

# Technician Education in India: Rejuvenation with World Bank Assistance

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*During the 45 years following independence, there has been a substantial quantitative expansion in polytechnic (or technician) education. This paper discusses the strengths and weaknesses of this system. The National Policy on Education of 1986 and the subsequent Programme of Action have laid down policy directions for improvement of quality and performance. In the face of the prevailing squeeze on resources, two agreements have been signed for World Bank Assistance. The objectives and salient features of the project are discussed at length. The progress achieved so far is also indicated.*

## INTRODUCTION

DURING the four and a half decades since independence, technician education in India has witnessed phenomenal expansion. While there were only 53 polytechnics with an annual intake of 6370 students in 1947, today the total number is approximately 950 (including about 560 government and government-aided polytechnics) with an annual intake of about 1,25,000 students. The variety of diploma courses offered by these institutions has also increased considerably from about 10-15 in 1947 to nearly 120 at present. This expansion in conformity with the needs and demands of industry and society has made the polytechnic system in India the largest in the world, but the unprecedented growth of the system has also posed problems relating to infrastructural development, curriculum revision, staff development, funding, deterioration in standards and their ramifications.

## PRESENT STATE OF SYSTEM

### *Efforts made at centre and state levels*

The various state governments, despite their meagre financial resources, have been providing some inputs for the system's growth through their nominal budgets despite the heavy odds against them. The Indian government, which is responsible for the quality of the outputs of the system, has also introduced several measures to improve quality:

- Establishment of four regional Technical Teacher Training Institutes (TTTIs) at Bhopal, Calcutta, Chandigarh and Madras.
- Undertaking UNDP-assisted projects during the 1980s for strengthening TTTIs.
- Funding of schemes such as library development,

instructional resource centres, production-cum-training centres, industry-institute interaction centres, apprenticeship training schemes, etc.

- Establishment of the All India Council for Technical Education (AICTE) through an Act of Parliament to enforce uniform norms and standards for infrastructure, curriculum, staff, etc.
- Introduction of new and emerging technologies on a small scale during the 1980s.
- Funding of schemes for modernization and removal of obsolescence, and establishment of computer centres.

### *Strengths of system*

As a result of the various efforts by the state and central governments, the polytechnic system in the country today possesses certain strengths and distinguishing features, which can be listed as follows:

- The establishment of the four TTTIs has given a major impetus to faculty development through long-term and short-term training programmes and provided competent staff for the system, besides the provision of other support services.
- The involvement of polytechnics in rural development, a unique feature of polytechnic systems anywhere in the world, was made possible with the approval of the Parliament in the late 1970s. There are nearly 175 such polytechnics in the country today and the Government of India proposes to extend further the coverage of this scheme.
- Several faculty and senior officials of the system have been attending training programmes at the Colombo Plan Staff College for Technician Education (CPSC) since its establishment at Singapore in 1975 and later at Manila from 1986. About half a dozen faculty of the TTTIs

contributed to this college as faculty members. Two of the directors of the CPSC were also from the polytechnic system.

- Through two UNDP projects undertaken during the 1980s, the TTTIs were strengthened in the areas of educational technology, national testing service, educational research and development of multimedia learning packages and films.
- As compared to other subsystems in technical education, the polytechnic system now has, due to the efforts of the TTTIs, well-structured curricula, books specially written for polytechnics, video programmes and computer-assisted packages meant for polytechnic students. Several educational research studies were also taken up by the TTTIs in collaboration with industry, and management development in the system has been facilitated.
- Unlike any other subsystem, the TTTIs have been able to introduce several innovations, albeit in a small way in several polytechnics.

### WEAKNESSES OF THE SYSTEM

Because of the rapid expansion in a very short period and lack of matching financial inputs coupled with general socio-political problems, the system has developed a number of weak areas, some of which are as follows:

- Uneven distribution of polytechnics in the country, with 70% of them concentrated in the four states of Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu.
- Many polytechnics are still offering only conventional diploma courses, which are outdated, and this has resulted in problems of unemployment.
- Because of the low social status and unattractive payscales, teachers have migrated to other lucrative positions and nearly 30% of teaching posts are lying vacant in many institutions.
- A large number of institutions have not yet developed adequate infrastructural facilities like laboratories, libraries, hostels, computer centres and staff quarters.
- The production of manpower in various disciplines is not based upon an accurate assessment of manpower demand in various sectors of the economy. As a result, today about 100,000 diploma holders are reported to be either unemployed or under-employed.
- Unlike at the degree level, diploma institutions are mainly dependent on the state governments for inputs and there is no organization akin to the University Grants Commission for providing special funds.
- The instructional process in the polytechnics remains outdated and modern communication technologies have not yet taken sufficient roots.
- The reach of polytechnic education has yet to encompass underprivileged groups in society,

the handicapped and the rural population. The enrolment of women is only about 17% despite the presence of 70 women's polytechnics in the country.

- With a few exceptions, the linkage between industry and polytechnics has been extremely weak with attendant repercussions on the quality of polytechnic leavers.
- The opportunities for continuing education and upgrading from diploma to degree level for career development are inadequate.
- Most polytechnics do not have autonomy and academic freedom for reforming curricula and introducing innovations. Private institutions have a slight edge over government institutions in this respect.
- The emphasis on experimentation, practical training and fieldwork has become gradually diluted, despite the fact that technicians are required to have a greater component of skill in the curricula.
- The lowering of voting age to 18 years has brought politics into the campuses of polytechnics and disturbed their smooth functioning. Many polytechnics are unable to conduct teaching for even 100 days in the academic year.

### THE WORLD BANK ASSISTED PROJECT

In view of the above situation, the National Education Policy of 1986 and its Action Plan have indicated clear directions for growth and development of the polytechnic system to remove most of these weaknesses. However, due to the lack of resources in most states, two agreements have been signed for World Bank assistance to the tune of US\$517 million (Indian input about Rs.1600 crores; 1 crore = 10 million) for bringing in quality and upgrading institutions as per international standards.

The project presently covers 17 states and two union territories, and is the single largest project ever taken up by the World Bank (IDA and IBRD) in any country in the education sector in its long history of financial assistance. The project is aimed at giving a further boost to polytechnic education, preparing it for the challenges of the 21st century so that polytechnics can provide the high-quality technical manpower that industry needs to compete in world markets.

#### *Objectives of the project*

The primary objective of the project is to enhance the quality of technical (polytechnic) education in terms of its processes and products. This would be achieved by:

1. Capacity expansion, which would include:
  - (a) Introduction of programmes in new and emerging technologies at existing polytechnics.
  - (b) Developing a limited number of new polytechnics.

- (c) Establishing programmes of continuing education.
  - (d) Expanding programmes aimed at women, students in rural and informal sectors and physically handicapped students.
  - (e) Construction of institutional buildings, students' hostels and staff residences.
2. Quality improvement, which would be achieved by:
    - (a) Strengthening teacher education and training programmes.
    - (b) Establishing state-level staff development centres, curriculum development centres, computer centres and learning resource development centres.
    - (c) Modernizing laboratories and workshops.
    - (d) Instituting maintenance programmes and improving internal revenue generation.
  3. Efficiency improvements, which would be achieved by:
    - (a) Strengthening the administration and management of the Bureau of technical education, state directorates and Boards of technical education.
    - (b) Setting up project implementation units at state and polytechnic levels.
    - (c) Granting autonomy to selected polytechnics.
    - (d) Establishing industry-institute programmes at polytechnics.

#### *Salient features of the project*

The project will be implemented in two phases, whose salient features are as follows:

##### *Phase I (Cr. 2130 In)*

1. Date of commencement: 5 December 1990.
2. States included (eight): Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Orissa, Rajasthan and Uttar Pradesh.
3. Central sector institutions included: four TTTIs at Bhopal, Calcutta, Chandigarh and Madras, and the National Project Implementation Unit in New Delhi.
4. Total investment: approximately Rs. 832.7 crores.
5. Bank reimbursement: US\$260 million at 70% average rate of reimbursement.

##### *Phase II (Cr. 2223 In)*

1. Date of commencement: 29 January 1992.
2. States included (ten): Andhra Pradesh, Assam, Haryana, Himachal Pradesh, Maharashtra, Punjab, Tamil Nadu, West Bengal and union territories of Delhi and Pondicherry.
3. Total investment: approximately Rs. 825.2 crores.
4. Bank reimbursement: US\$307.1 million at 83.3% average rate of reimbursement.

In accordance with a subsequent understanding with the Government of India in March 1992 the Bank inputs for Phase I have been reduced to SDR 159.8 (approximately US\$210 million) but with a

reimbursement percentage of 83.3% (the same as in Phase II).

Because of the inbuilt flexibility of the project, more states can be included in Phase I and more union territories in Phase II as agreed to by the Government of India and the Bank.

#### *Major conditions to be fulfilled by the states*

1. States agree to provide rupee inputs on an annual basis (as indicated in the project proposals approved by the Bank) to the polytechnic system to ensure successful implementation and achievement of targets.
2. States initially to spend their own money to implement the project and then claim reimbursement from the Department of Economic Affairs, Ministry of Finance at rates indicated in the agreements.
3. All vacant teaching positions as specified in the project proposals are to be filled before commencement of the project by every state.
4. Additional staff required for successful project implementation should be appointed on an annual basis as per the 'Key Additional Staffing Plan' appended to the agreements.
5. No new polytechnics or courses shall be started without the prior approval of the All India Council for Technical Education.
6. All states shall introduce in a phased manner multipoint entry and credit systems in selected disciplines and polytechnics.
7. The states shall promote close interaction with the industry by:
  - (a) developing and instituting industry-institute programmes and
  - (b) constituting industry-institute cells at the directorates and polytechnics.
8. The states shall review their current levels and practices of internal revenue generation and develop plans to increase the same through diverse ways and means.
9. The project states shall provide adequate resources for the maintenance of the buildings and equipment in the polytechnics and delegate appropriate powers to the principals to execute the same.
10. The Government of India shall cause the TTTIs to increase their internal revenue generation by charging fees for courses conducted for the teachers of the states and for other services offered.

The details of the physical targets agreed to be fulfilled by each state as per the agreements are as shown in Appendices I and II.

### **MANAGEMENT STRUCTURE FOR PROJECT IMPLEMENTATION**

#### *Mechanisms at national and regional levels*

The implementation of a major project of this nature with its multiplicity of activities and wide

geographical spread throughout the country over several states and nearly 600 polytechnics necessitates the establishment of an appropriate management structure for its implementation with a view to ensuring timely achievement of financial and physical targets and establishment of mechanisms to achieve the desired level of quality and efficiency improvement. With this objective, the project design envisaged the creation of structures at four different levels (national, regional, state and institutional) exclusively to oversee and monitor project implementation. This management structure is indicated in Fig. 1.

*National level.* Although the project is envisaged as a state sector undertaking, the various agreements entered into identify the Government of India as the 'borrower'. Two ministries of the Government of India are primarily involved in the management and control of this project:

- *Department of Economic Affairs, Ministry of Finance*—This department basically deals with financial matters and related procedures for reimbursement of expenditure, obtaining foreign exchange releases and finally arrangements for repayment of credit.
- *Department of Education, Ministry of Human Resources Development*—The Bureau of Technical Education in the Department of Education, Ministry of Human Resources Development deals with all academic and other matters relating to the project and liaises with the Bank, all states, participating central ministries, TTTIs, etc., to ensure effective implementation of the project.

*The Bureau of Technical Education.* It was envisaged that in order to discharge these additional functions arising out of the project, the Bureau will be strengthened with appropriate staff to assist the Joint Educational Adviser (Department of Education) who is also designated as the National Project Director for this project. The major function of the Bureau is to liaise with the World Bank, Planning Commission and report progress to Parliament as required. It is also the nodal agency for project implementation and carries out this function through a specially created central unit designated as the National Project Implementation Unit.

*The National Project Implementation Unit (NPIU).* This unit was created by the Department of Education, MHRD specifically for the duration of the two projects and was established under the umbrella of Educational Consultants (India) Ltd (Ed.CIL), an autonomous body and public sector undertaking under the same ministry. The NPIU was conceived as an autonomous unit with sufficient flexibility to take independent and timely actions in accordance with the emerging needs of this time-bound project with set targets.

The major functions of NPIU are:

- Study of the project objectives and strategies and identification of the corresponding roles of each participating central institute and the states.
- Preparation of national strategy and framework for scheme design within which the project would be implemented.
- Orientation of the state directorates, polytechnics, central institutes and other organizations to the national framework.
- Provision of assistance to participating states with the help of TTTIs, NTMIS and external consultants for formulating policy, administrative and academic actions to achieve project objectives.
- Provision of guidance and assistance to the participating states for resource planning and development (building construction, equipment procurement, information base, staff development, project finance management, etc.).
- Monitoring progress of the project during implementation, periodically for internal purposes and, on an annual basis, for the World Bank against set targets and providing information to the Government of India and the World Bank for decision-making.
- Coordinating with the identified procurement agency in matters relating to procurement of equipment required by the states.
- Facilitating disbursement of project funds to the states based on actual expenditure and agreed norms and procedures for reimbursement and
- Assessing the project impact on the target beneficiaries.

For the benefit of the project, the NPIU is expected to develop working links with various national bodies, industries, professional organizations, etc. (as indicated in Fig. 2) and seek their assistance in project implementation whenever required.

The NPIU comprises of an academic wing to deal with academic (software) aspects and a resources wing to deal with resource (hardware and procurement) aspects of the project.

#### *Regional level*

At the regional level the NPIU operates in close coordination with the four regional TTTIs at Bhopal, Calcutta, Chandigarh and Madras (autonomous bodies under the MHRD), which have been operating in the technical education system as resource institutions for the past 25 years. The TTTIs have also been included in the project for funding and strengthening and they are expected to help implement and monitor all academic activities envisaged in the project.

Each TTTI has established a separate Project Facilitation Unit (PFU) with a professor as its head in order to correlate various activities at the institute to the needs of the project.

The Ministry has also constituted a National Facilitation Committee of TTTIs for the project, which meets periodically to review the actions

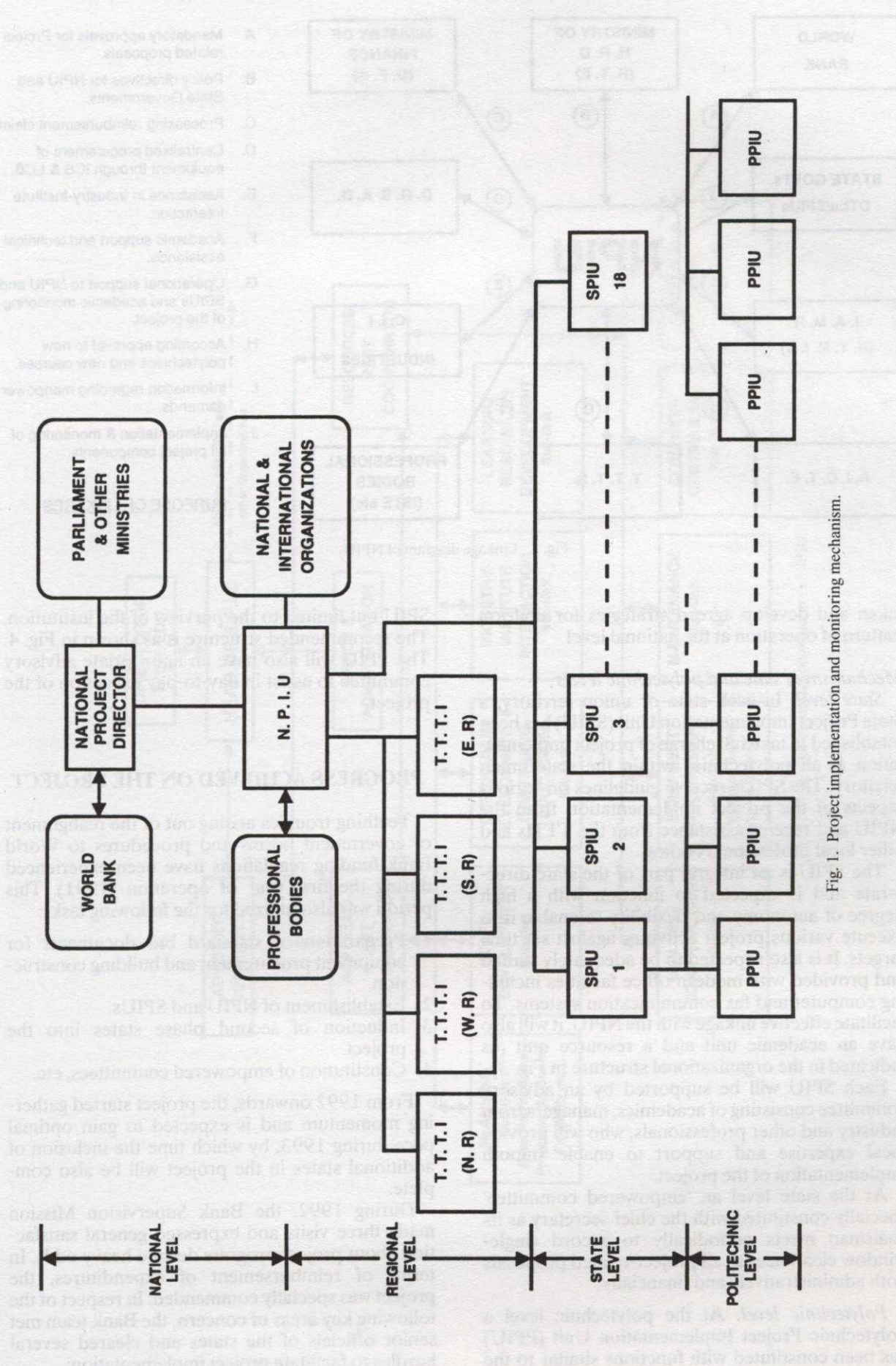


Fig. 1. Project implementation and monitoring mechanism.

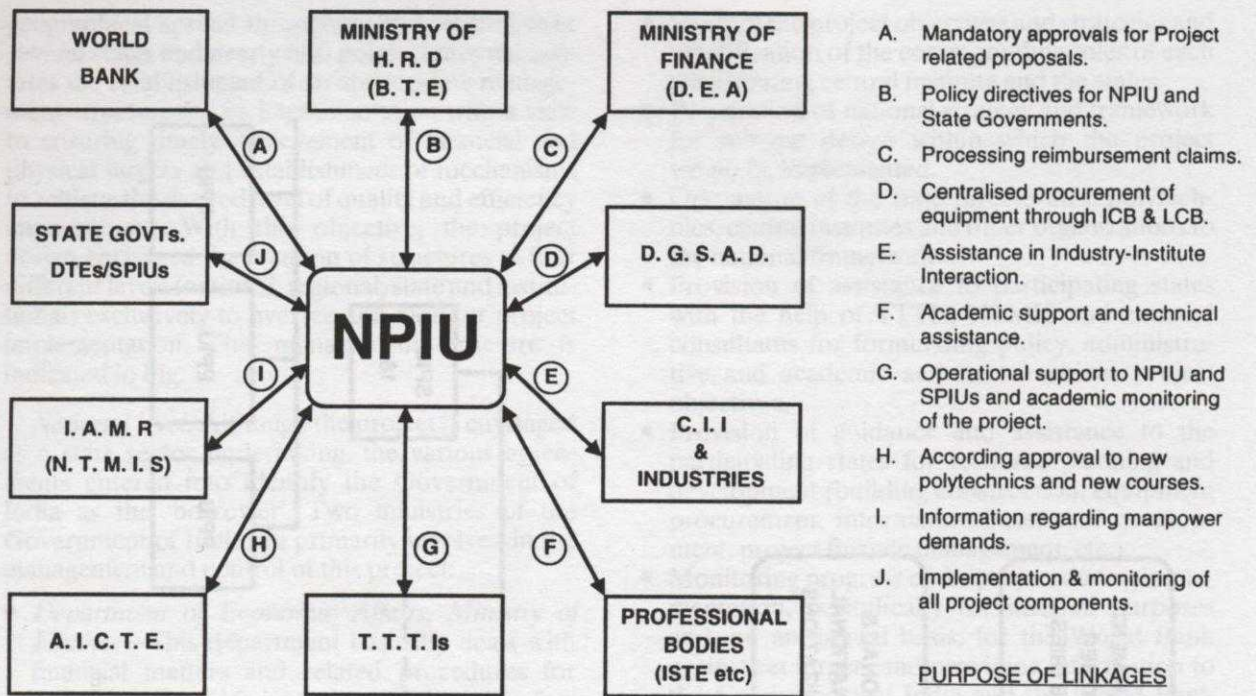


Fig. 2. Linkage diagram of NPIU.

taken and develop agreed strategies for uniform pattern of operation at the national level.

#### *Mechanism at state and polytechnic levels*

**State level.** In each state or union territory, a State Project Implementation Unit (SPIU) has been established to take full charge of project implementation at all polytechnics within the state/union territory. The SPIUs receive guidelines on various aspects of the project implementation from the NPIU and receive assistance from the TTTIs and other local professional bodies.

The SPIU is an integral part of the state directorate and is expected to function with a high degree of autonomy and flexibility to enable it to execute various project activities against set time targets. It is also expected to be adequately staffed and provided with modern office facilities including computer and fax communication systems. To facilitate effective linkage with the NPIU, it will also have an academic unit and a resource unit (as indicated in the organizational structure in Fig. 3).

Each SPIU will be supported by an advisory committee consisting of academics, managers from industry and other professionals, who will provide local expertise and support to enable smooth implementation of the project.

At the state level an 'empowered committee' specially constituted with the chief secretary as its chairman meets periodically to accord single-window clearances to all project-related proposals both administratively and financially.

**Polytechnic level.** At the polytechnic level a Polytechnic Project Implementation Unit (PPIU) has been constituted with functions similar to the

SPIU but limited to the purview of the institution. The recommended structure is as shown in Fig. 4. The PPIU will also have an appropriate advisory committee to assist in day-to-day execution of the project.

#### **PROGRESS ACHIEVED ON THE PROJECT**

Teething troubles arising out of the realignment of government norms and procedures to World Bank funding regulations have been experienced during the first year of operation (1991). This period was also utilized for the following tasks:

1. Preparation of standard bid documents for equipment procurement and building construction.
2. Establishment of NPIU and SPIUs.
3. Induction of second phase states into the project.
4. Constitution of empowered committees, etc.

From 1992 onwards, the project started gathering momentum and is expected to gain optimal pace during 1993, by which time the inclusion of additional states in the project will be also complete.

During 1992, the Bank Supervision Mission made three visits and expressed general satisfaction about project progress despite heavy odds. In terms of reimbursement of expenditures, the project was specially commended. In respect of the following key areas of concern, the Bank team met senior officials of the states and cleared several hurdles to facilitate project implementation:

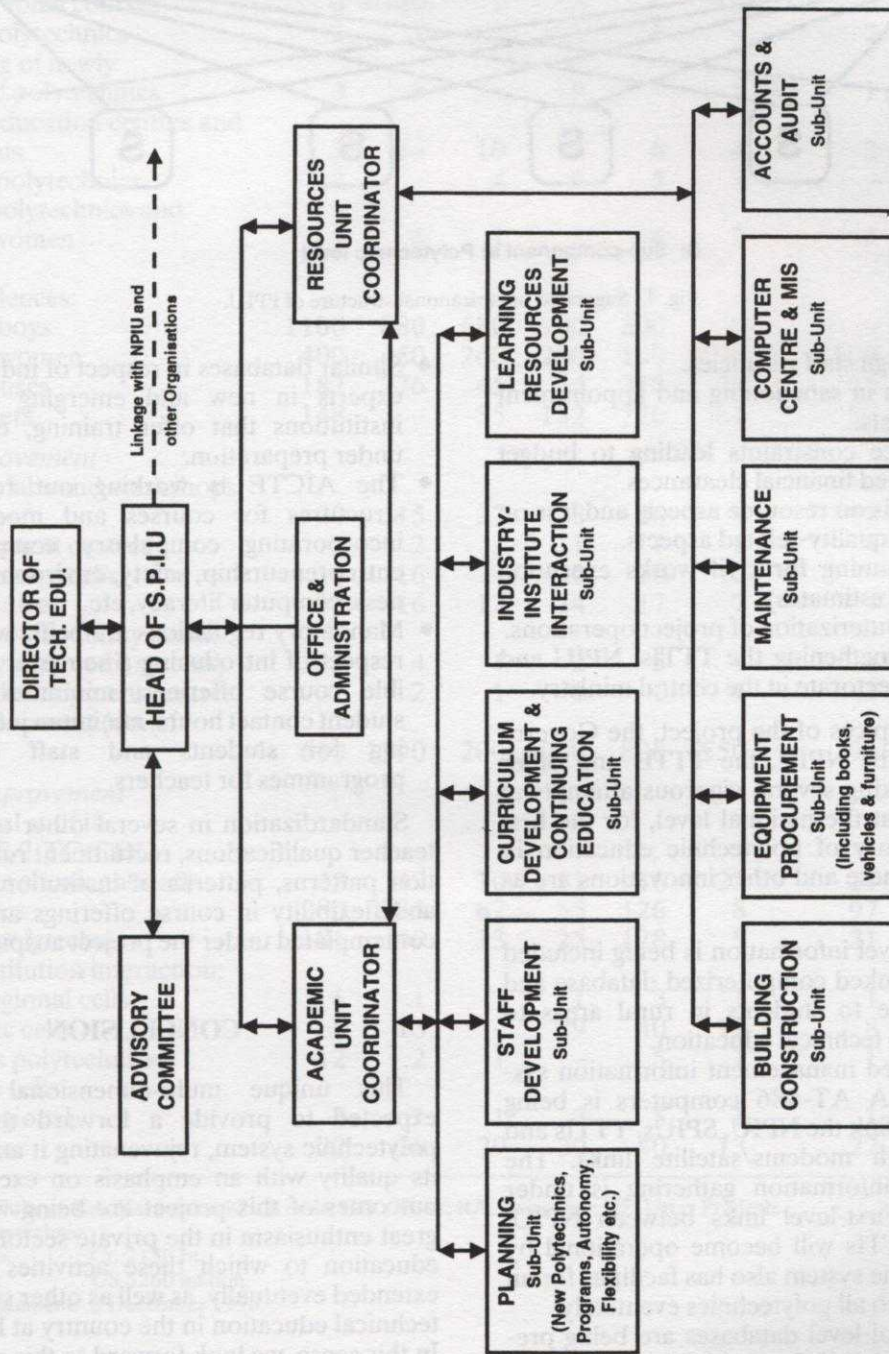
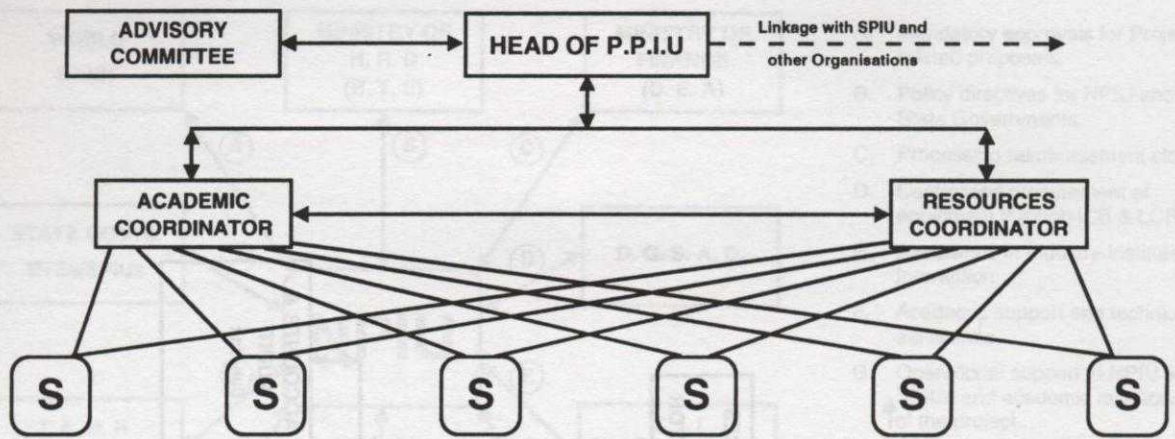


Fig. 3. Suggested organization structure of S.P.I.U.



S: Sub-component at Polytechnic level

Fig. 4. Suggested organizational structure of PPIU.

- Persistently high staff vacancies.
- Slow progress in sanctioning and appointment to new key posts.
- Local resource constraints leading to budget cuts and delayed financial clearances.
- More emphasis on resource aspects and less on academic and quality-related aspects.
- Delays in planning for civil works execution (drawings and estimates).
- Delay in computerization of project operations.
- Delays in strengthening the TTTIs, NPIU and the project directorate in the central ministry.

Under the auspices of the project, the Government of India, the NPIU, the TTTIs and other agencies are making several vigorous attempts at standardization at the national level, for the first time in the history of polytechnic education in India. Some of these and other innovations are as follows:

- Polytechnic-level information is being included in a satellite-linked computerized database and made available to students in rural areas to attract them to technical education.
- A computerized management information system with EISA AT-486 computers is being established to link the NPIU, SPIUs, TTTIs and PPIUs through modems/satellite links. The software for information gathering is under preparation. First-level links between NPIU, SPIUs and TTTIs will become operational by April 1993. The system also has facilities for an e-mail service to all polytechnics eventually.
- Several national-level databases are being prepared to provide information in respect of polytechnic-level textbooks and reference books, laboratory equipment, teaching aids, training films/video cassettes and CAI packages.

- Similar databases in respect of industry, subject experts in new and emerging technologies, institutions that offer training, etc., are also under preparation.
- The AICTE is working out recommended structures for courses and model curricula incorporating compulsory components like entrepreneurship, safety, environmental awareness, computer literacy, etc.
- Mandatory regulations are being worked out in respect of introducing a semester system, flexible course offerings, minimum number of student contact hours, minimum industrial training for students and staff development programmes for teachers.

Standardization in several other areas such as teacher qualifications, recruitment rules, examination patterns, patterns of institutional autonomy and flexibility in course offerings are also being contemplated under the project auspices.

## CONCLUSION

This unique multi-dimensional project is expected to provide a forward thrust to the polytechnic system, rejuvenating it and improving its quality with an emphasis on excellence. The outcomes of this project are being watched with great enthusiasm in the private sector of technical education to which these activities need to be extended eventually, as well as other subsystems of technical education in the country at higher levels. In this sense, we look forward to this project to act as a pace-setter to promote excellence in technical education in India as a whole.



APPENDIX I

Indian technical education project: detailed project components by state

Component	BI	GU	KA	KE	NP	OR	RA	UP	Total
<i>Capacity expansion</i>									
New diploma courses	6	5	6	3	4	11	8	27	70
New post-diploma courses	6	20	2	3	-	13	5	3	52
New co-ed polytechnics	3	1	2	1	8	-	2	2	19
Strengthening of newly established polytechnics	3	5	-	9	-	1 (W)	1 (W)	16	35
Continuing education centres and departments	5	26	10	3	6	4	3	11	68
Community polytechnics	3	-	4	6	5	3	-	-	21
Residential polytechnics and wings for women	1	4	1	1	6	2	3	4	22
<i>Hostel/Residences:</i>									
Places for boys	1100	880	680	900	300	-	-	2670	6530
Places for women	400	450	260	280	190	770	500	810	3660
Faculty houses	187	276	45	74	318	30	45	332	1295
Staff quarters	148	-	35	132	720	61	80	183	1639
<i>Quality improvement</i>									
Modernizing labs and workshops (no. of polys.)	20	15	27	28	26	9	17	80	222
Staff development centres	1	2	2	1	1	1	1	1	10
Staff development cells	15	16	-	30	10	10	-	71	152
Computer centres	17	16	12	24	17	7	4	50	147
Introduction of flexibility (multi-point entry and credit system)	3	4	1	2	5	1	1	4	21
Curriculum development centres	1	2	1	1	1	1	1	1	9
Faculty development (no. of teachers)	610	1590	200	1000	808	550	94	2947	7797
<i>Efficiency improvement</i>									
<i>Key additional staff in:</i>									
<i>SPIU/DTE/BTC/CDC/LRDC professional staff</i>									
Polytechnics	43	42	10	11	16	22	11	35	190
Women's polytechnics	280	383	62	55	126	8	97	676	1689
Industry-Institution interaction:	181	40	13	25	128	5	21	183	594
Central/regional cells	1	1	1	1	3	1	1	1	10
Polytechnic cells	8	13	-	29	40	12	8	76	186
Autonomous polytechnics	12	2	1	-	5	1	1	2	24
Maintenance cells									
Central/regional	3	1	1	3	5	1	1	2	17
Polytechnic	22	26	29	30	40	13	22	80	262

BI, Bihar; GU, Gujarat; KA, Karnataka; KE, Kerala; OR, Orissa; RA, Rajasthan; UP, Uttar Pradesh.

W, Women's polytechnic.

Phase I credit no. Cr. 2130 In.

IDA investment US \$260 million.

Date of commencement: 5 December 1990.

## APPENDIX II

## Indian second technical education project: detailed project components by state

Components	AP	AS	HA	HP	NA	PU	TN	WB	HD	Total
<i>Capacity expansion</i>										
New diploma courses	14	2	16	4	40	12	41	14	12	57 <sup>a</sup>
New post-diploma courses	2	-	1	3	22	-	12	5	5	32 <sup>a</sup>
New co-ed polytechnics	1	-	3	1	1	-	-	2	1	9
Continuing education centres and departments	-	1	1	1	17	6	12	4	5	47
Community polytechnic	6	5	-	-	26	7	-	7	3	54
Residential polytechnics/ wings for women in Co-ed Polytechnics	1	1	1	-	2	3	-	1	-	9
Hostel/Residences:	1	-	-	-	5	-	-	-	-	6
Places for boys	225	-	825	280	1200	330	-	1725	40	4625
Places for women	2958	240	730	230	600	240	1200	790	20	7008
Faculty houses	181	-	281	65	200	120	-	161	40	1028
Staff quarters	118	-	85	75	-	55	80	401	-	814
<i>Quality improvement</i>										
Modernizing labs and workshops (no. of polys)	58	8	12	4	43	14	36	30	8	211
Staff development centres	-	1	1	-	6	1	1	-	-	10
Staff development cells	-	-	-	-	22	19	-	1	-	42
Computer centres	56	9	16	5	52	12	25	10	3	188
Introduction of flexibility (multi-point entry and credit system)	5	7	1	1	7	1	10	1	2	35
Curriculum development centres	1	1	1	1	7	1	1	1	1	15
Learning resource	-	1	1	1	8	-	1	1	1	14
Development centres learning resources	3	9	15	5	55	-	55	34	9	185
Utilization cells faculty development (no. of teachers)	330	253	392	120	1200	517	1955	789	247	5803
<i>Efficiency improvement</i>										
Key additional staff in:										
SPIU/DTE/BTC/CDC/LRDC										
professional staff	27	10	44	18	59	25	87	37	14	301
Polytechnics	220	24	180	45	282	288	249	48	-	1564
Womens' polytechnics	64	21	30	8	129	90	51	-	-	454
Industry-institution interaction:										
Central/Regional cells	1	1	1	1	10	1	1	1	1	18
Polytechnic cells	56	8	16	5	18	19	55	34	9	220
Autonomous Polytechnic	5	0	0	1	7	1	10	2	-	26
Maintenance cells										
Central/regional level	4	1	1	0	3	1	1	1	-	12
Polytechnic level	8	8	18	5	52	12	55	34	5	195

<sup>a</sup> Different types of courses (numbers by states will not add to total). AP, Andhra Pradesh; AS, Assam, HA, Haryana; HP, Himachal Pradesh; PU, Punjab; TN, Tamil Nadu; WB, West Bengal; ND, Phase II credit no. Cr. 2223 In. IDA investment: US \$307.1 million. Date of commencement: 29 January 1992.



**Prof. C. Ramakrishna Sastri** graduated in Electrical Engineering in 1954 and obtained his Masters Degree from the University of Illinois (Urbana) U.S.A. in 1962. He had a distinguished academic career throughout school and college and was a gold medalist in mathematics and physics. For nearly 37 years, he taught at all levels in technical education from polytechnics to engineering colleges and I.I.T. (at Bombay) and had earned the reputation of being an excellent teacher. From 1972, he became a teacher-educator and trainer in technical education, specializing in curriculum development and educational technology. As head of the Educational and Media Centre at the Technical Teachers Training Institute, Madras, he had initiated the production of educational films and video packages by establishing a modern colour TV studio. During 1983-86 he worked as a Faculty Consultant at the Colombo Plan Staff College for Technician Education (then located at Singapore) and had extensive exposure to polytechnic education systems in many countries in the South Asian region. Back at TTTI, Madras, he worked as Dean and was in charge of several UNESCO and other bilateral projects for the development of TTTIs and Polytechnics. From the inception of the World Bank Assisted Project in 1989, he was actively associated with the same in project formulation and design and later was chosen to head the NPIU at Delhi for two and a half years until he superannuated in November 1993.