualified man power for nation building and overall socio-economic development. India, being the second most populous country and also one of the largest economies in the world, thus makes huge investments on education and to foster a rapid knowledge and skill based society. This vision also forms a part of overall human resource development and providing technical education (TE) through academic institutions is one among such steps.

Any business enterprise to grow and become competitive requires an updated technical knowledge and skill (Basant and Chandra 2007). The academic institutions provide the technical knowledge by training the youths and business enterprises recruit them and build on. The impact or any win-win situation between the educational institutions and industry interface would be defined only when such growth is felt at both levels. India is already on the trajectory of creating more and more academic institutions with the objective of creating facilities on par with any developed country and thus owns one of the largest higher education systems in the world.

1 The literacy of the population has increased from 18.33% in 1951 to 74.04% in 2011 (GoI 2014a). (The views expressed in this paper are those of the author and do not necessarily reflect those of the organisation where the author works.)

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At the time of independence, the country had hardly 38 institutions offering various degree programs with a capacity of mere 2,500 students (Shivani and Khurana 2012; Kohli 2011). Since then, there is tremendous growth both in number of institutions and the intake of students. As per 2011 census, population in the age group between 15 and 24 years (youths) in India was 231 million, constituting about 19% of the total population (GoI 2014b). These huge young populations are the potential candidates who could be absorbed by the various institutions offering higher education in India and elsewhere. Besides, considering current demographic structure of India, where the majority of population is below the age of 25 years, higher educational institutions play a critical role. Moreover, with an increasing (20.4%) Gross Enrolment Ratio (GER)[2]of the youth population for higher education and with annual enrolment of more than 25 million (GoI 2013a), India is ranked as the third largest provider of higher education in the world next to US and China (Sharma 2012).

Thus, the current educational system and the facilities being created in the country are subject to many such challenges. However, the quality of such workforce and their preparedness from academics to world of work is more important than a mere number of educated youths or creation of educational institutions. On the other hand, it is also observed that the spending pattern on higher education is still under-utilised and the gap existed between allocated funds from government and expenditure made (Anjum and Tiwari 2012).

With the above observations, this paper focuses on the structure of higher educational system with special reference to technical education system in India, its strengths and the challenges faced by the institutions in providing such education. In the final section of this paper, the status of TE is more elaborated with some specific developments in the state of Tamil Nadu[3], a leading state with approximately 66% of the population in the working age group (Peoplestrong 2014). Tamil Nadu is one among the 29 states in India. The state occupies a land area of 4% of the country and holds 6% of the country's population. Tamil Nadu state is also one among the states with relatively higher trend in urbanization, as 48.45% of state population lives in major cities and towns as against 31.16% at All India level. The State has achieved a better literacy level[4]. Between the rural and urban literacy population in the state, there existed only marginal differences (87.24% in

2 GER in higher education is the total enrolment as a percentage of population in the eligible age cohort of 18-23 years (GoI 2013b).

3 In this article, very detailed analysis on the TE was done only with respect to Tamil Nadu state and the issues, related to TE, identified in this select state were observed to be similar in other states of India also.

4The overall literacy rate of the population (as per 2011 census) was 80.33% (74.04% - All India) and the male and female literacy rates were 86.81% (82.10% – All India) and 73.86% (65.40% - All India) respectively.

urban and 73.80% in rural) as against 84.98% in urban and 68.91% in rural at National level.

2 General Structure of Higher Educational and Technical Educational System in India

The current educational system in the country provides greater scope and also the facilities to undergo TE and skill development. A separate stream of vocational education beginning at school level is also present. Some flexibility in lateral and vertical movement of students from Vocational stream to TE is also seen.

The general structure of the higher and technical educational system with the normal age of entry and leaving at each level that is from schooling to higher educational level including TE is shown in the Figure 1 (see chapter 1). At higher educational level, there are institutions offering both 'General' and 'Technical/Professional' education. Through the general education stream, the institutions offer various courses or degree programs in the field of study like arts, science, commerce and education. The technical or professional institutions offer programs relating to engineering, agriculture, veterinary, medical, law, agriculture, management, town planning etc. The opportunity for a student to undergo any type of TE begins at the age of 16 years, when the students select either polytechnics or other disciplines like engineering, management etc. A student can also enter a polytechnic college by passing out higher secondary schooling (12^{th} standard) and undergoes the courses for two years. There is some flexibility in entering the polytechnic stream. The students passing out secondary schooling (10^{th} standard) can also join polytechnic stream but has to undergo the course for three years. On completion of course in polytechnic, the student can continue their studies further, especially in engineering stream, as 'lateral entrant'. Such students join the Under Graduate (UG) degree program in engineering colleges in the 2^{nd} year of the curriculum.

In case of general school education stream, students after higher secondary level might prefer for TE. Normally the period of study, for instance in engineering, will be four years.

One could also classify the higher educational system and the institutions offering such education based on the form of presence. Accordingly, the higher educational institutions can be classified into three categories namely universities, colleges and special institutions offering diploma courses. The universities offer UG and Post Graduate (PG) degree programs in general courses like arts and sciences and Professional or Technical courses like medical, engineering, law, man-

agement, agriculture and allied subjects. The second category of educational institutions is the 'college' offering courses in different fields of study and the third category are the institutions offering exclusively Diploma courses. Based on the funding and management also the higher educational institutions can be further classified into universities as Central Universities, Central and State Open Universities, Institution of National Importance, State Public and Private Universities and Government and Private Deemed Universities.

Similarly, there are both government and private funded colleges. A comparison on the growth of the higher educational institutions (coinciding with the beginning and ending of the 11th Five year plan period) based on the funding agencies was made and the details are presented in Table 1.

Institutions	Universities		Colleges		Diploma Institutions		Total	
	06-07	11-12	06-07	11-12	06-07	11-12	06-07	11-12
Central Government funded	-	152	58	69	-	-	145	221
% change 06-07 & 11-12	-	*74.71*	-	*18.97*	-	-	-	*52.41*
State Government funded	227	316	9000	13024	1867	3207	11094	16547
% change 06-07 & 11-12	-	*39.21*	-	*44.71*	-	*71.77*	-	*49.15*
Private funded	73	191	12112	19930	5960	9541	18145	29662
% change 06-07 & 11-12	-	*161.64*	-	*64.55*	-	*60.08*	-	*63.47*
Total	387	659	21170	33023	7827	12748	29384	46430
% change 06-07 & 11-12	-	*70.28*	-	*55.99*	-	*62.87*	-	*58.01*

Table 1: Growth of Higher Educational Institutions - All India. Source: GoI (2013b: 94)

At the end of the 11th Five-year plan period (2011-12), 659 Universities, 33,023 colleges and 12,748 diploma offering institutions were functioning across the country. The Universities and Colleges were being funded both by Central and State Governments. Besides, the private sector also funded all the three types of

institutions namely Universities, Colleges and Diploma course offering institutions. The table above also shows that the number of institutions had increased more than one-third in a span of just six years that is between 2006-07 and 2011-12. The break up on the number of higher educational institutions would indicate that among the three major funding sources, the private colleges and diploma offering institutions outnumbered the government funded colleges, although the funding responsibilities for establishment of new Universities always vested with government agencies. The share of private funded institutions had increased to about 64% between the two time periods. Thus private sector funding in higher education is becoming more popular and significant across the country (Mani and Arun 2012).

3 Technical Education and Capacity Expansion

The concept of imparting technical knowledge and skill in India has been an age old tradition and thus has a long history (Ahmed and Satija 2005). Imparting formal TE in India can be traced back to mid-19th century (Shivani and Khurana 2012). The industrial revolution in Western countries traversed subsequently to many colonel ruled countries including India. The situations thus demanded local trained technicians for managing small scale industrial units, creation of infrastructure like roads, water bodies including dams, running industrial units with agricultural produce as basic raw material etc. Thus, providing TE began in the form an informal training and then transferred from generation to generation, later shaped into academic-cum-training based institutions in the field of engineering, management, applied crafts etc.

TE in India now covers the various courses and programs in engineering, technology, management, architecture, town planning, pharmacy, applied arts and crafts, hotel management and catering technology (GoI 2011).

Over a period of time since independence, the technical education system in India has grown fairly larger in size with participations both from government and private agencies. Programs in different disciplines/trades are now offered with the award of simple certificate of participation to award of Diploma or UG and PG degree certificates. Based on the funding, the institutions providing such TE can be broadly classified into three categories namely Central Government funded institutions, State Government funded institutions and Self-financed institutions. Currently, there are about 16,500 institutions offering TE at Diploma, UG and PG levels (AICTE 2014). In Table 2 below, the details on number of the technical institutions and intake in a span of six years (2006-07 and 2013-14) are shown:

Levels	2006-2007			2013-14		
	Number of Institutions	Number of Student Intake	Intake per Institute	Number of Institutions	Number of Student Intake	Intake per Institute
UG	2,322	746,672	322	4,599	1,736,174	378
PG	5,735	388,071	68	7,929	560,226	71
Diploma	2,511	633,983	252	4,037	1,172,868	291
Total	10,568	1,768,726	167	16,565	3,469,268	209
% change in 2013-14 over 2006-2007				56.75	96.15	25.13

Table 2: Number of Technical Institutes and Student intake - All India. Source: AICTE (2014)

The TE is offered as degree courses and diploma courses. During the year 2006-07, there were 10,568 institutions offering various courses and programs in engineering, technology, management, architecture, town planning, pharmacy, and hotel management and catering technology. The student intake per year was about 1.76 million and about 167 students were admitted in each institute. The growth is found to be tremendous, as within a span of six years, the student intake increased to 3.47 million from 1.76 million through establishment of 16,565 institutions during 2013-14. The overall increase (percentage change) in number of institutions, student intake and intake per institute were 56.75%, 96.15% and 25.13% respectively (Table 2).

Thus, there has been a tremendous growth in establishment of technical institutions and student intake every year. This growth in number of technical institutions is also on par with the overall growth in the higher educational institutions per-se.

4 Enrolment – Discipline Wise

The growth in establishing institutions must be on par with increase in the enrolment. The data indicate that growth in establishment of higher education is also found to be consistent with the increase in enrolment over the years. The number of students enrolled in higher education had increased from 0.21 million in 1950-

51 to about 22 million in 2011-12 (CII 2013)[5], with the effect that the GER has also increased from 0.40% in 1950-51 to 19.4% in 2012-13 (Naik and Agnihotri 2013). Such enrolment however has not been uniform throughout the disciplines. In this section, a brief analysis was done to understand the pattern of enrolment among different disciplines and how the growth in institutions offering TE found consistent with such enrolments.

5 It is expected that during 2016-17, about 31 million students are to be enrolled for higher education, out of which 18.5 million (60%) are expected to be enrolled in private-run institutions. About 14.3 million students (46%) are expected to take up TE at UG, PG and diploma levels out of total enrolment in higher education.

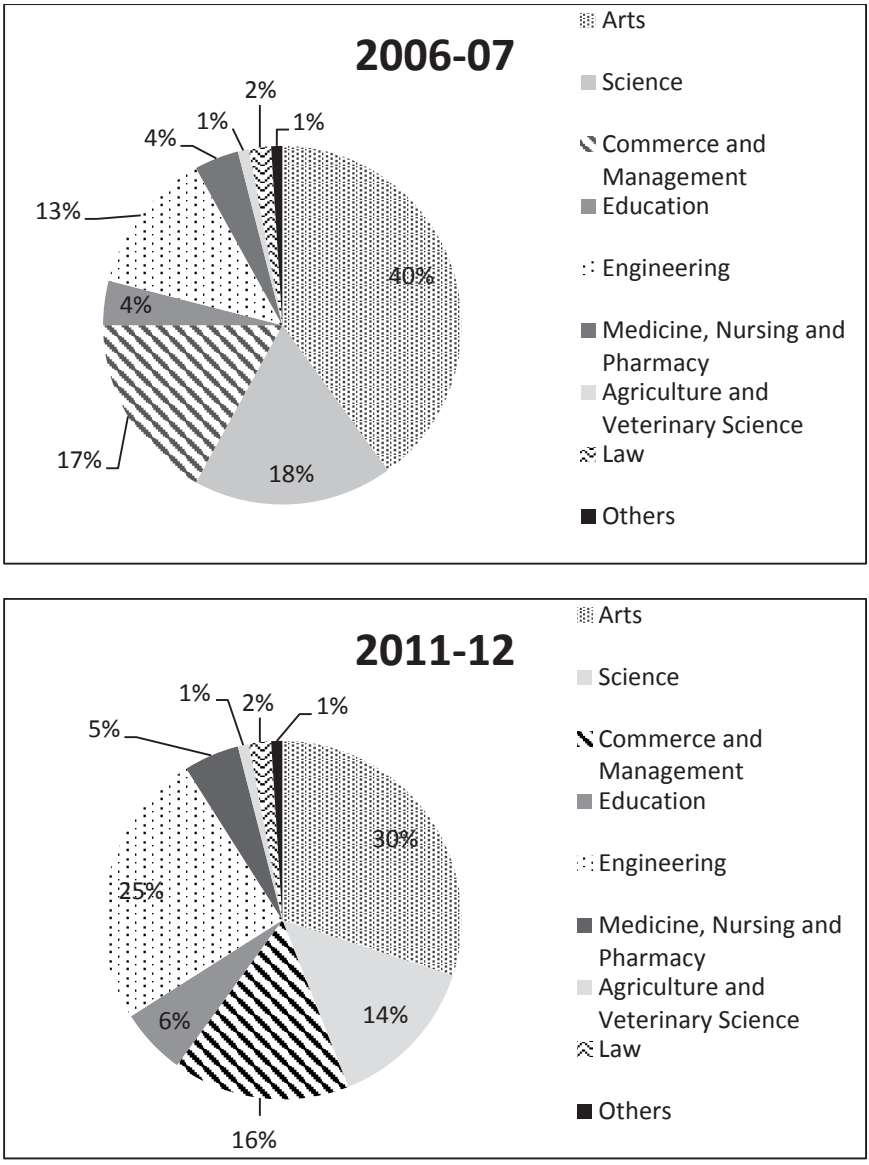

Figure 1 and 2: Discipline wise break-up of enrolment in higher education. Source: GoI (2013b: 94)

As could be seen from Figure 2, during 2006-07 about 14 million students preferred different disciplines and out of which about 58% of the students (8 million) preferred Arts and Science discipline. Based on the statistics, during the year 2011-12, the share however reduced to 44% (9.64 million) though there was increase in number of students preferred this discipline in absolute term. Subsequently, there is a great discipline switch-over towards technical/professional education like engineering science, management, medicine, agriculture, law as the share increased from 37% to 49%. This overarching shift towards TE might be continued as the establishment of institutions providing TE is found to be demand driven.

5 Technical Education in Tamil Nadu and its Governance

In Tamil Nadu also the educational system has gone through changes in several dimensions. One major development is tremendous increase in the number of educational institutions. This has also resulted in enrolment of students especially in technical educational institutions. The educational policy of the state aims to fit itself well with overall national agenda of improving the access, equity and quality of education. The overall structure of the higher and technical educational system prevails in the state with the normal age of entry and leaving at each level is shown in the Figure 3. The Directorate of Technical Education (DTE), Government of Tamil Nadu, is responsible for formulating policies and promoting any coordinated development in the field of TE.

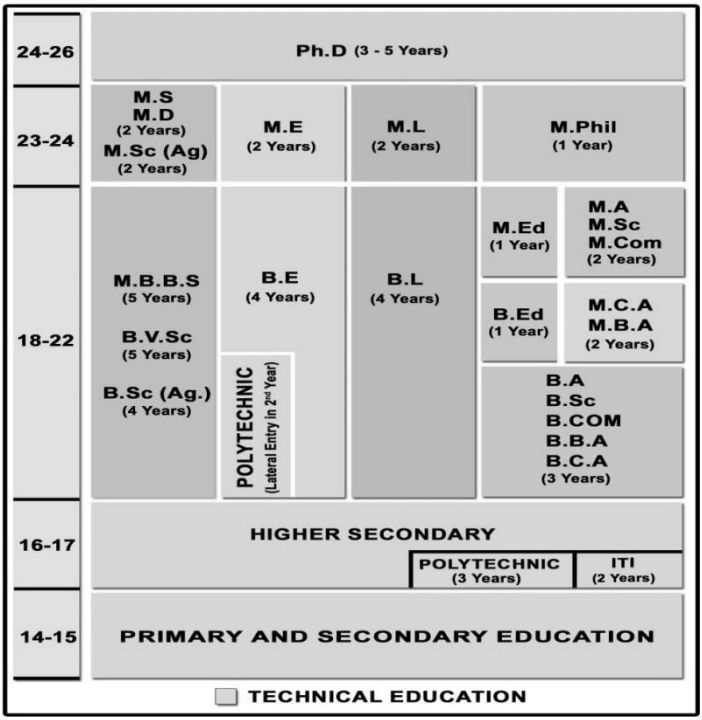

Figure 3: Education system and school to work transition in Tamil Nadu. Source: Adapted from Government of Tamil Nadu (n.d.)

Among the various TE offered in the state, 'engineering' courses are becoming popular among the students passing out of higher secondary education mainly due to various reasons. The mind-set is that acquiring any professional degree, including engineering, could improve the overall career opportunities of an individual. In addition, the students also believe that an engineering degree as a 'base' degree could open up possibilities to pursue higher studies in India as well as in abroad (Samuel 2013).

The duration of such engineering degree course is four years with the award of B.E degree. Every year, students get admitted to these engineering colleges through "single-window counselling system" organised by Anna University[6] (Government of

6 Government of Tamil Nadu introduced single window counseling system for admission of students to engineering colleges in Tamil Nadu during 1997–98. Every year, the admission is done at one centre (Anna University - a state run University) whosoever applied on the basis of merit. Around 50 to 65%

Tamil Nadu 2015). Few colleges and Deemed Universities, however admit the students based on the scores obtained in entrance tests conducted separately by these institutions.

Admissions to polytechnic colleges are done through the individual institutions but coordinated and monitored by the DTE, Government of Tamil Nadu. Polytechnic education is normally preferred by the less privileged and thus made affordable and accessible to many of the rural students who complete their secondary education. The courses like Master of Business Administration (M.B.A) and Master of Computer Applications (M.C.A) are also brought under TE. The students are eligible to apply for these courses after graduation. The number of institutions and the student intakes in various higher educational institutions including technical education institutions in Tamil Nadu are presented in Table 3.

Institutions	Government	Government aided	Self-Financing	Total
I. General				
A. Number of institutions				
a. Arts and Science colleges	62	133	438	633
b. Colleges of Education	7	14	651	672
c. Physical Education	-	3	8	11
d. Oriental colleges	-	10	-	10
e. Schools of Social work	-	2	-	2
Total	69	162	1097	1328
B. Student intake (sanctioned)[7]	156,000	356,000	373,000	885,000
II. Technical				
A. Number of Institutions				
Engineering	7	21	525	553
MBA and MCA (stand-alone)	-	-	69	69
Polytechnic	30	39	395	464
Total	37	60	989	1086
B. Student intake (sanctioned)*	15,770	25,692	407,988	449,450

* The data relate only to engineering and polytechnic colleges as the data were not available for MBA/MCA courses.

Table 3: Higher Educational Institutions in Tamil Nadu (2012-13). Source: Government of Tamil Nadu (2013a)

sanctioned strength in self-financing private engineering colleges are also being filled through single-window counseling system besides Government run colleges.

7 Means the maximum number of students allowed to be admitted in a particular institute as per the Government's approval. The DTE, Government of Tamil Nadu, is the competent authority to monitor the admissions.

In general stream, there are educational institutions offering arts and science degree programs, Bachelor degree in Education, physical education and other disciplines like social work. There are about 1,300 institutions in the state. Among the three major categories of institutions viz. fully funded by Government, partly funded by Government (government aided) and private funded, the private funding institutions dominate the system with an overall intake of about 0.9 million students. In the field of TE, there were 553 engineering colleges and 464 with a total intake of about 0.44 million students. Similar to general education, the TE is also dominated by privately funded education providers. The analysis below is an indicator of the trend for TE among students in Tamil Nadu with self-financing colleges (fully funded by private) dominating the intake of students over the years. The year wise details about number of students who could be admitted in the various colleges run by government and private are shown in Table 4.

Year	Government (1)	Government aided (2)	Private (3)	Total 4 = (1+2+3)	% of intake by private w.r.t total 5= (3÷4)x100
2006-2007	3,545	1,810	89,744	95,099	94.37
2007-2008	3,575	2,170	105,044	110,789	94.81
2008-2009	6,360	2,410	127,370	136,140	93.56
2009-2010	8,465	2,465	161,515	172,445	93.66
2010-2011	10,285	2,510	182,529	195,324	93.45
2011-2012	10,385	2,645	213,004	226,034	94.24
2012-2013	10,705	2,735	248,724	262,164	94.87
2013-2014	11,605	2,820	272,872	287,297	94.98
CGR (%)*	20.19	5.58	17.80	17.70	

* Denotes Compound Growth Rate between 2006-07 and 2013-14

Table 4: Student sanctioned strength in engineering colleges. Source: Government of Tamil Nadu (2013a)

Over the years, the sanctioned strength in the engineering colleges has been increased. During the year 2006-07, the total sanctioned strength was just 95,099. The student's sanctioned strength has increased to 287,297 with an increase of 17.70% (Compound growth rate) per year. Among the three types of institutions, the growth rate was relatively higher in government run institutions followed by privately run. Nevertheless, out of the total sanctioned student strength about 95% of the intake has gone to private run institutions.

Similarly, the approved sanctioned strength in polytechnic colleges has also increased during the above time period (Table 5). With a sanctioned strength of just 71,447 students during 2006-07, the strength has increased to 200,808 during

2013-14 with annual compound growth rate of 16.07%. The growth in student intake between government and private run institutions was about 19.56 and 17.36 %. However, about 85% (increased from 75.54% in 2006-2007 to 84.65%) of the sanctioned strength was with private funded institutions.

Year	Government (1)	Government aided (2)	Private (3)	Total 4 = (1+2+3)	% of intake by private w.r.t total 5= (3÷4)x100
2006-2007	5,080	12,399	53,968	71,447	75.54
2007-2008	5,160	12,980	69,316	87,456	79.26
2008-2009	6,085	13,453	90,844	110,382	82.30
2009-2010	6,090	13,658	112,443	132,191	85.06
2010-2011	8,430	13,716	136,194	158,340	86.01
2011-2012	11,670	13,842	145,910	171,422	85.12
2012-2013	12,910	14,257	159,264	186,431	85.43
2013-2014	16,255	14,567	169,986	200,808	84.65
CGR (%)*	19.56	2.03	17.86	16.07	

* Denotes Compound Growth Rate between 2006-07 and 2013-14

Table 5: Student sanctioned strength in Polytechnic colleges. Source: Government of Tamil Nadu (2013a)

6 Issues and Challenges

Given the above institutional framework of TE in the Tamil Nadu state and an increasing trend in the student seating capacity in both engineering and polytechnic colleges, lot of emerging issues and consequently challenges are now forthcoming. Some of them focused in this paper are privatisation of higher/technical education and fee structure and its disparity between government and private run institutions, gap between seating capacity and actual admittance, women in TE, quality of education owing to mushroom growth of institutions and lastly employability of the students after completion of the courses. The issues and challenges faced by TE institutes are similar in other states also and thus could be generalised.

7 Privatisation

The preceding discussions on the increasing number of institutions run by different funding agencies would clearly reveal and emphasise the significant role played by these private agencies in providing TE in the state vis-à-vis in the country. The

Government mostly acts as a regulatory body. In fact, the state government's priority is to provide elementary and secondary education and thus allocates more funds (budget) for improving the enrolment at schools rather higher education. It is estimated that during 2007-2012, about 43% of the public expenditure on education was incurred for elementary education, 25% for secondary education and the remaining 32% for higher education. With regard to Central Government's expenditure on education, 49% was incurred for higher education and the remaining for elementary (39%) and secondary (12%) education. The various states in India incurred about 74% of expenditure for school education of which 44% was on elementary education and 30% on secondary education and the remaining 25% for higher education (GoI 2013b).This is one of the reasons for more private participations in providing both higher and technical education.

However, Kapur and Mehta (2004) argued that the education system in India remains suspended between over-regulation by the Government and a discretionary privatisation is unable to mobilize capital in productive ways resulting in a sub-optimal structuring of higher education. Considering the huge youth population, the scale and the complex demand for higher education, it may not be possible for the Government to tackle challenges alone instead leaving the private partners to shoulder the responsibilities.

8 Fee Structure

Another closely related issue in providing TE is the fees collected by the technical educational institutes from the students. Since the TE is more or less privatised and also cater to the larger demand of students who aspire for such education, there existed different fee structure between government and self-financing private engineering colleges. In Tamil Nadu for instance, in a government engineering college, a student will be paying INR 9,180 per annum, and in a self-financing college, under government quota, an amount of INR 40,000 for non-accredited[8] engineering courses and INR 45,000 for accredited courses is charged. Besides, admission is also done under the umbrella Management Quota[9] and a student has to

8 Accreditation is a quality assurance scheme for TE. It is open to all institutions in Engineering and Technology, Management, Architecture, Pharmacy, Hotel management and Catering Technology, Town and Country Planning, Applied Arts and Crafts (http://www.nbaind.org). The higher educational institutions are encouraged for assessment and accreditation either by National Assessment and Accreditation Council (NAAC) in case of Arts and Science colleges and Universities or by National Accreditation Board (NAB) in case of Technical institutions. However, certain technical institutions offer non-accredited courses also.

9 Every institute admits certain percentage of seats for which the management has discretion to give admission on factors other than merit. Usually, out of sanctioned strength, a certain percentage (65%)

pay not less than INR 70,000[10].Such disparity in fee structure is highly criticized as selection of the institutions by students is left to the demand and supply forces. Since the seating capacity in government run is also limited (about 12,000) many of the students have left with the choice of selecting private funded institutions. The enhanced fee structure in private institutions should be justifiable only when they provide better facilities than the government run institutions. This warrants an independent agency to watch over the performance of any institutions in terms of quality education. Similar situations prevail in polytechnic colleges though the fee band is not as high as that of engineering colleges for the obvious reasons.

Considering the greater role played by the private players offering TE, it is very crucial that while framing any statute or imposing any regulations on fixing fee structure, these private players have to be given greater autonomy in management of educational institutes including the fixation of fee structure. However, the fees need not be at an exorbitant level and a balance has to be struck between the autonomous and a reasonable and a justifiable fee structure to break even (Rahman and Islam 2014). The overall vision will be that the students get better quality education and facilities.

9 Seat Capacity and Admittance

The scenario of a high growth rate in the establishment of new technical education institutions is evident. Nevertheless, there is a huge gap between sanctioned strength and students admitted in the technical institutions all over the country (Gosavi 2013). In case of Tamil Nadu, Table 6 shows that about 9.70% (2008-09) to 36.56% (2013-14) of the seats sanctioned were kept unfilled (vacant) in the engineering colleges during the time period from 2006 to 2014 in Tamil Nadu.

is earmarked to be filled from State level merit list and the rest (35%) are allowed to be filled by the management at their discretion.

10 Based on the web site details of the few colleges in Tamil Nadu.

Year	Government		Government aided		Self – financing		Overall	
	Eng.	Poly tech	Eng.	Poly tech	Eng.	Poly tech	Eng.	Poly tech
2006-2007	1.37	5.55	1.22	6.24	21.68	9.21	20.51	8.65
2007-2008	0.00	2.50	0.00	5.10	14.16	7.59	13.32	6.92
2008-2009	1.79	5.55	0.00	6.24	10.28	9.21	9.70	8.65
2009-2010	2.66	4.89	2.88	11.96	32.12	23.89	30.37	21.78
2010-2011	5.27	12.46	0.16	11.69	17.83	30.92	16.94	28.27
2011-2012	4.92	5.44	0.00	13.37	30.03	32.38	28.70	29.01
2012-2013	3.88	11.60	0.00	14.62	31.41	32.26	30.39	29.48
2013-2014	16.06	10.37	4.79	19.02	37.69	45.45	36.56	40.69

Table 6: Percentage of Vacant seats against seating capacity. Source: Government of Tamil Nadu (2013a)

The vacant seats in case of polytechnic colleges were also critical as 6.92% (2007-08) to 40.69% (2013-14) of the seats were not filled up. This raises the basic question whether TE lost its attraction? Whether increase in establishment of the technical institutions seems to be more of supply-driven rather than market driven? Many reasons are quoted for a rising trend in unfilled seats in both engineering and polytechnic colleges. One such reason is that trend to move towards conventional degree courses rather TE. This trend also highlights the failure of technical institutes to utilize the opportunity and their preparedness on employability. Combined with this is also a skewed growth of engineering and technical disciplines within the institutions. This necessitates that future expansion should achieve more disciplinary diversities; concentration on core disciplines and increasing capacity in already established institutions rather than creating new institutions.

10 Women in Technical Education

Women constitute about 48% of the total population in India. There is a phenomenal growth all over the country in the enrolment of women in schools and colleges since independence. In the following section, the analysis on the trend in girl students opting for TE specifically in Tamil Nadu also throws some interesting developments on this perspective. The details are shown in Table 7.

Year	Government		Government aided		Self - financing		Overall	
	Eng.	Poly tech	Eng.	Poly tech	Eng.	Poly tech	Eng.	Poly tech
2006-2007	32.34	33.84	29.36	17.17	34.84	7.89	33.89	11.43
2007-2008	33.57	35.50	35.13	16.51	36.30	8.00	35.58	10.99
2008-2009	38.85	37.45	37.34	20.14	37.12	7.85	37.26	11.07
2009-2010	36.60	38.07	36.17	16.32	34.08	6.40	34.52	9.33
2010-2011	36.78	31.44	38.87	15.52	34.83	6.91	35.25	9.42
2011-2012	40.18	25.69	40.66	16.57	35.27	6.88	35.85	9.54
2012-2013	43.69	24.17	41.54	15.60	36.48	6.91	37.01	9.21
2013-2014	42.40	19.86	38.55	13.79	34.28	7.04	34.94	9.27

Table 7: Percentage of girl students admitted in Technical Institutions. Source: Government of Tamil Nadu (2013a)

The number of girl students undergoing TE has been increasing (Table 7). However, only about 34.94% of the girls (2013-14) were admitted in engineering colleges and about 9.27% (2013-14) got admitted in polytechnic colleges though there is no ceiling on sanctioned strength for girl students. The above table also indicates that the trend in percentage of girl students admitted in polytechnic colleges is found to be declining, more particularly, in Government run colleges. Such decline in the demand for polytechnic courses in Tamil Nadu is due to factors like rise in number of engineering colleges on one side and increase in number of intake in Government run engineering colleges on other side, where the fee structure is nominal. Many of the students even leave the polytechnic colleges when they got admission in engineering colleges. In certain situations, engineering colleges are even competing with polytechnic colleges. The following news clipping substantiates the above observations.

> *"(…) demand for polytechnic courses in Tamil Nadu declined owing to a variety of factors, including the rise in number of engineering colleges. Many of those who enter polytechnics leave when they get admission through counselling elsewhere. So many seats remain vacant, but rules do not allow admission after the due date. Many private engineering colleges admit students after the due date, but most of them charge Rs. 30,000 to Rs. 40,000 a semester, akin to private engineering colleges, and offer no significant placement opportunities. And while government-run colleges have registered an increase in the number of girls, but those that offer evening shifts have fewer women students. It is also because many mechanical and electrical companies do not even allow girls in their recruitment procedures." (The Hindu 2011)*

11 Quality of Education

Yet another major challenge in TE is improving the quality of education by means of strengthening the faculty with required qualified teachers in different disciplines, providing academic autonomy, improving transparency in governance and proper regulation of the institutions. Among these, one of the serious concerns affecting the quality of TE is the lack of qualified faculty and shortage of faculty in many institutions though All India Council for Technical Education (AICTE) insists that 1:15 Teacher-Student ratio in engineering colleges and 1:20 in polytechnics has to be followed. Thus the most acute problem with the growth in number of technical educational institutions is inadequate quality on account of lack of competent faculty and lack of accountability (Sahu et al. 2008; Rani 2010; Gosavi 2013). Hence, there is shortage of faculty and the following news report supports the argument.

> *"(...) only 4 of the 10 government engineering colleges have full-time principals and 17 of the 41 government polytechnics do not have full-time principals. Nearly half of teachers' posts in government engineering colleges and polytechnics are lying vacant. The 10 engineering colleges have just 33 professors against a sanctioned strength of 50 and have a shortage of 130 Assistant professors. In the 41 polytechnics, there are just seven heads of department against a sanctioned 141, while 993 posts of lecturers are lying vacant." (The Times of India 2014)*

To address this issue, the Government of India with the financial assistance from the World Bank launched a Technical Education Quality Improvement Program (TEQIP) as a long-term Program of 10-12 years, for systemic transformation of the technical education system. The project mainly aims at strengthening the institutions to produce high quality engineers for better employability, scaling-up postgraduate education and demand-driven research and development and innovation, establishing Centres of Excellence for focused applicable research, training of faculty for effective teaching and enhancing Institutional and System Management effectiveness. About 190 Engineering Colleges were selected at All India level to participate in TEQIP II and 9 Institutions were selected from Tamil Nadu. The project cost is shared by Central and State Government in the ratio of 75:25. The above move is only a small step and has a long way to achieve the desired quality.

12 Employability

Employability focuses basically on the employee's needs and aims to match their requirements from their own perspectives. An appropriate TE would provide the

required knowledge and skill and make the students graduating from technical institutes employable. Thus providing employment to the students graduating from engineering and polytechnic colleges is yet another major challenge faced by technical institutes while providing TE. Technical educational institutions are to provide the required skills to the students so that the employers should not fall short of their requirements (Padmini 2012; Somalingam and Shantakumari 2013).

Most of the concerns in today's discussion fundamentally revolve around employability skills or job readiness skills possessed by the students graduating from both engineering and polytechnic institutes to be fit and remain in the world of work. Unfortunately, it is found that 64% of employers are only somewhat satisfied or found to be worse with the current engineering graduate skills and the country need to improve the skill set of the technical graduates and focus on higher order skills and creativity (Blom and Saeki 2011). Thus, there is a gap between qualifications attained by the students and how they should be trained for the job market.

> *"(...) the employability level in technical education is only 20%. The educational system concentrates only on transfer of knowledge and not on developing skills and the area that is ignored is the domain skill, which is what the industry rues about." (The Hindu 2012)*

Various reasons were been identified for the gaps. The graduating students lack various skills beyond mere communication skills. The decision making skills, problem solving and the ability to work with people with different backgrounds are also found lacking (Mehra and Virgandham 2013). There is also a need to change the current curriculum based on the industry-employer expectations (Gopalakrishnan and Sukmar 2013; Chithra 2013).The curriculum and the mandate of the educational institutes need to be updated to focus on the demand of industry and the job opportunities (Kasturi 2012) and majority of technical institutions in the country had poor linkages with industry (Kasturi 2013). This realization has driven many of the technical institutes for an increased awareness and to restructure the curriculum wherever essential.

13 Conclusion

TE in India, covering various courses and programs in engineering, technology, management, architecture, town planning, pharmacy, applied arts and crafts, hotel management and catering technology, has been witnessing significant changes both quantitatively and qualitatively since independence. Parallel to such develop-

ments, there is also increasing pressures for academicians or TE providers to integrate skill training vis-à-vis job orientation with that of academic subjects to make the graduating students employable or job-fit.

India's current demographic transition is looking for an opportunity to enjoy a dividend from the demographic burden of the erstwhile. As per the current development, the age structure of India's population plays a major role in providing young labour force to the job market in the next two to three decades. With the increasing population and more dynamism of young generation population in the demographic profile, the country is poised to create more job opportunities for such labour force. However, worthwhile changes can be possible only with clear cut policies on industrial development, technology adoption, research and development and objectives of TE and training (Sen 1989).

In order to capitalize these changes in technical education system and to meet the increasing demand for skilled personnel, the technical institutes in the country are now playing a critical role. Such technical institutes aim to prepare the students to become technically qualified with specialised skills and thus ensure employability. These technical institutes are no doubt the major players in providing such skills and the industrial development of country depends on these institutes.

The current growth of the technical institutes with an increase in numbers and the privatisation of such educational institutes are quite obvious from the preceding analysis. Such expansions have thrown up a wide variety of challenges especially to Government to maintain the quality of education. The Government of India and State Governments could not fully cater to the needs of matching the demand for providing TE by establishing needed technical educational institutions. Hence, the numbers of self-financing colleges (private institutions) are increasing and they also now shoulder the responsibilities, even more than any public-run technical institutes in preparing the youths towards the world of work.

Besides, the mandatory imposition of quality controls in education though largely rests with the government; the problem of plenty is now becoming a real challenge in a democratic set up. Equally important is that an adequate return on investment made by the students who undergo TE has to be ensured as education is considered to be a process of skill and training and treated on par with capital formation. Therefore, in this current scenario of superfluous supply of institutions, a long term strategy is essential to create more jobs and employability of the graduating students to be fit for such world of work. Such strategy needs to focus more on academic strength and their rigor with enhanced monitoring of quality education, besides a strong support from industry to correct mismatch in the current technical education system. In the threshold of major changes in the TE, the country has no other options except to build more credible technical and skill

oriented professional educational system for the welfare of the youths who enter the world of work.

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