

INDIA
 Technical/EngineeringEducationQualityImprovementProgram-PhaseI

ProjectAppraisalDocument

SouthAsiaRegionalOffice
 SASHD

Date: August23,2002 SectorManager : MichelleRiboud CountryDirector : ChristopherJ.Hoban ProjectID : P072123 LendingInstrument: SpecificInvestmentLoan(SIL)	TeamLeader : ShashiK.Shrivastava Sector(s): Tertiaryeducation(90%),Centralgovernment administration(10%) Theme(s): Educationfortheknowledgeeconomy(P), Othersocialdevelopment(S),Technologydiffusion(S)
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ProjectFinancingData

[]Loan[X]Credit[]Grant[]Guarantee[]Other:

ForLoans/Credits/Others:

Amount(US\$m): 250.00

ProposedTerms(IDA): StandardCredit

Graceperiod(years): 10

Commitmentfee : 0.5%

Yearstomaturity: 35

Servicecharge: 0.75%

FinancingPlan(US\$m):Source	Local	Foreign	Total
BORROWER	64.00	0.00	64.00
IDA	210.40	39.60	250.00
Total:	274.40	39.60	314.00

Borrower: GOVERNMENTOFINDIA

Responsibleagency : MINISTRYOFHUMANRESOURCEDEVELOPMENT

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EstimatedDisbursements (BankFY/US\$m):

FY	2003	2004	2005	2006	2007	2008		
Annual	9.00	40.00	68.00	72.00	48.00	13.00		
Cumulative	9.00	49.00	117.00	189.00	237.00	250.00		

Projectimplementationperiod : FY2003-2008

Expectedeffectivenessdate : 01/01/2003 **Expectedclosingdate :** 06/30/2008

A. Project Development Objective

1. Project development objective: (see Annex 1)

To support the production of high quality technical professional through reforms in the technical/engineering education system in order to raise productivity and competitiveness of the Indian economy

2. Key performance indicators: (see Annex 1)

Sector Indicators:

- Increased support of industry and services for R&D, consultancy and lifelong learning through technical/engineering institutions
- Increased demand from industry and services for high quality technical professionals

Outcome/Impact Indicators:

- Improved employment rate and earnings of graduates from participating institutions
- Increased cooperation and resource sharing between institutions
- Improved internal efficiency of the engineering education system
- Increased involvement of institutions with communities
- Improved planning and management of engineering education system to make it demand driven and forward looking

Output Indicators:

- Increased number of high quality graduates in relevant and cutting-edge technologies
- Increased number of post graduates/research scholars in engineering
- Increased professional outputs (publications, products, designs, patents, etc.) from participating institutions
- Number of joint research, design and development projects, consultancies, training programs, etc., conducted by participating institutions
- Increased revenue generation from outreach programs and services (as a percentage of annual recurring expenditure)
- Increased access to technical training for socially disadvantaged groups and unemployed youth
- Cost and time efficient implementation of competitive funding process
- Increased availability of well-trained system/institution managers

B. Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goals supported by the project: (see Annex 1)

Document number: 21852-IN **Date of latest CAS discussion :** 04/05/2001

The Bank Group's current priorities in India are defined around the Government's Ninth Five-year Plan themes of strengthening the enabling environment for development and sustainable growth and supporting critical interventions of special benefit to the poor and disadvantaged. Strengthening the enabling environment for development and growth involves the parallel and complementary task of improving government effectiveness and enabling the private sector to contribute fully to economic development.

Promoting private sector-led growth and investment will be critical for accelerated poverty reduction in India. The Bank Group will focus, among other things, on promoting competitiveness in industry and services. This would demand high quality skilled manpower to promote entrepreneurial growth in new fields of industrial endeavor, to improve the productivity of Indian industry in both manufacturing and

services and make the industry internationally competitive, and to generate new avenues of employment in the economy.

According to the CAS, the bottlenecks constraining growth in India include a shortage of appropriately skilled and trained personnel. Although India has one of the largest stocks of scientists, engineers, and technicians, the quality of their training from many institutions below the first tier is poor. Keeping the above in view, the Bank Group will focus on promoting policy and institutional reforms in the area of technical education covering both public and private institutions to improve the quality of India's pool of technical manpower.

The Technical/Engineering Education Quality Improvement Program will help to introduce several basic policy and institutional reforms in the existing system in India. These reforms will focus on governance and financing of institutions, promotion of excellence through competitive funding, networking of institutions for better utilization of resources, closer interaction with local community and economy, and improved capacity of system management.

The Program is designed according to the guiding strategic principles of the CAS, namely: *Selectivity* (only states and institutions willing to undertake reforms will be eligible for support; the participating institutions will be selected on a competitive basis), *Partnership* (the program will be implemented fully by the client based on the agreed parameters of funding; institutions will be funded based on their own vision of excellence and close linkages with stakeholders), and *Programmatic approach* (Bank assistance will be provided over a long-term overlapping phases to support reforms, excellence and innovations as proposed by participating states and institutions that would be selected based on their proposals during program implementation).

2. Main sector issues and Government strategy:

With over 300 million persons still poor, India is pursuing "accelerated economic growth with equity". Liberalization of the Indian economy, its gradual integration with the world economy and rapid transformation into a knowledge-based society are increasing the demand for a well-trained workforce -- a workforce that is not only literate and has mastered specific skills, but is also able to acquire new skills and knowledge independently. The pace of change and the intensity of competition are both likely to increase as the economy continues to reform and especially as global standards come increasingly to dominate a more outwardly oriented economy.

With the increased globalization of the Indian economy and the recent WTO general agreement on Trading in services, it has become imperative that Indian industry improve its productivity and offers goods and services in the international market at international levels of quality and at competitive cost. While achieving this objective would require parallel effort on many fronts including reforms in industrial policy, labor laws, trade policies and tariffs, the most vital component in transforming the Indian economy would be up-gradation of the quality of the professional human resource, i.e. the innovative and creative abilities of the working professionals, the skills and attitudes of the workforce, and the vision, dedication and maturity of the management. Technical education can decidedly play a major role in promoting the type of human resource developments such a transformation would demand.

Some of the indicators which point to the urgent need for improving the quality of skilled technical manpower in the country are:

- As part in the opening of R&D establishments by multinationals in high-tech areas of information sciences, software engineering, bio-technology, telecommunication, and power

management and control.

- The establishment of an increasing number of call centers to cater for international customer satisfaction.
- The increasing number of manufacturing units being established by large international business houses in automotive industries, white goods, entertainment electronics, power control equipment, etc.

All the above rest on the assumption that high-level skilled manpower is either available or can be produced/trained to the required levels at a relatively low cost within India from the output of the Indian educational system.

Recognizing the importance of higher education and, science and technology for national development, Government of India have provided full policy support and substantial public funds during the past fifty years to create one of the world's largest systems of post-secondary technical/engineering education. In 2001, it comprised over 1000 degree level and over 1200 diploma level institutions with a total enrollment capacity of about 1.5 million. The system includes a few well-known institutes of international standing on the one hand, and on the other hand, hundreds of newly established engineering colleges, which are yet to meet the prescribed minimum norms and standards.

India's technical education system is mammoth if measured in absolute numbers of institutions and students, surprisingly small if compared with OECD and other key developing country competitors in terms of coverage of age eligible or financial resources committed to it, very inefficient, and generally of relatively low quality in many institutions. The system, in large measure, met the manpower needs in a bygone era of self-reliance. But it no longer does so in the new environment in which high talent manpower must meet a single international standard and also respond to a growing demand for technical education and training of students from all socioeconomic levels.

As described in detail in a recent Bank study on Scientific and Technical Manpower Development in India (World Bank Report Number 20416-IN, Sept. 2000), the publicly funded institutions/universities providing S&T education in India are mostly not able to maintain high standards of education or to keep pace with developments in knowledge and technology. They are constrained by the explosion in enrollments, the sharply diminishing public financial support, and most importantly, by an overall regulatory and management framework built on a myriad of multilayered controls and the supply-driven approach of the past. In the absence of a strong quality assurance mechanism, most private engineering education institutions also do not provide the necessary faculty, teaching materials, information access, or infrastructure needed for quality education in spite of fees, willingly paid, which are often very high. Many engineering graduates from second and third tier institutions cannot find suitable employment due to a growing mismatch between their knowledge and current practice in the fields for which they are trained.

More specifically, the sector study has documented the following major issues and causes (listed according to their level of criticality) for deficiencies in India's higher scientific and technical manpower development system which must urgently be addressed if India is to utilize its huge potential for economic prosperity and better quality of life for its people.

Over-centralization, and lack of autonomy and accountability of institutions: Over-centralization in decision making at the central and state level has led to institutions being unable to respond dynamically to a rapidly changing national economic environment that is demanding state-of-the-art technical knowledge, multiple work skills and professional/entrepreneurial attitudes from graduates.

Most institutions have little authority in the areas of faculty appointments, student admissions, structure and contents of programs, evaluation methodology and financial management. Absence of autonomy in academic decisions has inhibited innovations.

Resource constraint and wastage: In publicly funded institutions, government financing covers not much more than staff salaries, themselves too low to attract the best and brightest to academic careers. Cost recovery from students forms a small fraction of expenditure. The existing controls and regulations, in most cases, do not provide positive incentives to institutions to mobilize other financial resources. Inadequate funding coexists with several inefficiencies in resource utilization: excess capacity in many courses combined with heavy unmet demand for newer courses; significant failure rates; average time taken for completing a course being longer than the expected duration of the course; and underutilization of libraries and laboratories. There is very limited cooperation and sharing of physical and human resources among institutions and even less with industry or public research and development laboratories.

Poor quality and relevance (weak quality assurance mechanisms): While the IITs and a few other first-tier institutions offer world-class education and training in engineering and technology incorporating the "best practices", a large number of institutions offer rather outdated programs (prescribed by their affiliating university/Board) within inflexible structures and content. Within each category of public, private aided and private unaided institutions, there is wide variation in quality. Quality assurance mechanisms are weak and programs in less than 15% of institutions are accredited through the National Accreditation Board, established in 1996. Information technology is not used significantly for teaching. No more than 6% of institutions have any research activity worthy of note. Institutions are essentially unconnected to the industries and sectors where their graduates find employment.

Faculty shortages and quality: Many institutions offering professional courses are unable to attract and retain qualified and trained faculty due to non-competitive pay packages, lengthy recruitment procedures, and working environments that are professionally and technically underdeveloped and intellectually unstimulating. Postgraduate seats remain unfilled. Approximately one-quarter of teaching positions are vacant. Faculty shortages are more acute in IT-related disciplines as industrial compensation and benefits are much higher. Only half of the faculty members in professional institutions have a postgraduate degree and very few, a doctorate degree.

Poor technology/infrastructure support: In many institutions, physical facilities are largely outmoded. Probably no more than 20% of the institutions—both public and private—have the barest minimum of laboratory facilities necessary to meet the current demands. Communication lines to most institutions are also extremely limited and of poor quality for computer or library linkages. Libraries are unable to subscribe to current literature.

Limited access and regional disparity (equity): The total enrollment in higher education accounts for less than 12% of the age-cohort. Of these about 12% (i.e., 1.4% of the age-cohort) are enrolled in engineering education. Some sections of the society (rural women, scheduled caste/tribes, and the physically challenged) are poorly represented among the beneficiaries. The potential of the S&T education system is also not being exploited fully to reach out and help people engaged in informal sectors of the economy. In addition, there are large regional imbalances in the availability of educational facilities, especially for professional courses.

The private unaided sector has made a major contribution in expanding access to technical/engineering

education. The expansion of the private sector has been governed by state government policies. To meet a very large student demand for professional training, a few states have encouraged private engineering colleges and polytechnic to be established in large numbers. This fact accounts for much of the regional imbalance in the availability of student places. Government institutions are established in a much more regionally balanced manner both nationally and in each state.

To remedy the weaknesses, a consensus in India is developing around a **major systemic reform strategy**. As outlined in the sector report, the strategy involves the following logically sequential interdependent elements (the first is a precondition for improvements in the second, and so on down the list):

- a) empowerment (with full accountability) of institutions;
- b) optimal utilization of resources;
- c) mobilization of additional financial resources;
- d) establishing effective quality assurance mechanisms;
- e) networking of institutions to enhance capacity, improve quality and promote excellence; and
- f) establishing better and closer linkages with industry and community;
- g) increasing access and reducing regional imbalances.

The suggested reforms, when implemented, could help towards achieving the **Government's vision for technical/engineering education** :

"To develop and nurture a Technical Education System in the country which would produce skilled manpower of the highest quality comparable to the very best in the world and in adequate numbers to meet the complex technological needs of the economy; and would provide the national comparative advantage in the creation and propagation of innovative technological solutions and in the development of technological capacity of the highest order, both for its application in economic development of the country and for becoming a major supplier of technology and technological services in the world".

Government strategy: The developments in the Science, Technology and Engineering sectors have been largely guided by the Scientific Policy Resolution adopted by the Parliament in 1958, which among other things, call for training of S&T personnel on a scale adequate to fulfill the country's needs in science and education, agriculture and industry, and defence. Further support for development and reforms in engineering education came with the adoption of the National Technology Policy Statement (1983), the National Policy of Education (1986/1992), and the Information Technology Policy (2000). The "Technology Vision for India 2020" released by the Prime Minister in 1996 calls for India to become a developed nation by 2020 and one of the five biggest economic powers. In August 2001, the Prime Minister released a task force report entitled: "India as Knowledge Superpower: Strategy for Transformation", projecting a requirement of over 3 million trained knowledge workers and suggesting ways and means to achieve the same.

The policy and vision documents recommend (a) public institutions to become more self-reliant with reduced public subsidy; and (b) a significant role for the private sector in providing professional education. This process has gained momentum in engineering education in recent years with well-known public institutions allowed to raise their fees significantly, and a very large number of fully self-supporting colleges permitted in the private sector to meet the growing demand. The sudden capacity expansion unfortunately has been coupled with compromise on quality (mainly because of an acute shortage of qualified faculty) and a skewed development of the private sector, concentrating more on low-investment and high (social) demand disciplines (such as electronics, IT, Management, etc.).

Other critical disciplines of engineering remain confined to public funded institutions that also perform major roles of providing access based on equity considerations.

Since 1992 when India began to liberalize and to open its doors to competition and globalization, the need to strengthen the technical/engineering education system in the country has been acutely felt. At the level of policy pronouncements, many bold steps have been announced in pursuit of a major transformation of the system--in capacity, effectiveness, quality, efficiency and outreach. Actual implementation on the ground of these policy initiatives has been slow, as stakeholder commitment to profound reform and institutional capacity to deliver it, especially in the states that have primary responsibility for educational systems, have developed more slowly than the policy framework at the national level.

The National Policy on Education (NPE), adopted in 1986 and modified in 1992, supports major reforms at all levels of education. In technical education, it focuses on quality and relevance, excellence, resource mobilization, greater institutional autonomy with accountability, networking, research, and equity. The policy led to a number of new initiatives by the central government to support the system, which included strengthening and upgradation of over 500 polytechnics through the Bank-assisted Technician Education Projects.

A National Policy Initiative for Technician Education, approved in 1998 by the Ministry of Human Resource Development, includes the following elements: (a) building partnership between institutions and industry; (b) delegating certain decision-making powers and responsibility from state governments to institutions and thereby bringing about a relaxation in the rather severe control and centralization that exists in the current context; (c) awarding a high degree of autonomy to deserving institutions; (d) introducing a high degree of flexibility in institutional program offerings and management; (e) instituting a market-driven approach in curriculum design; (f) utilizing institutional resources for a larger spectrum of academic services beyond formal academic programs; (g) encouraging institutions to engage in income generation and resource mobilization activities; and (h) involving institutions in the development process of the community.

The GOI's Information Technology Policy (2000) supports development of appropriate scientific and technical manpower at various levels to make India a leader in information technology. A number of initiatives are being supported under this policy in the public and private sectors.

The GOI's X Five-year Plan (2002-2007) is to focus on expansion of education facilities in information technology, conversion of Regional Engineering Colleges (RECs) as National Institutes of Technology (NITs) with a standard comparable to world-class institutions, improvement of postgraduate education in engineering and technology, staff development, quality assurance and certification, networking of institutions, granting of autonomy to institutions, and increasing technical education opportunities for weaker sections of society and the physically challenged.

Consensus around the urgent need to implement the fundamental reforms long identified in GOI policy statements has developed broadly in the last two or three years in many states and among all pertinent stakeholders. Paucity of funds has become the binding constraint in implementation of major reforms.

3. Sector issues to be addressed by the project and strategic choices :

The Plan documents of GOI have identified upgradation of the technical/engineering education system as one of the key issues in improving the competitiveness of the Indian economy. Although quality in the entire science and technology sub-sector needs to be improved, GOI is taking up engineering education first because of its immediate impact on improving the quality of technically trained manpower. Also previous investments in technical education have already developed competences to go forward to the next level of development--the search for excellence. The effort would be focused on two middle levels of the system--colleges/university departments of engineering/technology, and polytechnics--where a substantial *drive for quality, relevance and efficiency* continues to remain a primary need. The primary focus would be on systemic reforms leading to a major improvement of quality of education and training provided, relevance of program contents and responsiveness to current and future economic needs, and time and cost efficiency of system management at different levels.

The Program would address more specifically the following sector issues:

- *Governance*: The program will encourage major systemic reforms by limiting program support only to the states willing to provide significant academic, financial, managerial and administrative autonomy to their institutions. Only institutions with well thought-out proposals, and very firm and explicit commitment to establish an entrepreneurial, responsive, participatory and accountable management culture are likely to be selected as lead institutions.
- *Financing*: GOI and State governments propose to change their financing patterns to participating institutions and introduce incentives for revenue generation to make public institutions more efficient and self-reliant. Instead of the current method of 'same-for-all' investment funding for predetermined activities, the *competitive funding* under the program would be based on institutions' performance, and their potentials, needs, vision and action plan.
- *Quality and relevance* : The program will support institutions' drive toward excellence based on their own vision. The institutions would be selected through a transparent process of competition-open to all eligible institutions. This drive for excellence by these selected institutions is expected to influence in significant measure the quality and relevance of program offerings by other institutions as well. The program will also support strengthening of quality assurance and monitoring mechanisms.
- *Teaching-learning processes and faculty shortages* : The program will support innovations in teaching-learning processes, postgraduate and research programs in cutting edge technologies, and short-term training of high quality to attract bright students into the teaching profession.
- *Linkages*: Institutions will be encouraged to form networks to share their resources and experience. All participating institutions will also be expected to work closely with industry and local community. This will help to minimize isolation of institutions and students, especially in remote areas.
- *Internalefficiency*: The program would support effort to reduce wastage of physical and human resources and increase internalefficiency through rationalization of usage of physical resources, multi-skilling of support staff, improved monitoring and management practices, and through developing counselling and academic assistance services for needy students.
- *Obsolescence*: The program will help strengthening and modernizing of libraries, laboratory and workshop equipment, program offerings, staffing, and administrative support in institutions selected under the program to be in line with current practices and technology.
- *System management* : The Program will support training of system managers for planning, implementation and monitoring. It will support policy research, and the introduction of modern management practices for significant improvement of system efficiency.

To achieve a system-wide impact with potential multiplier effect, the Program would use *competitive funding* as a strategic vehicle for reforms (as against direct investment funding for meeting needs projected by pre-identified institutions). This is expected to trigger innovative thinking and greater ownership at the level of institutions. The process is also expected to result in a significant level of stakeholder and beneficiary consultations and ownership. Enhanced level of performance of institutions selected for funding, as well as the proposed strengthening of quality assurance mechanisms, are also expected to have a very significant impact on both public and private institutions including those not funded under the program.

C. Project Description Summary

1. Project components (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

The GOI has planned, in conjunction with several States (Haryana, Himachal Pradesh, Kerala, Maharashtra, Madhya Pradesh, Uttar Pradesh - to begin with) that are willing to introduce certain reforms, along-term program of quality improvement in technical/engineering education. The Program aims at supporting the production of high quality technical professionals through reforms in the technical/engineering education system - for fostering and propagating excellence - in order to raise productivity and competitiveness of the Indian economy.

The development objective of the Program is to be achieved through the following three groups of activities[

- catalyzing reforms in policies and procedures at the central and State level to create an environment in which engineering education institutions can achieve their own goals for excellence and sustain the same
- supporting Institutional Development Subprojects of competitively selected institutions to achieve higher level of academic performance and relevance to the society and the economy, through their individual efforts of quality up-gradation and through bi-directional sharing of each other's special qualities and resources; and
- supporting improvements in efficiency and effectiveness of the technical/engineering education management system through training of technical/engineering education policy planners, managers and administrators, and system research studies.

Competitive funding will be used as the primary strategy to encourage systemic reforms and drive toward excellence. *Only states and institutions willing to undertake reforms in governance and financing will be eligible for financial support under the Program*. Proposals from clusters of institutions (comprising lead institutions and network institutions) - based on their own vision, strategies and action plan for institutional development - would be selected through a national level competition.

Improvement of system management capacity - funded in a non-competitive investment mode - would support system-wide improvements and reforms through the training of engineering/technical education policy planners, managers and administrators; research studies; and the establishment of Program management structures at the central and state levels.

The Program would thus comprise of two components: (a) Institutional development through competitive funding; and (b) System management capacity improvement. For various activities listed in some details

in Annex 2 and the GOI's Program Implementation Plan (PIP), the Program would fund expenditure incurred according to the prescribed guidelines, on:

- Procurement of goods (equipment, books and learning material, furniture, vehicles)
- Works
- Training and workshops
- Consulting services
- Salaries of additional staff
- Operations and maintenance costs.

The distribution of funds would depend upon the proposals received from institutions. It is anticipated that the maximum expenditure would be on procurement of goods (about 45 percent of the total project cost); funds allocation for works to institutions would be limited to 10 percent.

The Program would be implemented as a centrally coordinated, multi-state, long-term program of 10-12 years in 2-3 overlapping phases, each of about 5 years duration. *Initially, Bank assistance would be provided only for the First Phase of about 5 years*. Based on an in-depth assessment at the mid-term, assistance for a Second Phase, partially overlapping with the First Phase could be negotiated. Similarly a Third and Final Phase could commence before the end of the Second Phase. Each successive phase would be built on the experience gained in earlier phases.

Component 1: Institutional Development through Competitive Funding

Under this component, well-performing engineering institutions - both public and private - would be selected through an open competition for assistance to attain higher standards of quality of education and to establish close linkages with industry, community and other institutions. The Program would support the following three activities in each Institutional Development Sub-project:

- a) **Promotion of Academic Excellence** : Though the Program seeks achievement of academic excellence in the entire technical education sub-sector, strategically it will support well-performing and competitively selected institutions (about 20 lead institutions and 60-80 networked institutions, in the *First Phase*) to achieve their self-delineated vision of excellence.

The approach to achievement of excellence would, among others, include granting of very significant autonomy to the institutions by the respective governments (GOI or state government); exercising of autonomy by institutions with accountability and improved internal efficiencies; enhancing faculty and staff competence, including institutional management and administration; recruiting and retaining competent faculty; increasing and utilizing capacity for postgraduate education; establishing teaching and research programs in cutting-edge technology areas; increasing interaction with industry, enhancing sponsored research, consultancy and other revenue generating activities; and instituting academic reforms including program flexibility.

- b) **Networking of Institutions for Quality Enhancement and Resource Sharing** : This would be achieved primarily through formal networks that would be established among lead institutions and 3-4 neighboring academic institutions (network institutions). The network activities would, among others, include sharing of teaching, learning, physical and human resources; faculty and staff competence enhancement; improvement of academic processes; and joint publications, researches and consultancies.

In addition, participating institutions would be encouraged to develop/strengthen linkages with public and private research and development laboratories and organizations, as well as leading national and international academic institutions, and industries.

c) **Enhancing Quality and Reach of Services to Community and Economy** : All lead institutions and network institutions will participate in this sub-component with the involvement of faculty and students. Technical and advisory services provided to the local community and economy (especially in formal sectors) would be demand-based.

Annex 2 summarizes a two-stage process of selection of states and institutions, eligibility criteria and evaluation methodology. In Stage 1, the institutions satisfying the eligibility criteria would be short-listed as potential lead and networked institutions. In Stage 2, detailed proposals submitted by clusters of institutions would be selected on the basis of an annual competition among eligible institutions. This process would be followed in each cycle of selection.

Component 2: System Management Capacity Improvement

This component would support the: (a) development of a modern management style through training of policy planners, managers and administrators from the central and participating State governments, and their bodies concerned with the management of technical/engineering education, (b) management of policy research studies at the State and national levels, (c) management of performance, quality and efficiency audit of institutions by States, and (d) establishment of structures and facilities for Program management at the central and State levels.

Further, the government would improve *from its own resources* the management capacity by establishing an Educational Management Information System (EMIS), strengthening several resource institutions, and supporting the National Board of Accreditation (NBA). The institutions in the Program will offer their full co-operation to the EMIS for collection of data, their validation and for undertaking required research studies.

The All India Council for Technical Education will act as a partner in development through its National Board of Accreditation.

Component	Indicative Costs (US\$M)	% of Total	Bank-financing (US\$M)	% of Bank-financing
1.1. Institutional Development through Competitive Funding: --Promotion of academic excellence --Networking of institutions --Enhancing services to community and economy	304.50	97.0	243.50	97.4
2. System Management Capacity Improvement	9.50	3.0	6.50	2.6
Total Project Costs	314.00	100.0	250.00	100.0
Total Financing Required	314.00	100.0	250.00	100.0

Note: The above cost estimates refer only to the First Phase of the Program.

2. Key policy and institutional reforms supported by the project:

Policy/administrative reforms at GOI and State levels : The Program seeks primarily to support the changing role of the government as the author of framework and monitor of actions within it rather than a direct administrator of institutions. This approach of GOI is now to be encouraged in states using the program support for leverage. In this direction, the GOI and state governments would:

- a. Accord and sustain very significant academic autonomy and full financial, administrative and managerial autonomy to lead institutions; and grants substantial academic autonomy and full financial, administrative and managerial autonomy to the networked institutions.
- b. Release funds to the participating publicly funded and aided institutions on a block-grant basis, and encourage the establishment of specific funds (corpus, staff development, depreciation and maintenance) from savings, generated revenue, donations, and endowments, etc., in all Program institutions.
- c. Encourage participating institutions to increase recovery of cost of education and services.
- d. Ensure comparable opportunities for both public and private institutions to provide high quality teaching and learning.
- e. Encourage networking of institutions and mobility of students and faculty.
- f. Facilitate closer linkages between institutions and community and economy.

Institutional reforms : During program implementation, the participating institutions would be expected to accomplish most of the following in their own specific situation, as indicated in their Institutional Development Sub-projects selected for Program support:

- a. Establish a governance and management system with participation of community, industry, staff and students and a decentralized administrative system for creating the ambience required for achievement of high standards in education, training, research and development, diffusion of knowledge and expertise and, service to local community and economy.
- b. Allocate and spend adequate amounts on developmental activities, staff development, modernization of teaching and training facilities, and upkeep of equipment and physical infrastructure through designated funds established/ to be established for each of these activities; also establish a system for increasing efficiency of resources utilization.
- c. Introduce structural and academic flexibility into programs offered to make them responsive to market demands and to offer services as needed by the community and economy.
- d. Provide incentives to faculty for participation in continuing education programs, consulting services, service to community and economy, and for securing sponsored research & development projects; also establish a faculty development system to attract and retain good quality teachers.
- e. Introduce reforms in student performance evaluation.
- f. Establish a system for teacher performance appraisal by students, and teacher counseling.
- g. Establish a system for periodic maintenance of equipment and physical infrastructure.
- h. Maintain a record of graduates and conduct regular tracer studies.
- i. Establish a mechanism for linkages with other institutions, R&D establishments, industry and community.
- j. Establish mechanisms for quality and efficiency audit of institutional activities including academic processes and administrative procedures.

3. Benefits and target population:

During the first Phase of the Program, it is proposed to develop about 20 well-performing engineering institutions as lead centers of excellence and support about 60-80 networked institutions. Thus about 8-10 percent of existing (over 1000) degree level engineering institutions are expected to be supported. In addition, about 15-20 (of over 1200) selected polytechnics are proposed to be supported for achieving academic excellence and to offer practice-focussed degree level programs - these polytechnics would also form a part of networked institutions. The major benefits emerging from the subsector development areas follows:

Benefits at the sectoral level :

- selected institutions reaching higher level of performance and producing high quality professionals
- improved participation of private sector in providing technical education of high quality and service standards, thereby reducing the need for large additional public outlays
- cost savings resulting from improvements in internal efficiency, better utilization of capacity through enrollment management and networking, enhanced institutional capacity, improved system planning and management
- enhancement of revenues (other than through public budgets) through cost recovery, consultancy and sponsored research projects
- enhanced contribution to technological growth and knowledge
- improvement in the earning capacity of artisans and unemployed youth of the community through enhancement of their technical skills.

Benefits for the economy :

- improvement in productivity through the provision of high quality engineering manpower
- higher growth in industries using new technologies through the provision of trained personnel in these disciplines
- greater innovation by firms through enhanced industry/community-institute interaction, financing of research projects by industry, industry-based training of students and staff
- availability of inter-institutional teams of experts in critical areas of technologies
- foreign investment likely to be encouraged due to the availability of a pool of highly skilled engineers who are globally competitive (provided that other factors conducive to foreign investments are also created)

Benefits at the individual level/target population :

- higher earnings of graduates and reduced duration of unemployment due to closer alignment of institutions with labor market demand
- superior skills and training of about 25,000 students graduating every year from participating institutions
- knowledge enhancement of over 10,000 persons per year benefiting from continuing education and training programs
- professional development of about 2,000 teachers and education managers and administrators every year
- technical help to about 30,000 persons per year exposed to community outreach programs of the participating institutions
- over 100,000 students (i.e. some 10% of students enrolled for engineering degree in India)

affected by general systemic reforms in the participating states.

4. Institutional and implementation arrangements:

Program Management/Implementation

GOI is planning to implement the Program along with 6-8 major states in the first phase. It will be a central-cum-multi-state program with coordination and guidance provided by the Department of Secondary Education and Higher Education (DSEHE) in the Ministry of Human Resource Development of the Government of India. It will include a major central component to support GOI-funded institutions, competitively selected under the Program. The overall responsibility for coordination, implementation and monitoring of the Program at the central level and through the states would be vested in the National Project Director, who will be a senior official of the rank of a Joint Secretary in the DSEHE. The NPD will be assisted by a National Project Implementation Unit (NPIU) established as an autonomous unit. The NPIU will provide information and best practice examples, guidance and support to governments and institutions on all aspects of Program implementation including the selection process, procurement and financial issues; facilitate fellowship programs, and periodically monitor progress of program implementation at the central and state levels. The NPIU will provide support to the National Screening Committee in eligibility determination of institutions, to the Evaluation Committee in evaluation of composite proposals, and to the National Selection Committee in the selection of composite proposals from institutions.

At the state level, the state secretaries of education assisted by the stated directors of technical/higher education will be responsible for facilitating Program implementation. A State Project Facilitation Unit (SPFU) in each of the participating states will provide support in the state-level screening process, and be the link between individual institutions and the state government for all policy and financial matters. The SPFU will also provide guidance and support to the individual institutions in project implementation, and will be responsible for overall coordination and monitoring of Program implementation at the state level. At the institutional level, project implementation will be the responsibility of the respective Head of the institution through an Institutional Project Management Unit (IPMU). The IPMU would assist the head of the institution in fulfilling all project-related obligations (physical, qualitative, financial, legal, etc.) and providing necessary periodic progress reports to the institution management, SPFU, NPIU, and the NPD. The IPMUs would also facilitate the necessary reviews and audits as required.

Program Monitoring

The primary responsibility for monitoring the individual institutional projects will lie with the SPFUs and the NPIU, and on a broader level with the Government of India and the Bank. Self-monitoring by the individual institutions would also be required. The basis for monitoring will be the action plans prepared by each institution, and a set of key performance indicators.

The methods of monitoring would include periodic progress assessment of institutional projects by their respective BOGs and SPFUs based on institutional progress reports, and by the SPFUs and NPIU through visits to institutions and reports from externally conducted quality, efficiency, reforms and performance audits. In addition, there would be biannual joint reviews by the GOI and the Bank, which will generally cover targets and performance indicators for individual projects with special focus on implementation of policy and institutional reforms, functioning of improved procedures and processes and achievement in quality components. These reviews would include visits to select institutions, and

interaction with students, teachers, employers and community representatives. The GOI and the Bank will also jointly assess the overall achievement of program objectives at the end of each Program phase.

In addition to the above, the NPIU will facilitate research studies on various Program aspects and share the findings with the GOI and the Bank.

Funds Flow

For the centrally supported institutions and the NPIU, funds will be budgeted under identifiable budget line items in the Ministry of Human Resource Development (MHRD), Government of India (GOI), and for state-supported institutions and SPFUs, in the budgets of the respective participating state governments. In the case of the Center, on approval of the budget by the Parliament, MHRD will release annual funds requirements in three to four installments through cheques/drafts to the institutions that fall under Central funding. These institutions will maintain separate bank accounts for Program funds. MHRD will also release funds to NPIU in 3-4 installments.

For the state-funded and aided institutions and SPFUs, on approval of the budget by the legislature, the State Governments will allocate and release the Program funds in 3-4 installment each year as grants through cheques/drafts. Each SPFU and funded and aided institution will maintain a separate bank account for the Program funds. Funds to private institutions will be lent by the respective State Governments in three to four installments each year.

Procurement

Please see Section E4.3.

D. Project Rationale

1. Project alternatives considered and reasons for rejection:

The main objective of the Program is to support reforms to foster and propagate quality, relevance and efficiency in the engineering education system. The Program approach is to be selective, by focusing on the high quality institutions that have the potential to develop centers of excellence, while enabling the benefits to spread through the system by networking of institutions. Further, systemic benefits would be obtained by building management capacity at the national and state levels and introducing reforms in the governance of the engineering education system.

At the identification stage, the GOI, states and the Bank discussed various approaches, including the following:

(a) *Investment project for pre-identified institutions* : This alternative was ruled out because the implementation mechanism for such a project would not encourage the cultural changes within institutions and in the governance of the system that would be necessary for systemic transformation. The intent is to establish a new regime of incentives for the technical/engineering education subsector and to invite institution level responses to those new incentives. The current Program approach shifts the locus of decision-making and drive for excellence to the institutions themselves while enabling the institutions to respond to changes in the economy and society through the provision of appropriate financial, material and human resources and the creation of an enabling policy environment.

(b) *Expanding the capacity of the Indian Institutes of Technology (IITs) or creating new IITs* : There are

only seven IITs at present, each with a moderate enrollment capacity. Expanding these institutions substantially would affect the supply of faculty to other institutions and potentially lower their quality in the short run. Five of these institutions were established with significant bilateral technical assistance during 1950-70. These are of international standards, working with full autonomy and close national and international linkages. Further investments in these institutions would not contribute to systemic reforms needed in engineering education system in India. On the other hand, the gap in levels between IITs and others would widen further. The creation of new IITs would require significantly higher resources with each new IIT costing over US\$200 million in capital costs.

(c) *Focus on only a few "focus states" in contrast to the national approach adopted in this Program* : Investments in engineering education in the Bank's focus states could complement other sectoral investments and measure to improve the environment for private investment and growth. While enrollment capacity is heavily concentrated in a few states (not all of them the Bank's focus states), high quality public institutions (both Central and state) are dispersed across the states. Further, due to the relatively high mobility of engineering graduates and postgraduates (polytechnic graduates have less mobility), the benefits of the investments in the focus states would not necessarily be captured by students or industry in these states. The national approach would *enable all states willing to reform their technical education systems* and high quality institutions from across the country to voluntarily participate in improving their quality and efficiency and those of networked partners. The creation of a facilitating environment would need changes in regulations and procedures by both Central and state governments and this is more likely to happen if the approach is national rather than state-specific.

(d) *Direct central assistance versus state-level projects* : The main limitation of a centrally funded approach covering all institutions, including state level institutions, is that it does not encourage ownership and active participation by state governments who are important partners in the development of the sub-sector. In order to create an enabling environment across the country for centers of excellence to emerge, state governments would need to take decisions regarding the grant of autonomy to institutions and regarding the participation of private unaided institutions, including the modalities for repayment of loans advanced by the state government under the Program. The GOI therefore propose to cover central institutions from the central budget and the rest under their respective states support.

(e) *Industrial participation as an option* : A majority of self-financing institutions in the private sector are largely catering to the needs of low investment, high returns popular fields such as IT, electronics, and management. Not many investors are willing to take up other critical areas requiring significant capital investments. Some institutions established by industrial houses have also gradually become dependent on public support. The private sector would not be able to raise resources to the extent of US\$500 million estimated for creating centers of excellence in emerging technologies. However, greater participation of industry is desirable and its participation in management of institutions is sought.

(f) *Training abroad in high-tech areas* : This option was rejected as it would help develop individuals to meet short-term needs but would not contribute to building local capacity and improving the performance and efficiency of the system as a whole. Further, a large number of trained students may be lost to the economy through out-migration.

(g) *Providing student loan/scholarships/vouchers* : With the limited seats available under the present very complex process of admissions with reservations/quotas for several categories of applicants, heavy demand from students, and willingness of many to pay high fees to get admission in good institutions, this option is unlikely to encourage the range of reforms envisaged in institutions. In addition, such a scheme would need to be coupled with reduced direct public funding of institutions and correspondingly

increased fee. This would reduce access to disadvantaged group of students. As seen in other developing countries, governance and sustainability of such a scheme would pose its own challenges.

2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned).

Sector/Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-financed To assist in upgrading the training of medium and high level technical and professional manpower needed for the rapid and efficient growth of the electronic industry. To improve the quality and efficiency of craftsman and apprenticeship training; and to improve and diversify advanced training programs. To support national policy initiatives to modernize and expand technician education and improve its quality and efficiency (in nine states). To support national policy initiatives to modernize and expand technician education and improve its quality and efficiency (in eight states and two union territories). To assist the industrially and economically underdeveloped and geographically remote states to expand capacity and improve the quality and efficiency of technician (polytechnic) education to meet the specific economic needs of each state.	Electronics Industry Development-HRD Component (Ln.3093-IN) (closed FY96) (Co-financed by the Swiss Agency for Development and Cooperation)	S	S
	Vocational Education Project (Cr.2008-IN)(closed FY99)	S	S
	Technician Education Project (Cr.2130-IN)(closed FY99)	HS	HS
	Second Technician Education Project (Cr.2223-IN)(closed FY00)	HS	HS
	Third Technician Education Project (Cr.3413-IN) (approved in FY00)	S	S
Other development agencies Strengthening of Regional Engineering Colleges in selected disciplines. Strengthening of industry-institute interaction and continuing education programs in selected polytechnics. Skills development programs in advanced technologies.	UK-British Council-REC Project (closed FY99) Canada-India Project (on-going) GTZ-Madhya Pradesh Govt. CRISPP Project (on-going)		

TheWorldBankassistedtheGovernmentofIndiaandstategovernmentsduring1990-1999through TechnicianEducationI&IIprojects(Cr.2130-INandCr.2223-IN)forupgradationandstrengtheningof over530polytechnicsin19StatesandUnionTerritorieswithIDAcredits totalingaboutUS\$500 million.Theprojects,whichclosedinSeptember1998andOctober1999respectively,generated the following remarkableachievements:

- Increaseinwomenenrollmentintechicianeducationfrom11%toabout30%;
- Introductionofover200newandemergingtechnologyprograms;
- Creationofmajorfacilitiesfortechicaltrainingofthephysicallychallenged;
- Modernizationofsome6000workshops,laboratories,andlibraries;
- Trainingofover15000teachers(includingindustrialexposure);and
- Significantimprovementsininternalandexternalefficiencyofpolytechnics.

Thetwoprojectsalsopilotedthemodestbeginningsoftheneededsystemicreformswithpromising resultsthroughintroductionof:(a)program(curricular)flexibility;(b)someelementsofinstitutional autonomy;(c)greaterselfreliance throughresource mobilizationincluding costrecoveryfrom beneficiaries;(d)effectivelinkageswithindustry;and(e)continuingeducationprograms inselected polytechnics.

TheOperationsEvaluationDepartment(OED)oftheBankhasrecently(FY00) conductedanauditof BanksupportinthetechnicaleducationandvocationaltrainingsubsectorinIndia.Itfoundthe implementationofTechnicianEducationI&IIProjectstobe **highlysatisfactory** andtheIndian experience,insomeways, **bestpractice** .Italsoidentifiedcertainareasofweaknessand supported furtherBankassistanceinthesubsector.

OtherdonorshavealsosupportedthedevelopmentofengineeringeducationinIndia.Thefirstfive IndianInstitutesofTechnologywereeachestablishedduring1950-65withtechnicalassistancefroma singlebilateral donor(US,USSR,Germany,UK),involvingtwiningarrangementswithforeign institutions.TheSwissAgencyforDevelopmentCooperation(SDC)joinedwithIBRDtosupport14 engineeringcollegesand12polytechnicsduring1990-96throughtheManpowerComponentofthe ElectronicsIndustryDevelopmentProject(Ln.3093-IN;IBRDloanofUS\$8millionandSDCgrantof CHF25million)Further,programs inenergyscience,materials,informationtechnology,anddesignat eightRegionalEngineeringCollegesreceivedGBP6.2millionfromtheUKovertheperiod1994to 1999.In1992-94,a150-year-oldengineeringcollegeatPunereceivedagrantofYen720million(US\$7 million)fromJapanformodernization.GermanyandCanadahavealsoprovidedassistance toafew polytechnicsinIndia.Someinstitutionshavereceivedsupportforjointresearchunderbilateral programsnotablywiththeUSandFrance.

3. Lessonslearnedandreflectedin theprojectdesign:

TheBankhasbuiltupsubstantial experiences supporting tertiary education reforms in Argentina, Chile, Indonesia, Jordan, Romania and Vietnam through performance-based funding, accreditation and management information systems as key elements to trigger quality and efficiency in their respective system. Brazil introduced competitive funding and science and technology research to increase and improve the stock of high-level human capital. Higher education reforms in China include renewal and restructuring of science and engineering disciplines and the funding of innovative forms of cooperation, which include partnerships and networks of institutions. The proposed Program adapts the concept of competitive funding open to all institutions and networking as key to promoting system-wide reforms.

The Program design has benefited from major recommendations in some recent, relevant publications/policy notes of the Bank. These include: *Higher Education in Developing Countries* : Perils and Promise (2000), World Development Report-- *Knowledge for Development* (1999), Bank-ILO study on *Vocational Educational and Training Reforms: Matching Skills to Markets and Budgets*, Bank Reports- *Constructing Knowledge Societies* : New Challenge for Tertiary Education (2002), and *Science and Technology in Development* (2002)-(under finalization). The following lessons of experience have been incorporated in the design of the Program:

- *Borrower ownership* : Sustained commitment and participation of major stakeholders are crucial to successful implementation.
- *Political economy* : This warrants close attention by the Bank when determining the kind of changes that are feasible in a country, and the role stakeholders and beneficiaries should play in the process.
- *System-wide approaches* : The degree of comprehensiveness of the Bank's support strategy is an important predictor of outcome. Policy measures and investments which are not integrated into a broad reform program on a global vision and strategy for change are less likely to bear fruits.
- *Reliance on incentives* : The extent to which projects rely on positive incentives rather than mandatory edicts to stimulate change has a great influence on their outcomes, as institutions tend to respond more readily to constructive stimuli. Well-designed competitive funds greatly stimulate the performance of tertiary education institutions and can be powerful vehicles for transformation and innovations.
- *Monitoring and evaluation* : Governments should pay special attention to monitoring and evaluation, which is often neglected in their preoccupation with financing and the provision of training.

The Bank has built a close partnership with the Government of India and several state governments in the development of technical education over the past 12 years. The Program builds on the experience gained and confidence developed through these projects in introducing systemic reforms, although on a small scale, in the Indian context. Some of the recommendations of the Operations Evaluation Department (OED) Performance Audit Report on *Investment in Technical Education and Vocational Training in India*, and the major reform strategies suggested in the Bank's Sector study on *Scientific and Technical Manpower Development in India*, are also taken note of in the program design.

The experience in India indicates that an early consensus on program scope and components through micro-planning at institutional level would help in Program progress. The design of the Program is based on detailed consultations with and inputs from state secretaries and directors of technical education, principals and faculty and students of Regional Engineering Colleges and other engineering colleges and polytechnics, the Technical Teachers' Training Institutes (TTTIs) and National Technical Manpower Information System (NTMIS) in the Institute for Applied Manpower & Research, the All India Council for Technical Education, the National Board of Accreditation, the Planning Commission, and industry and community representatives.

Key to the success of the two Technician Education Projects was full ownership by the states together with the policy support and critical technical assistance from the Center, which is ensured in the design of the present Program. The Program has the necessary support of state governments. Effective central coordination, recognition of good performance of states through allocation of additional funds, monitoring and evaluation studies, sharing the problems and possible solutions through workshops, promoting healthy competition and cooperation between states, and facilitating responsive management

had helped the earlier projects. Similar strategies are incorporated in the Program design.

4. Indications of borrower commitment and ownership:

After the adoption of the National Policy on Education (NPE) in 1986, the GOI has taken a number of initiatives aimed at reforming the technical education system. These include establishment of the statutory All India Council for Technical Education in 1987, the National Board of Accreditation in 1996, the Five-Year Plans support for schemes on 'centers of excellence', 'autonomous institutions', staff development, thrust areas of technical education, etc., and support for a very large-scale expansion of technical education in the private sector. The financing pattern of many top ranking institutions (IITs, IISc, IIMs, etc.) is changed from deficit-financing to a 'Block-grant' pattern with incentive to generate additional revenue. Ten Regional Engineering Colleges have been up-graded as National Institutes of Technology, with "deemed-to-be university" status.

As further evidence of GOI's commitment to a systemic transformation of technical education in India, action is initiated on the basis of the work of several high level expert committees whose critical examinations of key sector issues and recommendations for profound policy reforms have become available during the last three years. These include:

- Mashelkar Committee Report on Regional Engineering Colleges (1998)
- Rama Rao Committee Report on Post Graduate Education in Engineering and Technology (1999), AICTE
- Indiresan Committee Report on Technical Teachers' Training Institutes (November 2000), MHRD
- Draft Policy Guidelines for Training Teachers of Polytechnics and Engineering Colleges (May 2000), MHRD
- IT Manpower Advisory Committee (2000), MHRD
- Raju Committee Report on Networking of Engineering Institutions (2001)
- Swaminadhan Committee Report on Mobilization of Additional Resources for Technical Education, AICTE
- India as Knowledge Superpower: Strategy for Transformation (June 2001), Planning Commission
- Tenth Five Year Plan (2002-2007) - Working Group Paper on Technical Education (October 2001).

In addition, several other important initiatives planned or already underway include:

- The Prime Minister's decision to launch Phase II of the Technology Development Missions program of the GOI (January 2001), including a mission on management of technical education
- GOI's decision to introduce a uniform national level examination as the basis for admission to engineering colleges
- GOI's intention to expand the mission of the four Technical Teachers' Training Institutes to encompass the staff development needs of the engineering colleges as well as the polytechnics, and to upgrade and resource them accordingly
- GOI's action to change the regulatory framework to encourage the emergence of strong higher education institutions in the private sector, including universities/'deemed to be universities'
- GOI's new science budget to double funding for academic infrastructure.
- Offer of full support from industry leaders for quality improvement in engineering education.

Several States have opened the system to the private sector for investment in human development.

Public institutions are also being permitted to generate additional resources and utilize them for institutional development. Some states have given autonomy to the institutions or placed engineering colleges (both public and private) under state universities for engineering and technology for better management and quality assurance. Many states have indicated their willingness to implement systemic reforms suggested by the GOI and by the Bank's sector study.

The ground has been prepared for far-reaching reforms of the technical education sector. Assuming that the governments at Union and State levels now follow-up by implementing the expert recommendations, including through allocation of the necessary resources, very significant elements of the desired systemic transformation of engineering education will in fact be underway.

5. Value added of Bank support in this project:

In the last ten years, the Bank has funded four successful projects in the technical/engineering education subsector in India, making it the most important partner in modernization and upgradation of technical education - as a complement to the Bank's major involvement in Primary Education Program in India. The discipline attending to design, implementation and monitoring of projects assisted by the World Bank is highly valued by both the central and state governments. The Bank brings valuable international knowledge and expertise in systemic reforms in the areas of tertiary education. The Bank's support would accelerate system-wide reforms proposed in the Program, which may otherwise take much longer due to resource limitations. In addition, the Bank's participation at all phases, as professional colleagues, would help encourage Indian counterparts, who often tend to remain closed in, to look at relevant international experience. The proposed Program will also provide the opportunity for continuation of the Bank's international efforts in tertiary education.

E. Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

1. Economic (see Annex 4):

Cost benefit NPV=US\$ million; ERR= % (see Annex 4)

Cost effectiveness

Other (specify)

The economic analysis examines the following issues: (i) the market for engineering skills; (ii) the rationale for public investment; and (iii) the costs and benefits of the Program.

The Market for Engineering Skills

The formal engineering education system currently embraces 1,059 degree level institutions with an approved annual intake of 294,075 at the undergraduate level. The public sector (comprising about 180 Central and state government institutions) provides only 17 percent of total enrollment at the undergraduate level; most of the expansion in capacity in the nineties has occurred in the private sector. The supply of undergraduate engineering education is segmented by quality with the high quality institutes being mainly in the public sector.

Student demand for undergraduate engineering education is also differentiated by quality. Students prefer high quality education and, in the absence of restrictions on fees, they would be willing to pay more for higher quality than for lower quality. Due to regulations on fees, developed on the basis of Supreme Court guidelines which are applicable to the entire country, the limited high quality seats in publicly funded colleges are offered at the lowest fees (although fee levels vary by state). Hence, there is considerable excess demand for the highest quality of engineering education and this is cleared by a screening mechanism consisting of entrance examinations and a laborate system of quotas.

The supply-side constraints on the expansion of high quality undergraduate engineering education arise due to the following factors: (i) budgetary factors, limiting the overall growth of public expenditure on technical education, and growth in real salaries in the public sector resulting in relatively small amounts being spent on quality improvement; (ii) limited contribution by the private sector to high quality engineering education, despite its substantial contribution to overall capacity expansion. Lack of access to capital markets and high interest rates on borrowed funds prevent mobilization of capital on the required scale by the private sector. Credit market failures also prevent individuals from accessing loan funds to finance engineering education. Regulations on fees (fixed by each state government for all colleges in a state in line with Supreme Court guidelines) and the level of unit costs (determined by AICTE guidelines on staff-student ratios, salary levels of staff) lead to revenue gaps and attempts by private colleges to save on expenditure on quality improvement (faculty training or depreciation); and (iii) inflexibility of institutes to adapt courses and curricula to the rapidly changing needs of the economy and the labor market.

Postgraduate engineering education is provided only in the IITs, the RECs, some state government and University colleges and a few private colleges. There are 21,460 seats available in 242 institutions, but it is estimated that about half of this capacity remains underutilized as (a) demand is influenced by the relatively anticipated financial return to teaching and research (which employs postgraduates) and high opportunity costs and (b) relatively small number of applicants pass through a national level Graduate Aptitude Test for Engineering (GATE).

Demand for Technological/Engineering Skills and Demand-Supply Mismatches

Since liberalization in the early 1990s, the private sector demand for engineers and technicians has been growing strongly. Data show that employment of engineers and technicians in the private sector grew at 5.5% annually during the period from 1991 to 1995, and this pace has been maintained since then. Unfortunately there has been limited rigorous analysis examining the demand for technical and engineering skills in India. However, the limited data do suggest demand-supply mismatches in particular disciplines. Discussions with employers indicate that lack of appropriate technical skills is a bottleneck when firms consider expansion of output or technological upgradation. It is also felt that graduates of engineering institutions lack practical knowledge and have to undergo significant on-the-job training.

Rationale for Public Investment and Justification for Program Components

There are four reasons for public intervention in engineering education and all four are relevant in the Indian context: (i) market failure: this is reflected in the supply-side constraints discussed earlier, which prevents the private sector from expanding the supply of high quality engineering education; (ii) contribution to growth: engineering education contributes to innovations in productive technologies, augments productivity and increases the range and variety of products. In particular, externalities associated with the emerging technologies, postgraduate education and research and development suggest a rationale for public investment in these areas; (iii) equity: very few poor students enroll in engineering education and due to the prevailing fee/quota system, most of the subsidies for engineering education are not currently directed toward the poorer students; (iv) information asymmetry: the government has a crucial role to play in the collection, analysis and dissemination of information on skill needs in the economy and the type and quality of education provided in different institutions. Both these types of information are currently not available on a large scale in India. In addition, there is excessive regulation of both the government and private colleges that make it difficult for them to be responsive to the changing labor market needs.

The Program has two components: (i) competitive grants program under which direct support would be provided to selected public and private institutions, and (ii) system management capacity improvement. The first component addresses supply-side constraints by improving the quality of public and private institutions (excluding the top level institutions like the Indian Institutes of Technology), through investments in lead institutions and networked partners, thereby increasing the overall supply of high quality places in engineering education. Program expenditures will be mainly devoted to activities to improve quality, student learning and research activities (including improvements in instructional techniques and instructional resources; modernized curricula and evaluation methods). The competitive grant mechanism also aims to direct public expenditure towards those areas with significant externalities. The selection criteria favor those institutions that encourage postgraduate education and/or introduce new courses in emerging technologies. Granting of academic, financial and administrative autonomy to institutions is a condition of eligibility for states to participate in the Program and this is expected to improve market orientation and flexibility, as well as increase private financing (for services provided by the participating institutions) which will enable institutions to sustain quality improvements after the end of the Program. The introduction of the block grants scheme in publicly funded institutions is expected to improve the efficiency of resource allocation within institutions.

The second component will contribute to system efficiencies by building the capacity of managers, research studies, reducing information asymmetries, and improving quality assurance mechanisms.

The Program does not address issues relating to efficiency and equity arising from the current fee/quota structure, which are governed by national case law and not amenable to change at this juncture, or from the current pattern of providing subsidies to institutions. However, it is anticipated that many of these issues will be analyzed further as part of the research studies envisaged under the Program and policies to improve equity and efficiency.

Cost-Benefit Analysis of the Competitive Grant Component

The economic benefits from the Program can be classified into three categories. First, the efficiency of public spending is expected to improve as the financing of publicly funded institutions shifts from a system of gap-filling grants to block grants. Second, due to changes in the financing mechanism which would encourage institutions to generate additional revenue, private financing is expected to increase. Third, labor market outcomes improve with increases in earnings, employment rates and speed of employment.

Gains from the improvement in efficiency of public use are difficult to quantify. The main incentives arise from the shift to the block grants scheme for publicly-funded institutions which is expected to encourage institutions to economize on expenditures, re-allocate resources to quality improvement activities and mobilize additional resources from the private sector. The draft block grants scheme proposed by the Government of India could be refined further to enhance the efficient use of public resources.

Additional resource mobilization from private sources as a result of the shift to the block grants system is a quantifiable benefit from the Program. Pre-project studies indicate that even RECs generate less than 5 percent of their annual recurrent expenditure from non-fee revenues. An estimate of the revenue potential from continuing education programs and consultancy services suggest that up to 15 percent of recurrent expenditures of each selected institution could be financed from these sources.

An internal rate of return has been calculated using the costs of the Program and benefits arising from

improvements in internal efficiency (proxied by higher pass-out rates) and in external efficiency (proxied by the higher probability of employment and higher earnings for three groups of students—postgraduate, degree and diploma level). Benefits arising from increased resource generation and non-quantifiable external benefits—which could potentially be significant—are excluded from the calculation. Using assumptions of moderate increases in these parameters over existing estimated values, the IRR is expected to be 14 percent. However, if the Program significantly underperforms—little increase in pass rates, employment probabilities and earnings, the IRR is 3 percent; if performance exceeds the assumed values, the IRR could be as high as 23 percent.

Rates of return have also been computed assuming that the total number of beneficiaries are only a fraction of the potential beneficiaries of the Program. If only half the potential beneficiaries benefit from the Program, the IRR will be 3 percent. If only half the students in network institutions benefit from the Program, the rate of return is 8 percent. These simulations highlight the risks associated with the Program, particularly the networking and academic excellence sub-components. If these two sub-components do not lead to institution-wide benefits for all students (and not just for the specific programs or departments that are funded), there will be a significant decline in the IRR. This, in turn, highlights the importance of institution-level governance and academic reforms for the success of the Program. The results also show that the rates of return are sensitive to changes in assumptions on number of beneficiaries, graduation rates, employment probability and wages. It will be necessary to monitor these variables during the life of the Program, and to regularly conduct impact evaluations to evaluate the labor market benefits for project participants in comparison to non-participants. It will also be important to try and start getting some measures of the currently non-quantifiable benefits of the Program, which are likely to be significant.

2. Financial (see Annex 4 and Annex 5):

NPV = US\$ million; FRR = % (see Annex 4)

Total project (Program-Phase I) costs are estimated at US\$ 314.0 million. The foreign exchange component is estimated to be about US\$ 39.6 million and local costs including taxes at US\$ 274.4 million. The Bank credit of US\$ 250.00 million will finance 79.6 percent of the total cost and the Government of India will provide the remaining US\$ 64.0 million. Of the total cost, 7.5 percent will be spent in the first year, 24.2 percent in the second year, 29.9 percent in the third year, 27.6 percent in the fourth year, and 10.8 percent in the final year.

Fiscal Impact:

3. Technical:

The technical content of the Program has been extensively reviewed with the Borrower. Consultations have taken place with many policy planners both at the Center and several states, with institutions, faculty, students, and employers. The Bank has taken an active part in these consultations along with officials of the Government of India. Based on these interactions and discussions at several workshops organized by the Government, detailed criteria for participation in the program by states and by institutions, and criteria for selection of proposals for funding have evolved. The appropriateness of the eligibility criteria for lead and network institutions were field-tested through several dummy runs with a few sample institutions. Although the finalized criteria is now ready for circulation, some fine-tuning may have to be done before the launch of the Program to ensure wide participation of institutions.

The Government of India has prepared a large number of documents highlighting the concept and philosophy of the Program, detailing plans and procedures for participation, identifying educational

reforms which are a prerequisite for fostering excellence and making them mandatory for all participating states, developing an Educational Management Information System, and evolving an appropriate Program management, monitoring and evaluation system. Some of the issues, which have been given special attention, are:

- a. *Importance of Policy Reforms:* Only states that are willing and able to introduce desired policy reforms within a limited time frame would be permitted to take part in the Program. The states that have already initiated advance action on the reforms would be included in the first phase of the Program. Also participating institutions will have to accept and implement these reforms along with safeguards to insure against misuse or lack of accountability.
- b. *Transparency in Selection Process:* To ensure confidence in the selection process in a competitive environment, it is essential that the selection process be not only fair but also transparent. It is appreciated that while eligibility of states and institutions for participation would not create any problem for evaluation, the selection of lead and network institutions and evaluation of proposals submitted by them for funding would require a high level of integrity, professional maturity and experience in promoting excellence in an educational environment. The problem is complicated by the fact that proposals for individual institutions would be multi-dimensional, with differing visions of excellence, varying objectives, differing time frames for implementation and differing demands for physical and financial resources. Criteria for eligibility for participation would be widely circulated before inviting proposals and a self-evaluation proforma for institutional eligibility has been included in the Working Document for States and Institutions prepared by the NPIU. Detailed guidelines for evaluation of the composite proposals submitted by eligible lead institutions together with their network partners is under preparation and would be validated before use.
- c. *Building Capacity for Strategic Planning:* Participating Institutions are required to develop their own vision, mission, and objectives, their implementation strategies and their plans of action to meet their self-determined level of excellence. Many of the participating institutions may never have done any strategic planning in the past and would need training on best practices and hand holding in the beginning. Provision has been made in the Program to give such training and assistance before institutions prepare their proposal for funding. Over the period of the Program, sufficient competence would be built in the participating institutions for strategic planning which would then permeate to the rest of the technical education system.
- d. *Involvement of AICTE and NBA:* The All India Council of Technical Education (AICTE) is the statutory body responsible for planning of Technical Education in the country and for setting up standards of education through the National Board of Accreditation (NBA). Assistance of AICTE and NBA would be required for accrediting courses of participating institutions, empowering institutions in several ways, starting new courses in frontier areas of technology, for permitting innovative experiments in delivery systems, and for monitoring performance and maintenance of excellence. Discussions with the respective chairpersons of AICTE and NBA have resulted in strong support for the Program and an assurance that accreditation of courses in participating institutions and permission to start new programs and to bring innovations in the delivery system would be put on a fast track.
- e. *Involvement of Industry:* Discussions have taken place between leaders of Indian Industry and the Government on the scope and desirability of the Program. The Bank has taken part in these discussions. Industry leaders have expressed the urgent need for upgrading the competence of Indian engineers and technicians to international level of performance in view of the competition Indian Industry is facing from multinational firms and from cheap imports from many foreign countries. Their support for the Program was unequivocal and they have assured full support in its implementation.
- f. *Identification of Critical Parameters for Success and their Monitoring:* The Program design includes identification of critical parameters for success by each institution submitting a proposal

for funding their vision of excellence, and detailing a methodology for their monitoring and for initiating auto-correction actions if things go wrong. Additionally, performance monitoring and correction would be done at the SPFU and NPIU level on parameters identified holistically for the success of the Program.

4. Institutional:

4.1 Executing agencies:

At the national level, the overall coordination and guidance for the Program will be provided by the Department of Secondary and Higher Education in the Ministry of Human Resource Development (MHRD) of the Government of India. The National Project Director (NPD), appointed by MHRD in the rank of a Joint Secretary to the GOI, will be responsible for Program implementation at the national level. The NPD will be assisted by a new National Project Implementation Unit (NPIU) to be established.

At the state level, the government department dealing with technical/engineering education will be responsible for Program implementation. The concerned department will be assisted by a State Project Facilitation Unit (SPFU). SPFUs will work closely with the NPIU.

Both MHRD and the States have larger residual experience of implementing externally funded projects including World Bank-funded projects.

4.2 Project management:

Only a skeleton staff of the existing NPIU has been involved in Program preparation and similar skeleton staff groups have prepared the State reports. Although many members of these groups have had experience of previous World Bank-funded Technician Education Projects, they still needed a lot of guidance in their present assignment. It would be highly desirable if most of those involved in the initial preparation are retained in the new implementation agencies. If the SPFUs and the new NPIU to be established are staffed with totally new personnel, they would need considerable training in not only performing their functions but also for becoming adequately equipped to guide and support institutions in their project implementation. Experience has shown that even some of the resource institutions took time to understand the objectives of the Program, which led to considerable delay in providing guidance and support to NPIU and States in Program preparation.

Given the above situation, GOI would soon need to identify institutions that could provide training to staff of the new NPIU and the SPFUs to enable them to efficiently and effectively discharge their functions and to help and guide participating institutions. The training institutions may themselves need assistance and guidance in formulating appropriate training programs.

4.3 Procurement issues:

The Bank is currently carrying out a comprehensive country procurement assessment review. The first phase on prevailing procurement practices is completed and includes recommendations on public procurement law; simpler procedures for e-briefing; publishing contract awards; an annual opinion poll on corruption perception; blacklisting rules and delays on various aspects dealing with procurement and contract processing. These are now under discussion with the GOI.

Under competitive funding, both lead and network institutions would be selected during Program implementation based on their specific proposals. It is anticipated that most of the institutions selected as

lead/network institutions would already have or be given authority to procure goods and works at their own level. The institutions are experienced enough to carry out small civil works at their level and through NCB using the services of PWD/procurement consultants. A significant portion of goods procurement is expected to be through NCB, and there would be also some ICBs for procuring high-value items or items to be procured in large quantities. The NPIU will carry out ICB procurement for all institutions. In addition, NPIU would also carry out NCB procurement for central institutions as required. The SPFUs would undertake NCB procurement for the respective state-sponsored institutions. The SPFUs could also carry out NCB procurement for the central institutions located in the state, if so desired by the latter. All concerned staff would be formally trained in procurement at ASCI, Hyderabad or NIFM, Faridabad and such other institutions as may be identified later. The need for hiring a procurement agency at the national level would be reviewed after one year of Program effectiveness.

4.4 Financial management issues:

The Program has a financial management system, which would be able to adequately account for project resources and expenditures.

The present structure of NPIU, which is currently implementing the Third Technician Education Project will be replicated for the Program. Both the existing and the new NPIUs will be co-located and there will be liberal collaboration between the two. The NPIU has developed an Operations Manual laying down in detail the financial policies and procedures in respect of Tech. Ed. III. The manual has been operationalized. The Operations Manual of Tech. Ed. III will be suitably modified and adopted for the Program. The finalization of the manual will be a condition for disbursement to institutions. The proposed system will ensure that the information from all the executing institutions will be collated and consolidated at the State level to generate the FMRs. The central project institutions will submit their claims directly to NPIU. NPIU will consolidate all claims received from each SPFU, central institution and its own, and file with drawl claims through CAA & AogGOI to the Bank. NPIU will also consolidate all quarterly FMRs for the entire project and send it to the Bank.

SPFUs have been established in all the participating states.

As institutions participating in the Program would be known only on selection through a competitive process after Program effectiveness, the current assessment of the institutions is based on an interaction with the institutions that had participated in a sensitization workshop organized by the GOI. The publicly funded institutions follow Government accounting system with the focus on bookkeeping and transactional control over expenditure. The financial information is generated to comply with the Government procedures and audit requirements. The accounts of some of the institutions aspiring to be lead institutions are computerized and the capability to generate various MIS does exist. The only private institution that was reviewed demonstrated having a sound financial management system. FM-based evaluation criteria have been developed which will be used to evaluate proposals received from the institutions.

The Program funds for Institutional Development subprojects will be released to the participating institutions in three to four installments each year on the basis of a Memorandum of Understanding (MOU) between the States and the institution which will contain the terms and conditions of the grant/loan. The first installment will not be more than 20% of the grant/loan amount and will be based on the agreed performance target for quarter as per annual plan. The installments will be released on the receipt of utilization certificates. Each subsequent installment will be released on utilization of 70% of the amount of the previous installment. The same system will be followed for the private institution too – except that the funds will be onlent to them and not passed on as a grant.

A detailed staffing plan has been drawn up which is part of the Program Implementation Plan (PIP). The finance function will be managed by a Financial Management Specialist at the NPIU. The finance function at SPFU will be headed by an accounts officer and as senior accounts staff will work exclusively on the project at IPMUs.

5. Environmental: Environmental Category: C (Not Required)

5.1 Summarize the steps undertaken for environmental assessment and EMP preparation (including consultation and disclosure) and the significant issues and their treatment emerging from this analysis.

No environmental issues are expected to arise as a result of Program implementation. The Program would not support any acquisition of land, construction of any new institution, or any major physical expansion. Only some small constructions on the existing institutional sites and/or rehabilitation of existing buildings would be supported under the Program.

The institutions would be encouraged to revise existing curricula/introduce new courses to increase awareness of environmental issues among students and technicians graduating from the participating institutions. The institutions would also be encouraged to undertake related training, research, design, development, and consultancy assignments for industry and community.

5.2 What are the main features of the EMP and are they adequate?

Not required

5.3 For Category A and B projects, timeline and status of EA:

Date of receipt of final draft:

Not applicable

5.4 How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?

Not applicable

5.5 What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?

Not required

6. Social:

6.1 Summarize key social issues relevant to the project objectives, and specify the project's social development outcomes.

The key social goals related to the Program's Development Objective of providing high quality technical professional staff to meet the needs of India's modernizing economy and society are (a) to provide equitable access on merit; (b) to sensitize students to economic, social and environmental issues; and (c) to establish close links between the participating educational institutions and industry and community. The key social needs related to the achievement of these goals are:

- to improve the access of disadvantaged groups (Scheduled Castes (SCs), Scheduled Tribes (STs), Other Backward Classes (OBCs), minorities, and Poor Urban and Rural students) to engineering education and ensure their ability to perform well, complete the education successfully and secure employment;
- to increase the representation of women by removing barriers to their participation, and to

mainstream women's concerns both in the organization and pedagogy of the technical/engineering education system;

- for technical/engineering education system not only to meet the technical requirements of the country but also to be socially relevant and to train students who are sensitive and responsive to the broader social and economic development needs of the Indian society; and, similarly,
- for technical/engineering education system to forge a relationship with industry to jointly meet social responsibility both to the students and to society.

The Program's social development outcomes are expected to be (a) enhanced participation of the above-mentioned disadvantaged groups, including women, and improvements in their completion and employment rates; and (b) well-established programs linking the education institutions with communities and industries, and tangible positive benefits from these links. The institutions are expected to be more responsive to the needs of society--the communities to which they are linked, other educational institutions (e.g., secondary schools, training institutions), local youth who wish to acquire informal training, local development projects, national and local industries, and R&D organizations.

6.2 Participatory Approach: How are key stakeholders participating in the project?

A full Social Assessment was carried out during Program Preparation. This included visits to and consultations with a range of selected technical education institutions in different parts of the country. Within these institutions, meetings were held with faculty and students, and in some cases separately with disadvantaged students, women faculty, etc. Several meetings were also held with representatives of engineering institutions, industry representatives, and Central and state government officials in the technical/engineering education sub-sector.

All applicant institutions are expected to prepare their proposals with the participation of faculty and students, industry representatives, and the local communities that would benefit from their informal/outreach programs. They are expected to identify specific activities to address the first two needs listed in section 6.1 above (i.e., improving the access of and outcomes pertaining to disadvantaged groups and women). These proposals would be formulated with the participation of these groups. The proposals would also include the programs planned with communities and industries, whose involvement and consent would be required. During the competitive selection of proposals for funding from the Program, attention will be paid to the participation of these groups in the preparation of the proposals and to the quality of the actual activities proposed for them.

6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

NGOs may be part of the communities involved in the informal/outreach programs, and hence would be among those consulted, as described above. The industries that would participate in the institute-industry linkage programs (and consulted in their formulation) would most likely also be private sector organizations. Where local community organizations and associations of industries exist, they would also be involved in identifying, for example, training programs, proposed to meet the needs of these partners. Evidence of these consultations will be included in and evaluated as part of the institutional proposals.

6.4 What institutional arrangements have been provided to ensure the project achieves its social development outcomes?

The NPIU, responsible for the overall management of the program, would have an officer responsible for issues related to gender and disadvantaged groups. Some of the institutions that are likely to participate in the Program also have such officers. The relevant units in the participating institutions would be responsible for ensuring the flow of benefits (e.g., remedial teaching, guidance counseling, books and

materials, job placement) to these disadvantaged groups. Further, special SC/ST cells are expected to be created in each participating institution to monitor the flow of benefits to these groups. In addition, it is expected that the SPFUs and IPMUs will oversee implementation of proposed activities for these groups. The participating institutions would be expected to specify appropriate institutional arrangements to ensure effective implementation of the activities they propose to address the first and second concerns listed in section 6.1 above.

Each participating institution will set up a community interaction cell (or equivalent) with representation of the relevant stakeholders. This cell will decide on the implementation of programs that are related to the third and fourth social development concerns listed in section 6.1. The evaluation of institutional proposals to select those who will receive the competitive grants under this Program will include evaluation of both these sets of institutional arrangements.

6.5 How will the project monitor performance in terms of social development outcomes?

The institutional project monitoring data would include at least the following indicators for SC/ST students and women:

- (a) Intake (and proportion of the SC/ST quota filled)
- (b) Dropouts (by social group and trend over time)
- (c) Number of students passing the course
- (d) Number of years taken to complete the course
- (e) Placement of students
- (f) (Quantitative and qualitative) Outcomes of community linkage programs

7. Safeguard Policies:

7.1 Do any of the following safeguard policies apply to the project?

Policy	Applicability
Environmental Assessment (OP4.01, BP4.01, GP4.01)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Natural Habitats (OP4.04, BP4.04, GP4.04)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Forestry (OP4.36, GP4.36)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Pest Management (OP4.09)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Cultural Property (OPN11.03)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Indigenous Peoples (OD4.20)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Involuntary Resettlement (OP/BP4.12)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Safety of Dams (OP4.37, BP4.37)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in International Waters (OP7.50, BP7.50, GP7.50)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in Disputed Areas (OP7.60, BP7.60, GP7.60) *	<input type="radio"/> Yes <input checked="" type="radio"/> No

7.2 Describe provisions made by the project to ensure compliance with applicable safeguard policies.

A Tribal Development Plan (TDP) focusing on meeting the needs of scheduled tribe (ST) students has been prepared by the GOI. The Plan also covers needs of scheduled cast (SC) students. The Plan aims to ensure the following:

- a. State and central government policies to ensure (reserve) seats for SC/ST candidates in engineering/technical education institutions will be implemented by all institutions from the beginning of their projects;
- b. SC/ST students will receive special coaching for entrance tests; "Pre-Examination Training

- c. Centres’’ will be set up in all institutions immediately on their selection into the Program;
- c. SC/ST students will receive thorough orientation on entry to the institution, on its programs and facilities and their entitlements;
- d. They would have access to hostel facilities, guidance counseling, remedial teaching, books and self-instructional materials, and grievance redressal; these activities are expected to improve their academic performance and social situations; the assistance is expected to be in place in the participating institutions within six months of the start of their projects;
- e. Special Cells will be set up in the institutions to ensure and monitor the flow of benefits to the students;
- f. Special promotional activities will be undertaken to increase the access of women in the SC/ST communities to engineering education, and programs/facilities to assist their performance will be implemented; and
- g. Placement cells in the Program institutions will offer special services to foster employment of SC/ST students.

The institutional proposals will provide details of the activities they will undertake in compliance with the above TDP. These will be evaluated during the evaluation process, and recommendations for improvements may be given. Finally, their implementation will be monitored, in keeping with a monitoring plan that has also been prepared.

F. Sustainability and Risks

1. Sustainability:

The key sustainability issue is to ensure that the major policy and management changes introduced by the Program are sustained and deepened, and that the Program is eventually extended to cover other institutions that would be excluded in the initial stages. For this to occur, two factors are important. First, institutions must become financially sustainable so that the incremental recurrent expenditures can continue to be financed and the beneficial effects of the proposed policy and management changes can be seen in practice. Specifically, there must be enough funds to sustain vital aspects of the quality system introduced by the program, in particular faculty training, participation in seminars, maintenance of equipment, attachments to industry, continuing education programs, etc. Second, the major cultural changes introduced by the Program must become internalized and ingrained within institutions. This is a much more difficult process and its success will depend to a large extent on how the competitive grant system is administered and the emphasis on reviewing the desired progress on these dimensions during the selection/monitoring process. These key sustainability issues will need to be addressed during supervision.

2. Critical Risks (reflecting the failure of critical assumptions found in the fourth column of Annex 1):

Risk	Risk Rating	Risk Mitigation Measure
From Output to Objective Support for administrative and institutional reforms may not continue with changes in governments	M	Extensive discussions with different state governments conducted during program preparations should ensure support of major political parties for reforms; all parties have supported the National Policy on Education
Beneficiaries and stakeholders may oppose institutional reforms, especially those related to increased cost recovery	S	Institutions proposing to participate in the programs are required to develop their proposals in close consultation with

and tougher quality standards		beneficiaries and stakeholders-students, faculty, industry and community leaders
Existing regulatory mechanisms may inhibit institutions from responding quickly to changing technological and economic stimuli	M	Discussions held with the controlling bodies during program development should ensure their support for the success of the program
Participating institutions located in small towns may not be able to attract and retain good faculty and students	S	Measures to promote excellence in all participating institutions and networking of institutions would encourage students and faculty to join the institutions selected in the program
Needs and areas of possible growth in short and long term are not well identified and reflected in the programs offered by institutions	S	The Program approach would provide sufficient flexibility to meet the needs as they are identified; each institution applying for funding would need to have extensive consultations with stake-holders before making its proposals for funding
State governments unable to provide public funds to participating institutions and management units on a regular basis	M	The program implementation progress would be monitored closely and corrective measures taken as needed. Only well-performing States willing to reform will be eligible to join the program.
From Components to Outputs		
Process and criteria of selection of institutions are not adequately publicized and thus open to external influence	M	Program guided documents and PIP provide adequate details and safeguard measures for a transparent process to minimize such pressures
Existing regulations and infrastructure inhibit institutions from cooperating and sharing resources	M	To a limited extent the Program helps overcome these problems in institutions selected for support; cooperation would be on a voluntary basis keeping in view various physical constraints
Union and state governments may not provide any incentive to institutions for revenue generation and better utilization of public funds	N	This is one of the main reforms sought by the Program; only states which agree to introduce such reforms are eligible to participate in the program
Management structure, processes, and accountabilities of program entities are not well defined	N	The program guided document and PIP spell out these in some details

Staff and students in engineering institutions may not be willing to participate in services to community	M	GOI, states and institute managements would give due recognition and support for community outreach programs
Due to financial constraints, Governments may not permit opportunities to education managers and heads of institutions/faculties for exposure to best practice in other countries	M	Program agreements and regular monitoring would help minimize this possibility; alternative approaches for providing such exposure would also be sought
Procurement may be delayed due to participating institutes' non-familiarity of the Bank guidelines	M	NPIU and SPFUs will create procurement cells with experienced staff to provide all necessary assistance to institutions
Funds may not be accounted for properly and may be used for activities other than that of the project.	M	There release of funds will be in installments, which will be linked to the receipt of the utilization certificate. Each subsequent installment will be released on utilization of around 70% of the amount of the previous installment. The achievements of the agreed milestones will be closely monitored by the SPFUs. The institutions will be provided adequate training in financial management and accounting. The reporting formats will capture financial and physical progress.
A large number of institutions are reporting to SPFU and a number of financial reports and audit reports will require analysis. There is a risk that financial controls may be diluted	S	Close FM supervision will ensure that control issues are addressed at all levels of project implementation. There will also be periodic evaluation of FM capacity of the institutes receiving large funds.
Overall Risk Rating	S	

Risk Rating-H(High Risk),S(Substantial Risk),M(Modest Risk),N(Negligible or Low Risk)

3. Possible Controversial Aspects :

None

G. Main Credit Conditions

1. Effectiveness Condition

None

2. Other [classify according to covenant types used in the Legal Agreements.]

- a) The Borrowers shall
 - Include only those States in the Program which have adequately demonstrated preparedness to

carry out all such reforms as are required by the eligibility criteria for states agreed to between the GOI and the IDA.

- Withhold and cause States and the Bureau of Technical Education (BTE) in the central Ministry for Human Resource Development (MHRD) to withhold inclusion of any institution in the Program which does not satisfy the eligibility criteria for institutions agreed to between the GOI and the IDA.
- Ensure selection of institutions to be funded under the Program according to a transparent process as described in the PIP dated August 2002. Changes in the process, if required after a review, should be agreed to between the Borrower and IDA.
- Ensure that evaluation of institutional proposals includes financial management evaluation on the basis of the FME evaluation criteria agreed with the Bank and described in the PIP.
- Enter through the BTE into MOUs with these selected institutions to cause them to carry out their respective projects and to discharge their several obligations as stated in the MOU and the PIP.
- Ensure at all times that the States and the BTE implement and sustain all such reforms as are required by the eligibility criteria for states throughout the Program life.
- Keep the National Project Implementation Unit (NPIU) adequately staffed and funded throughout the Program life, and cause it to effectively and efficiently perform its assigned functions.
- By January 31 each year, jointly with the States and the BTE, and acceptable to the IDA, develop and institute an annual training and study tour program for improvement of system management capacity at the central, state and institutional levels, and ensure its implementation.
- Share with the IDA bi-annually, the findings of independent review of performance, reforms, quality and efficiency carried out by each State and the BTE of their respective institutions.
- Share with the IDA as soon as reasonably possible, the results of research studies carried out by the SPFUs and the NPIU.
- In conjunction with the States, the BTE and the IDA, undertake bi-annual reviews and a mid-term review by October 31, 2005 on the basis of monitorable benchmarks and performance indicators agreed to between the GOI and the IDA.

b) Each State and the BTE shall

- Implement and sustain all such reforms as are required by the eligibility criteria for states throughout the Program life.
- Ensure at all times that each of their respective institutions implements the institutional reforms as are agreed to between the GOI and the IDA.
- Enter into MOUs with these selected institutions to cause them to carry out their respective projects and to discharge their several obligations as stated in the MOU and the PIP.
- Keep the State Project Facilitation Unit adequately staffed and funded throughout the Program life, and cause it to effectively and efficiently perform its assigned functions.
- Ensure timely release of Program funds to each of their respective institutions in equally spaced installments.
- Ensure timely release of funds as loan on publicly notified terms to private institutions selected under the Program.
- Keep GOI and IDA informed of all the activities being funded under the Program in the State and institutions selected from time to time.
- Bi-annually cause conduct of independent review of performance, reforms, quality and efficiency of each of their respective institutions, and make the results of the review along

with recommendations for remedial actions known to the Board of Governors of each institution and to the NPIU.

- In conjunction with the GOI and the IDA, undertake bi-annual reviews and a mid-term review by October 31, 2005 on the basis of monitorable benchmarks and performance indicators agreed to between the GOI and the IDA.

H. Readiness for Implementation

- 1.a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.
- 1.b) Not applicable.
- 2. The procurement documents for the first year's activities are complete and ready for the start of project implementation .
- 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
- 4. The following items are lacking and are discussed under loan conditions (Section G):

The procurement documents for the first year's activities would be ready once participating institutions are selected through competition - within four months of effectiveness.

I. Compliance with Bank Policies

- 1. This project complies with all applicable Bank policies.
- 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.

Shashi K. Shrivastava
Team Leader

Michelle Riboud
Sector Manager

Christopher J. Hoban
Country Director

Annex 1: Project Design Summary

INDIA: Technical/Engineering Education Quality Improvement Program-Phase I

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
<p>Sector-related CAS Goal: To promote competitiveness in industry and services: Focus on promoting policy and institutional reforms in the area of technical education to improve the quality of India's pool of technical manpower.</p>	<p>Sector Indicators: Increased support of industry and services for R&D, consultancy and lifelong learning through technical/engineering institutions Increased demand from industry and services for high quality technical professionals</p>	<p>Sector/country reports: Periodic reports of Center for Monitoring Economy (CMIE) Reports of professional bodies such as Confederation of Indian Industry, Indian Chambers of Commerce; labor market surveys</p>	<p>(from Goal to Bank Mission) Government policies and actions will continue to strengthen the enabling environment for development and growth Private sector led growth will accelerate poverty reduction in India</p>
<p>Project Development Objective: To support production of high quality technical professionals through reforms in the technical/engineering education system in order to raise productivity and competitiveness of the Indian economy</p>	<p>Outcome/Impact Indicators: Improved employment rate and earnings of graduates from participating institutions Increased cooperation and resource sharing between institutions Improved internal efficiency of the engineering education system Increased involvement of institutions with community Improved planning and management of engineering education system to make it demand driven and forward looking</p>	<p>Project reports: Tracer studies; labor market surveys States bi-annual progress reports Reports of State Directorates of Technical Education and All India Council for Technical Education Institutional quarterly progress reports NPIU's bi-annual Program performance reports</p>	<p>(from Objective to Goal) Investments by private sector in industry and services continue to grow Participating states promote and facilitate cooperation among institutions Beneficiaries and stakeholders support institutional reform, especially those related to increased cost recovery and higher quality standards</p>
<p>Output from each Component: Component 1: Institutional Development through Competitive Funding</p>	<p>Output Indicators:</p>	<p>Project reports:</p>	<p>(from Output to Objective) Support for administrative and institutional reforms continues despite any possible changes in union or state governments</p>

<p>A.PromotionofAcademic ExcellenceinInstitutions</p>	<p>Increasednumberofhigh qualitygraduatesinrelevant andcutting-edgetechnologies Increasednumberof postgraduates/research scholarsinengineering</p> <p>Increasedprofessionaloutputs (publications,products, designs,patents,etc.)from participatinginstitutions</p>	<p>Institutions'annualreports</p> <p>AICTEdata</p> <p>Institutions'annualreports</p>	<p>Regulatorymechanismsdonot inhibitinstitutionstorespond quicklytochanging technologicalandeconomic stimuli</p>
<p>B.NetworkingofInstitutions forQualityEnhancementand ResourceSharing</p>	<p>Numberofjointresearch, designanddevelopment projects,consultancies, trainingprograms,etc., conductedbyparticipating institutions</p>	<p>States'Programprogress reports</p>	<p>Incentivesexisttoattractand retaingoodfacultyand studentsinparticipating institutionslocatedinsmaller towns</p>
<p>C.EnhancingQualityand ReachofServicesto CommunityandEconomy</p>	<p>Increasedrevenuegeneration fromoutreachprogramsand services(asapercentageof annualrecurringexpenditure)</p> <p>Increasedaccesstotechnical trainingforsocially disadvantagedgroupsand unemployedyouth</p>	<p>Institutions'progressreports</p> <p>Institutions annualreports</p>	<p>Needsandareasofpossible growthinshort-andlong-term areclearlyidentifiedand reflectedintheprograms offeredbyinstitutions</p> <p>Institute-widewillingnessof facultyandstudentsto participateincommunity outreachprograms</p>
<p>Component2:System ManagementCapacity Improvement</p>			
<p>Establishment/strengtheningof programmanagement structures</p>	<p>Costandtimeefficient implementationofcompetitive fundingprocess</p>	<p>NPIU'sbi-annualProgram performancereports</p>	<p>Governmentsabletoprovide publicfundstoparticipating institutionsandmanagement unitsonaregularbasis</p>
<p>Researchandtrainingin educationplanningand management</p>	<p>Increasedavailabilityofwell-trainedsystem/institution managers</p>	<p>NPIU'sbi-annualProgram performancereports</p>	
<p>ProjectComponents/ Sub-components: 1.InstitutionalDevelopment throughCompetitive Funding A.PromotionofAcademic Excellence</p>	<p>Inputs:(budgetforeach component) \$304.50Million</p> <p>\$237.50Million</p>	<p>Projectreports:</p>	<p>(fromComponentsto Outputs)</p> <p>Processandcriteriaof selectionofinstitutionsis kept transparent,andfreefrom externalinfluence</p>

B. Networking of Institutions for Quality Enhancement	\$35.50 Million	Existing regulations and infrastructure do not inhibit institutions to cooperate and share resources
C. Enhancing quality and reach of Services to Community and Industry	\$31.50 Million	Union and state governments provide incentives to institutions for revenue generation and better utilization of public funds
2. System Management Capacity Improvement Establishment/strengthening of program management structures	\$9.50 Million	Management structure, processes, and accountabilities of Program entities are well defined within the existing framework
Research and training in education planning and management		Government willing to provide opportunities to education managers and heads of institutions/faculties for exposure to best practice in other countries

Annex2:Detailed ProjectDescription

INDIA: Technical/EngineeringEducationQualityImprovementProgram-PhaseI

1. Background

Despite the efforts of the Ministry of Human Resource Development (MHRD) of the Government of India (GOI) in implementing the National Policy on Education-1986 (revised 1992) and of the All India Council for Technical Education (AICTE) in regulating the technical education system and ensuring quality, several weaknesses have occurred in the system. These are well documented and discussed in the World Bank document *Scientific and Technical Manpower Development in India* (Report No. 20416-IN, August 30, 2000). Some of the major weaknesses are listed in Section A of the main document.

Recognizing the major role of high quality skilled manpower in the economic development of the country and in the export of technology and services, the Government of India (GOI) has decided to give very high priority to human resource development in engineering and technology. In this context, it is guided by the following **Vision Statement** :

“To develop and nurture a Technical Education System in the country which would produce skilled manpower of the highest quality comparable to the very best in the world and in adequate numbers to meet the complex technological needs of the economy; and would provide the nation a comparative advantage in the creation and propagation of innovative technological solutions and in the development of technological capacity of the highest order, both for its application in economic development of the country and for becoming a major supplier of technology and technological services in the world”.

For developing high quality technical manpower, the GOI has already taken several policy initiatives, developed strategies for implementation of policy direction through several committees, and planned several initiatives. Some of the strategies and initiatives are already under implementation. Notable among these are: (a) upgrading 10 of 17 Regional Engineering Colleges to National Institutes of Technology with deemed-to-be-university status, and (b) conducting national level competitive examination for admission to the participating institutions.

2. Program Goal and Strategy

The GOI has planned to launch, in conjunction with several States that have agreed to introduce certain reforms, along-term Program which aims to upscale and support the ongoing efforts of GOI to improve quality of technical/engineering education and enhance existing capacity of the institutions to become dynamic, demand-driven, quality conscious, efficient and forward-looking, responsive to rapid economic and technological developments occurring both at the national and international levels.

The expected systemic and institutional transformation under the Program is to be achieved through the following three groups of activities:

- catalyzing reforms in policies and procedures at the central and State level to create an environment in which engineering education institutions can achieve their own goals for excellence and sustain the same with autonomy and accountability
- supporting Institutional Development Subprojects of competitively selected institutions to achieve higher levels of academic performance and relevance to the society and the economy,

through their individual efforts of quality up-gradation and through bi-directional sharing of each others special qualities and resources; and

- supporting improvements in efficiency and effectiveness of the technical/engineering education management system through training of technical/engineering education policy planners, managers and administrators, and system research studies.

3. Technical/Engineering Education Quality Improvement Program

The Program aims to support the production of high quality technical professionals through reforms in the technical/engineering education system in order to raise productivity and competitiveness of the Indian economy.

Competitive funding will be used as the primary strategy to encourage systemic reforms and drive toward excellence. *Only states and institutions willing to undertake reforms in governance and financing will be eligible for financial support under the program*. Proposal from clusters of institutions (comprising lead institutions and networked institutions)--based on their own vision, strategies and action plan--would be selected through a national level competition for (a) promotion of academic excellence; (b) synergic networking of institutions; and (c) enhanced services to community and economy. Later sections summarize a two-stage process of screening and selection of states and institutions, eligibility criteria and evaluation methodology.

Improvement of system management capacity--funded in a non-competitive investment mode--would support system-wide improvements and reforms through the training of engineering/technical education policy planners, managers and administrators; research studies; and the establishment of Program management structures at the central and state levels.

By Component:

Project Component 1-US\$ 304.50 million

(Costs indicated refer to the Program-Phase I only)

Institutional Development through Competitive Funding

Institutional Development would be achieved through three sub-components/activities: (a) Promotion of academic excellence, (b) Networking of institutions for quality enhancement and resource sharing, and (c) Enhancing quality and reach of services to community and economy.

Under this component, qualifying institutions, based on their capabilities, will be first selected either as Lead institutions or as Network institutions. All these institutions will then be required to compete in clusters (as a group of network institutions) for funding through specific Institutional Development Sub-project proposals, necessarily covering all the three sub-components.

a) Promotion of Academic Excellence (US\$237.50 Million)

A excellence is a multifaceted ideal, institutions are likely to have differing visions of excellence and hence differing resource requirements for the attainment of their own goals. Institutions would be free to focus their development plans for excellence on either the whole institution or a Department or even a single program that has already reached a high level of achievement.

Institutional plans for excellence are expected to include, among others, such activities as: (i) improvements in institutional governance and, management and administrative practices; (ii) improvements in teaching, training and learning facilities; (iii) improvements in curricular practices; (iv) faculty and staff development; (v) enhancement in postgraduate education and research, and consultancy activities; (vi) enhanced interaction with industry; and (vii) increased attention to equity issues.

Improvements in Institutional Governance and, Management and Administrative Practices : Autonomy of institution to manage their own affairs is considered a pre-requisite for achievement of excellence. Policy reforms by the sponsoring governments are expected to result in adequate empowerment of institution through grant of academic, financial, administrative and managerial autonomy.

Each lead institution will be governed by its own Board of Governors (BOG) with adequate representation from the stakeholders. The BOGs are expected to pay particular attention to creating the required ambience for excellence, and ensuring implementation and sustenance of reforms envisaged under the Program. The BOGs will be responsible for ensuring implementation of all the institutional reforms envisaged under the Program (*described in a following section*) including proper management of block grant (for government-funded and -aided institutions) and, establishment and management of Corpus Fund, Staff Development Fund, Depreciation/Renewal Fund and Maintenance Fund in accordance with the guidelines issued by the concerned government.

Institutional management will be decentralized with delegation of financial and decision making powers to various functionaries. Improved management practices will also result in reduced wastage of resources, and enhanced utilization of infrastructure and teaching-training facilities. Improvements in administrative practices would be user-friendly, transparent, and supportive. Institutions will increasingly recruit their own faculty and staff, provide competitive emoluments and perks for attracting and retaining good quality faculty and staff, institute practices for recognition and reward of merit in faculty and staff, and create conditions that would increase commitment of faculty, staff and students for achieving and sustaining excellence.

Improvements in Teaching, Training and Learning Facilities : This would typically include: (i) modernization and strengthening of laboratories, computer centers, and libraries; (ii) establishment of new laboratories to meet the requirements for new program offerings in emerging areas; postgraduate, doctoral and faculty research activities; continuing education programs for industry and consultancy work; (iii) creation of large scale facilities for self-learning; (iv) intensification of use of modern teaching aids; and (v) establishment of campus-wide electronic connectivity and high-speed Internet facilities. Each institution will establish a Depreciation/Renewal Fund to ensure that all the teaching, training and learning facilities are kept adequately modernized in the post-Program period.

Improvements in Curricular Practices: With implementation of the policy reforms sought under the Program, all institutions will be suitably empowered to carry out academic reforms. Lead institutions will enjoy very significant academic autonomy, and most Network institutions substantial academic autonomy.

All institutions will establish mechanisms for periodical review and improvement of curricula and syllabi, and development of new ones, based on labor market information, feedback from alumni and employers, and with active participation of stakeholders. All curricula will address the output characteristic expected by the labor market in the technician and diploma holders, the engineering graduates and the postgraduates such as skills/abilities for problem solving, design, communication,

information processing, creative and innovative thinking, managing people at work, learning-to-learn, etc. Curricula would also focus on the overall personality development of students including development of positive attitudes, and appreciation of social and environmental concerns. Innovations in curriculum development would include competency-based-curricula; provision of self-learning, problem solving projects for community and industry; sandwich programs, learning by research, course flexibility, etc.

Curriculum implementation would be improved for maximizing student learning through continuous student performance assessment, feedback to students and organization of remedial instructions; extensive use of media, visits to and training in industry, invited expert lectures from industry and field, problem solving projects from industry and community, etc.

Rigid program structures would be gradually replaced and flexibility introduced through multi-level and multi-background entry, credit exemptions, credit transfers, flexible pace of learning through accumulation of credits, and provision of wide choice of electives including those offered by other institutions in the network.

Faculty and Staff Development : Enhancement of faculty and staff competence would receive focused attention under the Program. Besides being exposed to training for improved competence in teaching-training, faculty would also be trained in management of industry and community interactions, new techniques in research, student counseling, student performance evaluation, and development of modern learning resources. All the staff would be trained in their respective functional areas for improved delivery and efficiency. Senior faculty and staff would be trained in implementation and management of institutional reforms, and exposed to modern institution management practices. Faculty would be encouraged to: undertake research projects and consultancy, upgrade their qualifications, attend seminars and conferences, interact with peer groups within India and abroad, establish linkages with academic institutions and industry, etc. For continuous improvement of faculty competence, a mechanism would be instituted in each institution for *students' evaluation of teachers' performance* combined with feedback to teachers and peer counseling for improvement. Staff Development Fund established under the Program will ensure sustenance of faculty and staff development activity in the post-Program period.

Enhancement in Postgraduate Education and Research, and Consultancy Activities : Increased output of post graduates and doctorates is of crucial importance for meeting the large requirement of teachers and for meeting the needs of the industry. Based on national level signals and guidance from the GOI/AICTE, institutions would introduce postgraduate programs, and reorient or phase out some of the existing ones. Lead institutions in particular are expected to introduce doctoral programs. It is expected that both postgraduate and doctoral programs will be made highly flexible to facilitate their pursuit by in-service personnel. Institutions with the help of States/GOI/AICTE would institute schemes for securing large number of admissions to postgraduate and doctoral programs and retention of students.

Increased participation of faculty in research, projects and consultancy would be promoted by all institutions through merit recognition and, fiscal and career incentives. Lead institutions are expected to establish *research and consultancy cells*, which would help faculty prepare proposals for securing funds for sponsored research programs and projects and consultancy assignments. This cell would be responsible for all follow up action to timely obtain the funds, and for ensuring timely and quality delivery of results.

Enhanced Interaction with Industry : Interaction with industry would be intensified to obtain

academic benefits by way of increased relevance of curricula and expert lectures, and access to specialized equipment; industrial training and placement benefits for students, professional benefits for faculty through industrial exposure, and financial benefits for institutions through income from sponsored research programs and projects, consultancy assignments and continuing education programs, and receipt of donations. Institutions would establish Institute-Industry Interaction Cells, specifically responsible for promoting and nurturing interaction and partnership with industry.

Services offered by institutions to industry would include: conducting continuing education programs; undertaking problem-solving projects and consultancies on industrial products, services and processes; testing and calibration; serving as training centers for industry, etc.

Contributions from industries to institutions could include: participation in Governing and other bodies of the institutions; participation in curriculum improvement and development; training of students in traditional and new technologies, providing expert lectures; helping students undertake problem-solving projects; training teachers and staff in new technologies and processes, and collaborating in sandwich program offerings.

Increased Attention to Equity Issues : All institutions would comply with the reservation policies of the Central and State governments. In State funded institutions, percentage of reserved seats is about 50 percent (including 22.5 percent for SC and ST students). It is noted that SC/ST students, with lower scholastic attainment at entry than those from the general category, have difficulty meeting the demand of professional education and consequently have poor academic performance. Poor academic performance is found to lead to some sort of informal segregation. To ameliorate the situation, all Program institutions would: (i) establish coaching centers to upgrade the academic quality of SC/ST candidates seeking admission to engineering education; (ii) institute mechanisms for identifying areas of academic weakness and removing the same through remedial teaching; and (iii) establish SC/ST counseling cells responsible for providing advice and guidance, undertaking activities for their psycho-social integration with the rest of the institute community, and for ensuring timely payment of government financial assistance to students in these categories.

Although performance of female students at senior secondary examinations compare very favorably with those of male students, women's preference for technical education continues to be low. Participating institutions would also be expected to encourage greater women participation in technical/engineering education through pro-active interventions such as reducing/eliminating physical bottlenecks inhibiting female participation, removing misconceptions about engineering career option for women, providing incentives for meritorious female students seeking admission in engineering, providing interaction and counselling from role models -- lady engineering teachers and successful practicing professionals.

b) Networking of Institutions for Quality Enhancement and Resource Sharing (US\$35.50 million)

Two types of networking are proposed—formal and non-formal. In Phase-1, the Program would support development of excellence in about 20 selected clusters of institutions (about 100 institutions) through formal networking amongst well-performing institutions (called Lead institutions) and institutions on the threshold of becoming well performing (called Network institutions). Such networks are expected to be formed between technological/technical universities, deemed universities, university departments, university colleges, stand-alone colleges and polytechnics. All the network arrangements would be governed by Memorandum of Understanding among Lead institutions and Network institutions.

The formal networking envisages bi-directional sharing of expertise and resources among the institutions. Lead institutions would help and guide the Network institutions in improving their academic and research activities, and institutional management practices. Resource sharing between the networked institutions will result not only in improved academic, research and consultancy outputs but also in reduction in investment and operating costs.

In academic matters, institutions would share curricular improvements and new curricula, innovations in curriculum implementation, teaching aids and modern learning resources, faculty, training facilities, etc. Students would have the benefit of attending special courses in another institution. Institutions in a network would develop mechanisms for credit transfer. Libraries would be gradually networked, and expensive library resources shared. Lead institutions would carry out, organize and coordinate faculty and staff development programs for all the networked institutions. Joint research projects, consultancies, book writing and paper writing, seminars and conferences would be undertaken to build capacity in all the institutions.

Program institutions would be free to establish non-formal networks with R&D organizations, specialized laboratories, eminent educational institutions, industry, community, institutions from other formal networks, etc., for deriving a variety of benefits for the institution. Expenditure for activities under such network will be borne by the networking institutions under operation and maintenance.

c) Enhancing Quality and Reach of Services to Community and Economy (US\$31.50 million)

Most institutions presently do not render services to the community and the formal sector of the economy (organized industry) through very limited involvement of faculty and almost nil involvement of the students. Under the Program, two key changes will be brought into effect. First, all the faculty and students of each institution will be involved in rendering services to the community and the economy. Second, institutions as a whole will also extend services to the non-formal segment of the economy (the unorganized industry). Student participation will be ensured through curriculum design. Rendering of service by faculty will form a part of their service condition and count towards their career progress. All the services offered by an institution would be demand based, and would be identified through interaction with the community and the economy. Benefits are expected to accrue not only to the community and the economy (through improved productivity, earnings and quality of life) but also to students and faculty through implementation of projects and researches studies, and thus gaining real-life problem solving experience; and to institutions through revenue generation and mobilization of resources. For enhancing quality and reach of their services, institutions will establish linkages with central and state government agencies, and non-government organizations that are involved in providing similar services.

Project Component 2-US\$ 9.50 million

System Management Capacity Improvement

Implementation of reforms envisaged under the Program requires: (a) development of a modern management style in the various agencies responsible for guiding and supporting the policy reforms, and (b) establishment of structures and facilities for guiding and monitoring implementation of the Program at the central and state levels. This component would support: (i) development of a modern management style through training of policy planners, managers and administrators from the central and participating State governments, and their bodies concerned with the management of technical/engineering education,

(ii) conduct of studies at the State and national levels, the findings of which would be used for making improvements in policy and decision making processes, and implementation of reforms, (iii) conduct of performance, quality and efficiency audits of institutions by States, and (iv) establishment of structures and facilities for Program management at the central and State levels.

The system management capacity would be further strengthened by the GOI's support *(from its own resources)* for establishing an Educational Management Information System, strengthening several resource institutions and supporting the National Board of Accreditation. The institutions in the Program will offer their full co-operation to the EMIS for collection of data, their validation and for undertaking required research studies .

4. Selection of States and Institutions

The success of the Program for fostering and propagating excellence is dependant on two essential conditions. Firstly, the State governments must be willing and prepared to create an environment with policy reforms that would allow institutions to plan and manage their own affairs with autonomy, identify their own goals of excellence and, achieve and sustain the same. Secondly, institutions should possess the capacity for achieving higher standards and must be willing to exercise autonomy bestowed on them with accountability and carry out the intended institutional reforms. These two conditions make it necessary that selections be made of the States first and of the institutions sponsored by the selected States thereafter.

As all the potential sponsoring agencies and all interested institutions are not expected to be ready to implement the required reforms from the very inception of Phase-I of the Program, it is planned to make selections of both the States and institutions in 2-3 cycles for Phase-I of the Program. States and institutions not selected during the first cycle could try for the same during subsequent cycles of Phase-I; they would also be free to try for selection in any of the subsequent phases of the Program.

Selection of States

Interested States and UTs will submit their proposals to GOI in a prescribed format. Through this proposal, the States and UTs will demonstrate their commitment and preparedness to carry out reforms required for meeting the prescribed eligibility criteria (*listed in a following section*). The State proposals would also describe how: (i) each of the reforms would be brought into effect through policy support, and/or administrative and procedural reforms; (ii) the reforms would be implemented, (iii) implementation of reforms would be monitored at both the state and institutional levels; and (iv) the effectiveness of the reforms in bringing about the desired systemic changes would be evaluated. The National Project Director (NPD) will determine the eligibility of applicant States based on the merit of their proposals, make selection of the States to participate in a particular phase of the Program. After an initial selection for a phase, if funds permit additional States could be selected to join the phase within a specified period of program effectiveness. Results of selections will be informed by the NPD through written communication.

Selection of Institutions

Selection of institutions during each cycle of Phase-I of the Program will be carried out through a two-step process. In the first step, eligibility of applicant institutions would be determined, based on their eligibility applications, separately for Lead and Network institutions. In the second step, final selection of clusters of institutions, based on their Composite Proposals, would be made at the national

level through a competitive process. The major activities involved in the entire process would include: (a) determination of eligibility of institutions to be Lead/Network institutions at State/central and national levels; (b) preparation of national list of eligible institutions and formation of networks; (c) development of Composite Proposals; (d) evaluation of all eligible Composite Proposals and final selection of networks at the national level and announcement of results of selection.

Determination of Eligibility of Institutions to be Lead/Network Institutions

On behalf of the National Project Director (NPD), the National Project Implementation Unit (NPIU) will announce, through short advertisement in major national dailies, the start of Phase-I of the Program and invite submission of eligibility applications from institutions from eligible States/UTs. The concerned State secretaries and central institutions will also be directly informed of the start of Phase-I through a circular by the NPD. The advertisement will contain a list of eligible States and address of the NPIU website. Institutions would be advised to submit their eligibility applications (application format and details will be made available on NPIU website) in duplicate for consideration as Lead or Network institutions in one of the two prescribed formats (*separate for engineering degree institutions and polytechnics*) to the office of the respective State Project Facilitation Unit (SPFU) after carrying out self-assessment. Institutions in the central sector will submit their applications to the NPIU.

Each Eligibility Application format has 2 parts. Part-A deals with the conditions of eligibility (*listed below*) that are to be necessarily met by the applicant institutions. Institutions not able to meet the eligibility conditions will be disqualified. Part-B contains academic attainment parameters with benchmarks. Achievement of institutions in meeting the benchmarks will be evaluated through a system of scoring which is stated in the application formats.

Each eligible State and NPIU will appoint their respective Screening Committees, which will scrutinize the applications for veracity of statements made and score each application following the scoring method and related guidelines given in the application formats. Institutions scoring 80% or more of the maximum expected score would be considered for Lead Institution role; those scoring between 50-79% would be considered for Network institutions; those scoring less than 50% would be advised to improve their performance status and re-apply in another cycle or Program phase.

Each State and NPIU will prepare 3 lists of institutions: one for those recommended to be Lead institutions, one for those recommended to be Network institutions, and one for those not recommended for consideration for either Lead or Network status. These lists will be forwarded to the NPIU along with details of recommendations and one copy of each eligibility application received.

Preparation of National List of Eligible Institutions, Formation of Networks and Development of Composite Proposals

A National Screening Committee will, on behalf of the NPD, examine the recommendations of the States/NPIU, and compile national lists of: (a) eligible Lead institutions; and (b) eligible Network institutions. The NPD will declare these lists to the respective states, advising them to initiate action that would result in formation of clusters and preparation of Composite Proposals in the prescribed format. NPIU will make these lists available on its website, and announce the same through short advertisements in leading newspapers. The advertisement will enable institutions to choose their partners from within and outside the States of their location. It will also enable eligible Network institutions from the States, which have no eligible Lead institution to approach an eligible Lead institution in another State for possible networking. Institutions will form clusters in consultation with their sponsoring State.

Shortcomings in the eligibility applications would be communicated by NPIU and SPFU to ineligible institutions in the central and states sectors respectively. These institutions would also be advised to improve and re-apply in the next cycle.

Composite Proposal for each network will consist of individual proposals of Lead and Network institutions, and the common element in these proposals will be the activities related to network arrangement. Proposal of each Network institution will under this sub-component detail the bi-directional flow of benefits between the Lead institution and itself, and give the related activities and action plans. The proposal of Lead institution will sum all the bi-directional benefits, activities and action plans. Each Lead institution will sign an MOU with its network institutions.

Evaluation of Composite Proposals

Composite Proposals (proposal of Lead and all network institutions) will be forwarded by the States in which Lead institutions are located to the NPIU. Each proposal of Lead and network institutions must be accompanied by government orders in compliance with the eligibility requirements for States listed below. Any individual proposal without these orders would be disqualified for competition. A Composite Proposal as a whole would be disqualified if either the Lead institution is disqualified or the number of qualifying Network institutions is less than three. Disqualified proposals would be returned to the concerned States/NPIU along with a statement of reasons. Proposals so returned could be improved and resubmitted in another cycle of Phase-I or subsequent phase for competition.

An Evaluation Committee, assisted by sub-committees, constituted by the NPD will evaluate each composite proposal to assess (i) the technical merit of the constituent action plans, (ii) their logical framework and strategy, (iii) their cost effectiveness, and (iv) their inherent monitoring, quality assurance and auto-correction mechanisms. The main proposal would be evaluated in the background of the preparedness of the Lead Institution and its Network partners for undertaking a major quality enhancement project, and their capability demonstrated through their present and past performance. The proposal's interweaving of its action plans for various project activities and advance action proposed for sustaining the gains from the Program in future will be given due consideration.

Detailed guidelines would be evolved to ensure that the evaluation mechanism is both fair and transparent and overcomes the difficulty and complexity of using a common holistic yardstick for proposals for fostering excellence having widely varying objectives, strategies, outputs and outcomes. The evaluation sub-committees would score each composite proposal as per these guidelines and prepare evaluation reports for the consideration of the Evaluation Committee and the National Selection Committee (NSC).

Selection of Networks

A National Selection Committee (NSC) will be constituted by the Union Minister for Human Resource Development as below:

- Secretary, Department of Secondary Education & Higher Education, MHRD as Chairperson
- One ex-or-present Director of an Indian Institute of Technology
- 3 eminent experts from different professional organizations
- 2 industrialists
- National Project Director as Member-Secretary

The NSC will consider the scores and evaluation reports and prepare a ranked list of Composite

Proposals based on their judgment of how best the proposals fit into Program objectives and help India in its drive towards global competitiveness. The exact procedure for its working would be decided by the NSC in its first meeting to be organized soon after Program commencement date. The procedure will be made public.

Based on the ranked list of the first cycle, the NPD will allocate funds to institutions in order of merit. In case all the Phase-I funds do not get allocated during the first cycle itself, these selections would be continued during subsequent cycles till all the funds get allocated. The NPD will inform the concerned State Secretaries of these selections made and the funds allocated to these selected institutions. The NPD will, for information and record, also simultaneously share this information with the Bank along with a copy of the proposals of these selected institutions.

Eligibility Criteria for States to Participate in the Program

- a. To sponsor government-funded and aided, and private unaided engineering institutions that meet the prescribed eligibility criteria for participation in the Program through open competition.
- b. To accept results of open competition for selection of Lead and Network institutions by a National Selection Committee.
- c. To support both academic and non-academic reforms to be carried out in these selected institutions.
- d. To provide the agreed required financial support to these selected institutions and seek reimbursement as per norms.
- e. To provide funds to private institutions in accordance with an agreed mechanism for loan repayment by institutions.
- f. To accord and sustain very significant academic, and full financial, managerial and administrative autonomy to these selected Lead institutions.
- g. To accord and sustain full financial, managerial and administrative autonomy, and substantial academic autonomy to these selected Network institutions.
- h. To permit these selected institutions to increase recovery of the cost of education from students.
- i. To change pattern of fund release to block grant basis.
- j. To permit these selected institutions to generate, retain and utilize the generated revenue.
- k. To permit and encourage selected institutions to establish Corpus Fund, Staff Development Fund, Depreciation/Renewal Fund (for equipment replacement) and Maintenance Fund (for maintenance of equipment and buildings) and issue guidelines for proper management of these funds.
- l. To permit total participation of the institutions (all faculty and students) in community and industry service.
- m. To formulate a policy for enabling institutions to fill all teaching and staff vacancies.
- n. To continue supporting needy students as per current Government policy and practice.
- o. To agree to implementation of the provisions of the Program's tribal development plan by all institutions.

Eligibility Criteria for Institutions

- Institutions only from eligible states and central institutions can compete for funds under the program.
- The institutions should have applied for accreditation to the NBA of the AICTE, if not already accredited, and at least two batches must have graduated from the institution.

- The institutions should be willing to comply with all the criteria listed below:
 - a. To accept academic autonomy with accountability.
 - b. To accept full financial autonomy with accountability.
 - c. To accept full managerial autonomy with accountability.
 - d. To accept full administrative autonomy with accountability.
 - e. To increase recovery of cost of education from students.
 - f. To accept non-plan funding on block grant basis (*not applicable to unaided institutions*).
 - g. To establish distinct Corpus Fund, Staff Development Fund, Depreciation/Renewal Fund and Maintenance Fund from the revenue generated and savings and to accept Central/State government guidelines for utilization of these funds.
 - h. To accept the results of the enunciated process for award of competitive grants.
 - i. To institute positive measures for securing participation of faculty and students in providing services to community and economy.
 - j. To implement activities related to the tribal development plan.

Selection Criteria for Institutions for Program Participation

Selection would be based on transparent criteria in three blocks:

- a. quality of the proposal for achieving excellence,
 - b. preparedness for implementing institutional project and reforms related activities as proposed, and
 - c. capability demonstrated through present and past performance
- a. *Quality of the Proposal for achieving excellence* would include (illustrative)
 - Action Plans for strengthening existing seeds of excellence, removing existing weaknesses, grabbing new opportunities or warding off threats
 - Action plans demonstrating creation of new knowledge, improvement of teaching/learning processes, increase in employability of graduates, resource optimization internally or through networking, improved service to community and economy, or advancing the image of the department or institution
 - Action plans with potentiality towards national technological capacity development
 - Strategies for implementation
 - Inter-linkages among action plans and anticipated benefits to students, faculty and Institutions
 - Cost effectiveness of the strategy adopted to achieve objectives
 - Identification of critical parameters for success and their monitoring
 - Inclusion of auto-correction mechanisms for achieving success
 - b. *Preparedness for undertaking a major project for quality enhancement should include (illustrative)*
 - Delineation of Vision, Mission, and Objectives
 - Detailed SWOT analysis
 - Progress on Academic, financial, administrative and managerial autonomy
 - Progress on Block grant Scheme
 - Authority for retaining earnings
 - Internal delegation of autonomy
 - Consultations with industry and community including informal sector of

- economy
- Consultations and MOUs with Network partners
- Internal management practices to promote excellence
- Ownership of project by faculty, staff, and students

c. *Capability demonstrated through present and past performance (illustrative)*

- Adequacy of infrastructure
- Faculty competence and achievements
- Innovations in teaching/learning processes
- Developing required knowledge, skills, and attitudes among students through curricular innovations
- Outputs-graduates, post-graduates, research papers, patents, books, continuing education programs, consultancy earnings, technology transfer schemes, etc.
- National/International seminars/conferences organized and number of participants
- Assistance to graduates in getting employment
- Interactions with industry and community
- National and international recognition and awards, twinning arrangements

Priority would be given to most cost-effective proposals with clear vision for sustained drive for excellence beyond the program support.

In addition to the above technical evaluation, the institutions would also be evaluated for adequacy of their financial management system including arrangements for:

- system for fund flow including the project funds
- overall staffing in the financial management system of the institution and the specific staffing for overall management of project funds.
- accounting policies and procedures
- budgeting system proposed to be adopted for all institutional funds including the project funds.
- system to be used for making payments
- system for keeping cash and the type of payments to be made in cash, cash security and system for preventing its misuse.
- system for safeguarding institutional assets
- system to be used/adopted for carrying out audits and for reporting the results
- systems for periodic monitoring of fund utilization and reporting of results

5. Program Management

The needs for management of the Program are sound policy formulation, transparent and fair selection procedures, autonomy in functioning at all levels combined with accountability, quick decision making, strict performance monitoring and learning from experience. The various management functions required to be performed for successful implementation are grouped into 6 broad categories: guidance and direction; policy issues; selection of institutions; facilitation and coordination; implementation, monitoring and control; and quality assurance. These will be performed at the central, State and institutional levels as shown in tabular form below:

Management Function Responsibility Level	Guidance and Direction	Policy Issues	Selection Process	Facilitation and Coordination	Implementation Monitoring and Control	Quality Assurance
National Level	National Steering Committee	National Project Director	NSC with assistance from the NPIU	NPIU	NPIU	NPIU and NBA
State Level	State Steering Committee	Secretary	SPFU for determination of eligibility of institutions	SPFU	SPFU	SPFU and NBA
Institutional Level	Board of Governors	Board of Governors		--	Board of Governors and IPMU	IPMU

NSC: National Selection Committee

NPIU: National Project Implementation Unit

IPMU: Institutional Project Management Unit

NBA: National Board of Accreditation

SPFU: State Project Implementation Unit

Note: While internal quality monitoring will be the responsibility of each institution, SPFU and NPIU will carry out this function with the assistance of external experts at state and central level respectively. NBA will carry out its function of certification of quality in the Program institutions, and would be assisted by NPIU and SPFU as desired by the NBA.

National Level Management Structures

The Program will be managed at the National level through 2 bodies—the National Steering Committee, and the National Project Implementation Unit.

National Steering Committee

The 17-member National Steering Committee will be chaired by the Union Minister for Human Resource Development. It will be assisted by the National Project Director in his/her capacity as its Member-Secretary. The composition ensures pooling of wide experience and knowledge of national and global development needs. This Committee will meet at least twice a year to provide guidance and direction to the Program, suggest strategies for maximizing achievement of Program goals of systemic transformation, and make decisions regarding non-performing states and institutions.

National Project Implementation Unit (NPIU)

The NPIU will work under the guidance of a National Project Director, duly appointed by the MHRD in the rank of a Joint Secretary to the Government of India. His/her broad functions would include: (a) policy and critical decision making including decisions related to selection of states; (b) Program fund management; (c) coordination with Program States and Ministries/Departments of the GOI; (d) liaison with the World Bank; and (e) coordinating monitoring, reviewing and evaluating implementation of the Program and its outcomes.

The Government of India is establishing an NPIU (separate from the existing NPIU for the Third Technician Education Project). Until such time that the new NPIU is established, the existing NPIU established for the Third Technician Education Project will perform all necessary functions. Comprising of several functional cells, the new NPIU will be headed by a Central Project Advisor (CPA). In addition to providing support to the NPD in discharging his/her functions and working closely with the State Project Facilitation Units (SPFUs) established in each Program State, the NPIU will also: (a) conduct Program launch workshops and guide institutions in preparation of composite proposals; (b) coordinate activities related to invitation and processing of eligibility applications and composite proposals; (c) guide institutions on issues related to procurement and appointment of consultants; (d) guide States and

institutions on issues related to reimbursement; (e) facilitate/organize management development programs, foreign study tours and foreign fellowships programs; (f) conduct educational research studies; and (g) organize bi-annual, mid-term and end-of-Phase-I reviews, and prepare referenced documents and reports for all the reviews.

State Level Management Structure

At the State, there will also be two formal management bodies, namely the State Steering Committee and the State Project Facilitation Unit (SPFU). The State Steering Committee will provide guidance and direction to the concerned State Secretary and the SPFU for maximizing gains from the Program, and suggest strategies for corrective measures to be taken at the State and institutional levels.

The basic infrastructure of SPFU has already been created for Program preparatory activities in all States. The SPFUs will be fully functional well before program effectiveness. Each SPFU, with at least three functional cells, will be headed by a State Project Advisor (SPA) of the rank of a senior Professor of an Engineering college. Located preferably in the State capital, it will provide support to the State Secretary in charge of technical/engineering education in facilitating, coordinating and monitoring all institutional projects within the State and in interactions with GOI and the NPD on policy and financial issues, and with the NBA on issues related to accreditation of institutions. The major functions to be performed by SPFU include: (a) providing support to the State Screening Committee in processing of eligibility applications; (b) facilitating formation of networks within and outside the State; (c) guiding and facilitating implementation of reforms by institutions; (d) facilitating interaction of institutions with industry and community, and providing guidance for enhancing services to community and economy; (e) conducting quality, efficiency and reform-related audits using external agencies and causing remedial actions to be taken; (f) ensuring adequate and timely fund flow to institutions; (g) providing guidance and assistance on issues related to procurement, fellowship programs and use of consultants services; (h) monitoring and periodically reviewing progress of implementation of institutional projects and causing remedial actions to be taken, and (i) receiving and compiling State-wide audit reports, and preparing reimbursement claims based on inputs from institutions.

Institutional Level Management Structures

At the institute level, an Institutional Project Management Unit (IPMU) will be responsible for implementation of the project. It will report to the Board of Governors (or Governing Council/ Management Committee) of the Institute and coordinate with the respective SPFU and NPIU.

Board of Governors (BOG)

For exercising its managerial autonomy, each institution will have/establish its own BOG with adequate representation from the stakeholders, taking guidance from a sample Memorandum of Association (MOA) and Rules developed by the GOI. The BOG will meet at least once every 3 months, and discharge its functions, which among others include: (a) taking all policy decisions; (b) developing strategies for creating an ambience for excellence; (c) suggesting measures for enhancing reach and effectiveness of services to community and industry; (d) ensuring institutional accountability and compliance with policy reforms; (e) reviewing progress of institutional project implementation and giving guidance for achieving project goals and targets; and (f) overseeing proper utilization of funds and submission of reimbursement claims.

Institutional Project Management Units

Each Lead and Network institution will constitute an Institutional Project Management Unit (IPMU), staffed solely by the institute faculty and staff and headed by the Head of the institution. The exact composition of each IPMU and constitution of its sub-units will vary between institutions, depending on the institutional project design. The overall responsibility for institutional project implementation and its internal monitoring will be that of the IPMU, which will be assisted by units assigned with work related to: (a) each of the sub-components of Institutional Development component; (b) procurement of goods, civil works and services; and fellowship and management development programs; (c) financial management; (d) project implementation monitoring; and (e) conduct of quality and efficiency audit of educational processes and institute functioning; and evaluation of institute's performance in the exercise of autonomies with accountability, and in implementing reforms.

The major activities of each IPMU will include: (a) implementing activities related to academic excellence, formal and non-formal networking, providing services to community and the economy, and development of management capacity in accordance with the action plans contained in the institute proposal; (b) monitoring achievement of targets; (c) conducting quality and efficiency audits and submitting reports to BOG along with recommendations for improvements; (d) monitoring compliance with conditions of Program funding including the agreed institutional reforms, and submitting periodical reports to BOG along with recommendations for remedial actions as required; (e) ensuring timely conduct of financial audits and timely submission of audit reports to SPFU; and (f) providing all relevant information to SPFU for enabling the State Government to claim reimbursement.

6. Program/Project Monitoring

The primary responsibility for monitoring individual institutional projects will lie with the institutions themselves and the SPFUs, and at the national level with the NPIU. IPMUs will monitor project activities on day-to-day basis in their respective institutions and present quarterly progress reports to their respective BOGs and SPFUs. The SPFUs will quarterly consolidate the reports from all the state institutions and present the status to the concerned State Secretary and the NPIU.

At the national level, progress of Program implementation will be reviewed periodically by the NPD, and bi-annually, at mid-term and end-of-Phase jointly by the GOI and the World Bank. The monitoring and evaluation will be based on the action plans prepared by each institution and a set of key performance indicators. Focus of monitoring and evaluation will be on *outcome and output indicators* along with five key project aspects: (a) implementation of reforms by institutions; (b) achievements in Program components and sub-components; (c) procurement of resources and services; (d) achievement in staff development and management capacity development activities; and (e) utilization of financial allocations. These five aspects of Program monitoring would require a holistic view to be taken of actual achievements of Program goals rather than focussing on mere completion of the process.

The tools for monitoring and evaluation would be: (a) institutional progress reports and internal quality and efficiency audit reports; (b) visits to institutions by SPFUs and NPIU; (c) State's progress reports; (d) NBAREports; (e) educational research studies and external quality, efficiency and performance audit reports; and (f) interactions with stakeholders.

Progress in implementation of the institutional reforms sought under the Program, functioning of improved procedures and processes, achievements in quality components, achievement of targets related to key performance indicators; and external quality, efficiency and performance audit reports along with action taken reports would constitute important components of State reports prepared for bi-annual and Mid-Term Reviews. The NPIU will, based on these State reports, present a State-wise performance report

with analysis and suggest remedial actions required at the State and national level, if any, and present the same during the joint reviews. The NPIU report for each joint-review would also include results of concluded educational research studies and status of ongoing studies. The joint-reviews would also include visits to select institutions and interaction with stakeholders such as students, teachers and, industry and community representatives. These joint-reviews will help identify problem areas and suggest remedial actions to be taken at different levels.

The Mid-Term Review, undertaken jointly by the GOI and the Bank, will also assess Program progress, consider revised institutional development plans with new targets, take decisions regarding institutions that have not shown satisfactory performance, and assess the Program design requirements for a subsequent Program phase.

The GOI and the Bank will also jointly undertake an Implementation Completion Review Mission to assess the overall achievement of the Program objective at the end of each phase of the Program.

Annex3: Estimated Project Costs

INDIA: Technical/Engineering Education Quality Improvement Program-Phase I

Project Cost by Component	Local US\$ million	Foreign US\$ million	Total US\$ million
A. Institutional Development sub-projects	239.40	34.20	273.60
(a) Promoting academic excellence	186.80	26.70	213.50
(b) Networking of institutions	28.00	4.00	32.00
(c) Providing services to community and economy	24.60	3.50	28.10
B. System Management Capacity Improvement	8.40	0.60	9.00
Total Baseline Cost	247.80	34.80	282.60
Physical Contingencies	12.00	1.70	13.70
Price Contingencies	14.60	3.10	17.70
Total Project Cost	274.40	39.60	314.00
Total Financing Required	274.40	39.60	314.00

Project Cost by Category	Local US\$ million	Foreign US\$ million	Total US\$ million
Institutional Development sub-projects	265.50	39.00	304.50
Goods*	0.77	0.08	0.85
Books and learning resources*	0.11	0.05	0.16
Consultant services*	1.10	0.12	1.22
Training and workshops*	1.05	0.35	1.40
Recurrent costs: Incremental Salaries*	2.50	0.00	2.50
Recurrent costs: Incremental operating costs*	3.37	0.00	3.37
Total Project Cost	274.40	39.60	314.00
Total Financing Required	274.40	39.60	314.00

* For Component II only

The estimate for Component-1: Institutional Development Sub-projects, which accounts for about 97% of the total cost, is based on the following assumptions made by the Government of India in the design of the First phase of the program:

1. Institutes will be selected on a competitive basis based on their own vision and plans, which may vary significantly from others;
2. The Program would fund about 20 lead institutions and about 60-80 network institutions, including some polytechnics;
3. The funding for each lead institution could be of the order of Rs. 500 million (about US\$ 10 million). On the average, a network institution could receive about Rs. 100 million (about US\$ 2 million). The polytechnics could expect about Rs. 50 million each.

4. As a broad guideline, the institutions are expected to spend about 10% (maximum) on works, 45% on goods (equipment, books, learning resources, furniture, vehicles), 15-25% on services (training, fellowships, consultancies, workshops/seminars), and the balance on salaries of additional staff, operations and maintenance, consumables, travel, etc. (Different percentages and ceilings are suggested for lead institutions and networked institutions in the Program Working Document for States and Institutions.)

The relatively small fund for Component-2 is supplemented by the GOI's/participating States' own funding for strengthening system management capacity.

Annex4 EconomicAnalysis

INDIA: Technical/EngineeringEducationQualityImprovementProgram-PhaseI

1. Background

India's objective of promoting economic growth by competing in global markets requires well-trained, technologically competent personnel who can adapt to rapid changes in technology and who can contribute to technological improvements and augment productivity growth. As discussed below, the non-availability of capacity to train high quality professionals is the critical constraint in engineering education in India.

The objective of this Program is to support the production of high quality engineering professionals through integrated reforms in the engineering education system. The Program can be considered a success if the engineering education subsector efficiently produces graduates who will be in greater demand in a competitive economy functioning in global markets.

This annex examines: (a) the market for engineering skills; (b) the rationale for public investment; and (c) cost-benefit analysis of the Program.

2. The Market for Engineering Skills

The Supply of Engineering Skills and the Market for Engineering Education

The formal engineering education system currently embraces 1,059 degree level institutions with an approved annual intake of 294,075 at the undergraduate level. Capacity expansion—both in aggregate and by discipline—is regulated by the All India Council for Technical Education (AICTE) which grants approval for institutes and courses.

The public sector (comprising about 180 Central and state government institutions) currently provides only 17 percent of total enrollment at the undergraduate level; most of the expansion in capacity in the nineties has occurred in the private sector. A few private institutions receive government aid (for teachers salaries) but the majority are unaided. There is a clear differentiation in the quality of education provided by engineering institutes, leading to a situation where the total supply is divided into distinct segments. At least three tiers of the system can be distinguished. At the apex are the Indian Institutes of Technology and a few other reputed institutes, run by the Central government; in the second tier are the 17 Regional Engineering Colleges (RECs—funded jointly by the Central and State governments), and about 30 well-established government and private aided colleges; and the third tier consists of the majority of private colleges (mostly unaided) of varying quality. Ten of the RECs have now been converted into National Institutes of Technology with "deemed university" status and with full Central funding. The public sector institutes are distributed relatively evenly across different states while the private sector is concentrated in the southern and western regions of the country.

Student demand for engineering education is also differentiated by quality. Students prefer high quality education and, in the absence of restrictions on fees, they would be willing to pay more for higher quality than for lower quality education. However, the high quality seats are in limited supply. They are also almost entirely in publicly funded institutions and regulations on fees ensure that these have the lowest fees. These features of the market result in considerable excess demand for high quality engineering education which is cleared by a screening mechanism consisting of entrance examinations and an elaborate system of quotas. The admission process and guidelines for the fee structure are laid down in a

Supreme Court judgement that is applicable to all states and all types of institutions (the actual fee level, however, is fixed by individual state governments and varies across states). Students are ranked by their performance on the Common Entrance Examination conducted by each state and are allowed to choose the college and discipline by order of merit. All seats in publicly funded colleges have low fees while 50 percent of these seats in private colleges are also offered at low fees (called "free seats"); of the remaining "payment" seats, 40-45 percent are charged much higher fees and 5-10 percent is reserved for Non-Resident Indians who pay dollar-denominated fees. Reservations based on caste and community are applicable in government funded colleges and follow Central/state government guidelines.

The demand for engineering education depends in part on the demand for skills (discussed in the next section), although social factors play an important role in India in ascribing higher status to engineers than to general higher education graduates. Both labor market demand and social factors ensure that demand for engineering education is not constrained but there are constraints on the supply of high quality engineering education which are due to the following factors:

- Increase in high-quality capacity in public sector institutes is constrained by budgetary factors. In 1998-99, state governments funded about 58 percent of total costs (current and annualized capital costs) with the Central government funding the remainder. Central government expenditures on technical education grew at about 6 percent per annum in real terms in the nineties, but the real growth in state government spending is likely to have been much lower due to the fiscal crisis in many states. Total public spending on technical education is about one-tenth of one percent of GDP at current market prices and is low relative to that in advanced countries (Srivastava and Rao, 2002). Much of the real increase in expenditures during the nineties has been on account of growth in salaries, with limited amounts being spent on quality improvement.
- The private sector's contribution to high quality engineering education is still limited, although it has contributed significantly to overall capacity expansion. The reasons are many. First, lack of access to capital markets and high interest rates on borrowed funds prevent mobilization of capital on the required scale. Many institutions did not fund libraries, laboratories and Information Technology adequately. Second, regulations on fees, other sources of revenue and costs make it difficult for private colleges to function. College fee revenues are determined by various quotas and the differential pricing of seats that are determined at the state level in line with Supreme Court guidelines and applicable to all colleges in the state. The normative recurrent costs are determined by AICTE guidelines (staff-student ratios, salary levels of staff) and are uniform across states. The fee structure determined by each state is expected to take into account the normative recurrent cost but, in practice, there is wide variation across states in the fees charged for "free" and "payment" seats. If some of the high-priced seats are not filled, colleges find it difficult to break-even. Colleges often resort to cost-reduction measures such as paying salaries below AICTE norms, hiring faculty with lower qualifications on short-term contracts and not providing for faculty training or depreciation (Dhananjaya, 2002). Actual recurrent costs are reduced below the norms at the expense of quality and hence many private unaided colleges provide low quality education, although students are charged the same fees as in high quality colleges.
- Both public and private institutes are unable to adapt quickly to the changing needs of the economy and the labor market. The process of introducing new courses, changing curricula and evaluation methods is cumbersome with multiple controls and sanctioning authorities at both state and Central levels.

Constraints on the supply of higher quality engineering education also affect equity. Students choose their college/discipline by order of merit on their performance in the CET and equity considerations are addressed by (a) fixing quotas for students from Scheduled Caste/Scheduled Tribe (SC/ST) and

backward classes background in the publicly-funded colleges and grouping students within each of these categories by order of merit (this means that entry level requirements can be lower for these groups as compared to other groups) and (b) fixing lower fees for seats in publicly-funded colleges and in 50 percent of seats in the private unaided colleges. In effect, these policies mean that the best students choose the best colleges (generally the publicly funded colleges) and pay lower fees. If performance in the entrance examination is correlated with socio-economic status, as suggested by the enormous private expenditure on pre-examination coaching, richer students are likely to gain entry into the high-quality, publicly-funded colleges and hence access public subsidies or the "free seats" in private colleges. Those who perform less well in the CET will tend to be in the higher priced seats in private colleges; if these students are also from relatively poorer backgrounds, this will mean that the poorer students not only do not gain access to public subsidies but they also cross-subsidize the richer students. The priced differential between the "free seat" and the "payment seat" is quite substantial, indicating a high level of cross-subsidization. The quotas for SC/ST and other backward classes alleviate the inequitable distribution of public subsidies to some extent provided these students are from poorer backgrounds as compared to the "non-reserved" category of students (which is likely to be the case). There is no empirical evidence, however, on the equity impact of the present fee/quota structure.

The existing fee-quota structure is complex and its impact on efficiency and equity is difficult to gauge. However, expanding the total supply of high quality education will enable more students from poorer or deprived social backgrounds to study in high quality colleges, even within the existing fee-quota policy framework.

Postgraduate engineering education is provided only in the IITs, the RECs/NITs, some state government and University colleges and a few private colleges. There are 21,460 seats available in 242 institutions. Even this capacity is underutilized as demand is influenced by the relatively low anticipated financial returns to teaching and research (which employs postgraduates) and high opportunity costs. The admission to postgraduate (PG) programs is also primarily limited due to anational level Graduate Aptitude Test for Engineering (GATE). Only students qualifying through GATE are eligible for admission to PG programs with government scholarships. Data collected from a sample of institutions in Uttar Pradesh, Karnataka and Andhra Pradesh indicate that actual intake is between 40-75 percent of the sanctioned intake in various disciplines.

Demand for Technological/Engineering Skills and Demand-Supply Mismatches

Since liberalization in the early 1990s, the private sector demand for engineers and technicians has been growing strongly. Data from the National Technical Manpower Information System (NTMIS) database covering more than 2000 industrial establishments show that employment of engineers and technicians in the private sector grew at an annual rate of 5.5 percent during the period from 1991 to 1995. Liberalization has also led to closures/cutbacks in the public sector - employment of engineers and technicians decreased by an annual rate of 2.3 percent in this sector during the same time period. Unfortunately, there has been limited rigorous analysis examining the demand for technical and engineering skills in India. However, what data exist, tend to demonstrate the mismatch between demand and supply.

Based on projections of needs of various technical and engineering skills, the Institute of Applied Manpower Research estimated skill shortages/surpluses for various disciplines in 2002, using 1995 NTMIS data as the base year. While these numbers are manpower projections and do not take into account unforeseen changes in demand and external environment, they are useful for illustrative purposes. These projections show significant shortages in many disciplines (e.g. computer engineering)

and surpluses in others (e.g. mechanical engineering) and suggest that institutions are slow in responding to changing market needs, owing to the inflexibility in the system.

The mismatch of demand and supply is better demonstrated by a tracer study of 8,642 graduates and 6,541 diploma holders carried out by the Nodal Center for Karnataka State (NTMIS) in 1997. According to this study, over 20% of degree holders in several disciplines had to wait for three years prior to gaining employment. In the case of diploma holders, graduates of some disciplines could not find employment even after three years (Table 4.1). These results indicate a need for regular assessment and adjustment of program to suit the market demands.

Table 4.1: Employment Rates after Graduation

Discipline	Degree			Diploma		
	0-1 Years	1-2 Years	2-3 Years	0-1 Years	1-2 Years	2-3 Years
Architecture	97	100	100	100	100	100
Automobile	39	72	100	54	84	100
Chemical	44	80	100	30	54	78
Civil	51	81	100	40	73	100
Electrical	79	100	100	33	60	100
Electronics	67	100	100	49	79	93
Industrial	58	88	100	NA	NA	NA
Mechanical	58	80	100	43	64	85

A survey of select industrial establishments was also conducted as part of the IAMR study with a view to identifying the relevance of existing courses to employers. This survey showed that the relevance of skills possessed by degree holders is rated reasonably well. However, employers feel that most diploma holders do not possess market-oriented skills. These results corroborate the data presented in Table 4.1.

Similarly, FICCI conducted a survey of 55 enterprises in late 2001 to get an assessment of the quality and relevance of higher/technical education from the industry's perspective. Close to 60% of the respondents felt that higher education institutions were not geared up to meet the challenges of the global economy. Over 43% of the respondents felt that academic institutions were not aligned to the needs of industry, 40% felt there were significant lacunae in curriculum development, and 30% of the respondents felt that the institutions lacked vision and awareness of global developments (Figure 4.1).

A majority of the respondents (86.7%) felt that institutions should foster greater exposure to industrial practices and over 40% also felt that higher education needed to include a closer industry-institute interface. They stressed the importance of a collaborative approach between academia and industry as an important factor in ensuring better matches between what industry wants and what the academic institutions produce.

This empirical evidence has been reinforced in discussions with a small group of employers and employer federations (FICCI, CII, and employers met in Indore) organized as part of project preparation. The lack of appropriate technical skills (and corresponding "soft" skills—e.g., teamwork, innovativeness) rank high on the list of bottleneck that Indian firms face as they try to expand output and increase productivity through technological upgradation. Employers feel that graduates of the engineering and polytechnic institutions lack practical knowledge and have to undergo significant on-the-job training in order to bring their skill level to match the needs of the industry. According to them, in order for the

system to be more responsive, it is crucial that participation of employers at the industry level be enhanced, and students and teachers be given some practical experience in industry. Most importantly, it is felt that the reforms should be introduced in the regulatory regime governing the operation of institutions, which currently inhibits any kind of autonomy, innovation and responsiveness to demand.

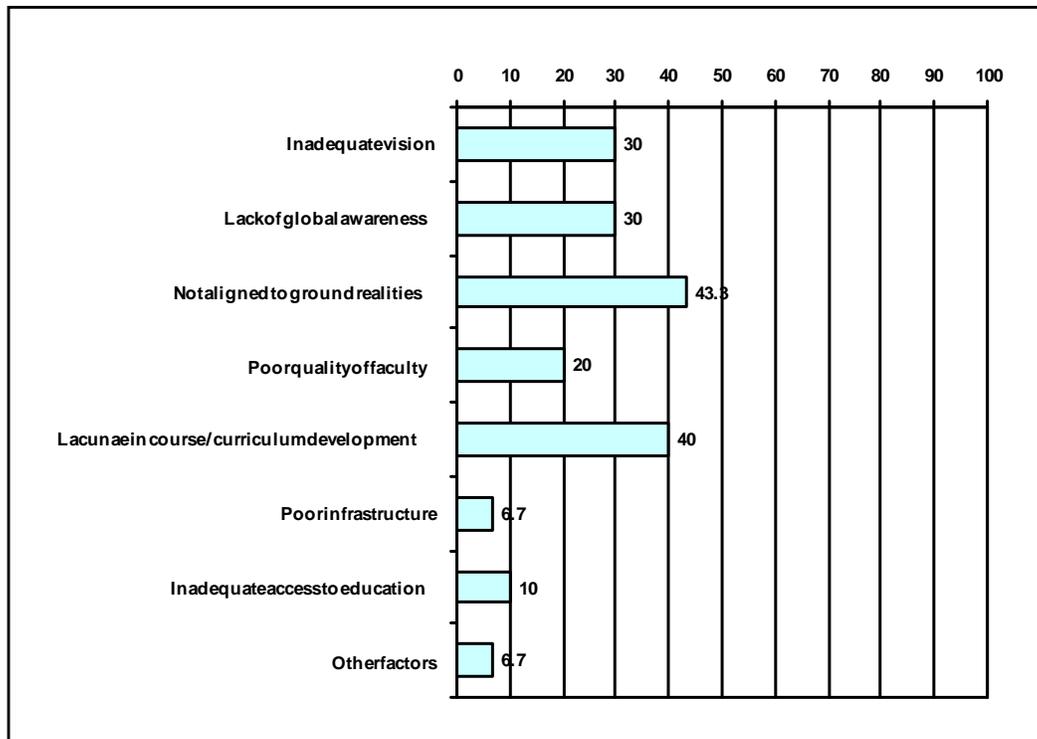


Figure 4.1: Industry Perception of Higher Education

While a thorough analysis of labor demand and demand-supply mismatch is not available, the evidence presented above supports the assertion of a poorly performing and non-responsive technical education sector.

3. The Rationale For Public Investment and Justification for Program Components

There are four reasons for public intervention in engineering education and all four are relevant in the Indian context:

- *Market failure* : this is reflected in the supply-side constraints discussed earlier, which prevents the private sector from expanding the supply of high quality engineering education.
- *Contribution to growth* : technical/engineering education contributes to innovations in productive technologies, augments productivity and increases the range and variety of products. The existence of significant positive externalities of tertiary education has been suggested by the international literature on “sources of growth” although there is no empirical evidence relating to India. In particular, externalities associated with emerging technologies, postgraduate education and research and development suggest a rationale for public investment in these areas.
- *Equity*: national household survey data show that relatively few students from low income households access engineering education. Given that engineering (or most higher education) graduates get on a higher income growth path as compared to the less-educated or those with general higher education, inequity in access will accentuate income inequalities over time. Due to the prevailing fee/quotas system, most of the subsidies for engineering education may not be

- currently directed towards the poorer students.
- *Information asymmetry* : the government has a crucial role to play in the collection, analysis and dissemination of information on (i) skill needs in the economy; and (ii) the type and quality of education provided in different institutions. The first will make the engineering education system more responsive to the labor market and student demand and the second will enable students to make more efficient decisions regarding the courses that are appropriate for them. Both these types of information are currently not available on a large scale in India.

In addition, there is excessive regulation of the engineering education system with both government and private colleges operating under multiple control that make it difficult for them to be responsive to the changing labor market and economic environment.

The proposed Program has two components: (i) competitive grants program under which support would be provided to selected public and private institutions for development; and (ii) system capacity development. The first component addresses supply-side constraints by improving the quality of public and private institutions (excluding the top level institutions like the IITs), through investments in lead institutions and networked partners, thereby increasing the overall supply of high quality places in engineering education. Program expenditures will be mainly devoted to activities to improve quality, student learning and research activities (including improvements in instructional techniques and instructional resources; modernized curricula and evaluation methods). The competitive grant mechanism also aims to direct public expenditure towards those areas with significant externalities. These selection criteria favor those institutions that encourage postgraduate education and/or introduce new courses in emerging technologies. Granting of academic, financial and administrative autonomy to institutions is a condition for eligibility to participate in the competition and this is expected to improve market orientation and flexibility, as well as augment private financing and thereby enable institutions to sustain quality improvements after the end of the project. The introduction of the block grants scheme in publicly funded institutions is expected to improve the efficiency of resource allocation within institutions.

The second component will contribute to system efficiencies by building the capacity of managers, research studies in best practice. It will also contribute in alleviating information asymmetries, and supporting quality assurance mechanisms.

The proposed Program does not address issues relating to efficiency and equity arising from the current fee/quota structure, which are governed by national case law and not amenable to change at this juncture, or from the current pattern of providing subsidies to institutions. However, it is anticipated that many of these issues will be analyzed further as part of the research program envisaged under the Program and policies to improve equity and efficiency. This project is envisaged as the first in a series of projects and further reforms will be considered in subsequent phases.

4. Cost-Benefit Analysis of The Competitive Grant Component

The economic benefits from the Program can be classified into three categories. First, the efficiency of public spending is expected to improve as the financing of publicly-funded institutions shifts from a system of gap-filling grants to block grants. Second, due to changes in the financing mechanism, private financing is expected to increase. Third, labor market outcomes improve with increases in earnings, employment rates and speed of employment.

Gains from improvements in the efficiency of public spending are difficult to quantify. It is proposed to shift from a system of gap filling grants for financing publicly funded institutes to a system of block grants. The state governments may make a matching contribution to the corpus/endowment fund

equivalent to the savings made by the institutes. Special grants would be made to cover instances of pay revision, devaluation of the Indian rupee, etc., which are beyond the control of institutes. The main incentives come from the government's matching grant which is meant to encourage institutes to augment their own resources and economize on their expenditures by redistributing existing faculty and other staff within a fixed total of staff positions. Efficiency in resource use will be improved because institutes will not need prior approvals for purchases of equipment for quality improvement and other internal adjustments, which normally take a lot of time.

A block grant scheme was introduced in IITs from 1993-94 with good results. This has been reviewed recently by an Expert Committee to make it more effective. The Committee has recommended major improvements in the funding pattern. It is suggested that the block grant be based on number of students at different level (UG, PG, research, part-time), generic research output and other considerations such as campus size, location, etc. The PIP includes recommendations of the Committee to help the states design their block-grant funding pattern. Discussions on adaptation and refinement of the block grants system will take place during the early phases of Program implementation.

Rate of return analysis

An internal rate of return has been calculated using the costs of the project and quantifiable benefits. Improvements in internal efficiency are proxied by higher pass out rates and in external efficiency by the higher probability of employment, higher earnings and reductions in search time for employment, for the three groups of students (post-graduate, degree and diploma level) in the two types of institutions (lead and network).

Benefits that are not quantifiable include externalities, gains in the efficiency of public spending resulting from improved practices and systems (component II of the project). Additional resource generation from the private sector, as a result of the shift to the block grants system, through continuing education programs and consultancy services are other benefits which have not been included in the rate of return analysis. Pre-project studies from a sample of institutions in Andhra Pradesh, Karnataka and Uttar Pradesh suggest that the revenue potential from continuing education programs and consultancy services could finance up to 15 percent of normal recurrent expenditures. In order to exploit these revenue sources, institutions need to set up appropriate administrative mechanisms and frame rules for undertaking continuing education and consultancy services; invest in required infrastructure; train personnel in market analysis, marketing, tendering, tax laws, contracting and project preparation. Institutional proposals will provide detail of these to enable selectors to assess the realism of projected revenue increases. Due to the difficulties in assessing the actual revenues that are likely to be generated, these benefits have not been included in the rate of return analysis. Other benefits that accrue from the program and have not been quantified include improved testing charges through use of sophisticated equipment provided in the project, sale of courseware and learning materials. There are also some indirect benefits that accrue from the project including faculty competence upgradation and increasing innovative and creative ability of students. Improved image of institutions fostered through management reforms, better infrastructure, better trained teachers, relevant curricula, and better learning practices would also bring indirect benefits to the participating institutions and the community. As stated above, these benefits are also difficult to quantify and have not been included in the quantitative analysis.

The cost-benefit model has been made as fine a description of economic reality as possible with the available data. The main problem in cost benefit analysis is the use of ex ante estimations for future projections. The model aims to show the rate of return to the project under credible scenarios. Furthermore, the results of the cost-benefit analysis under different risk scenarios—both, positive and negative deviations from the base assumptions about the efficiency of engineering education system and

the relevance of this education to the labor market – are also reported.

Assumptions

The numbers of potential beneficiaries are based on the data provided by the government. These are the expected numbers of students in lead and network institutions who are expected to benefit from the Program. The Program benefits are expected to kick in gradually – hence, while the lead and network institutions will be selected within the first 12 months of the program, for the purpose of this analysis, it is assumed that only about 20% of beneficiaries will be directly affected in the first year, 40% in the second year, 60% in the third year, and all students in participating institutions will benefit in the last two years (Table 4.2).

Table 4.2: Numbers of Potential Beneficiaries¹

Students	Year1	Year2	Year3	Year4	Year5
<i>Lead institution</i>					
Post Graduate	259	571	941	1725	1896
Graduate	4268	8620	13191	22644	23535
Polytechnic	1206	2532	3989	6979	7327
<i>Network institute</i>					
Post Graduate	1037	2283	3763	6900	7584
Graduate	17072	34482	52765	90576	94140
Polytechnic	4824	10128	15958	27916	29308

(¹ The difference in number of potential beneficiaries between Year 4 and Year 5 is due to an assumed growth in enrollments in these institutions.)

Data from engineering institutions and polytechnics on graduation rates, employment rates, wages and search time to get a job are not easily available. Hence, the data used in this analysis are based on a survey of a sample of engineering degree and diploma institutions (Table 4.3). Assuming these as representative, they have been used as a base case scenario on which to build the analysis.

Table 4.3: Current Graduation, Employment, Wages and Search Times²

	Graduation Rates (%)	Probability of Employment (%)	Annual Starting Wages (Rs.)	Average Search Time (Months)
<i>Lead...</i>				
Post Graduate	90	85	144000	11
Graduate	90	80	120000	
Polytechnic	80	75	72000	
<i>Network...</i>				
Post Graduate	85	80	120000	15
Graduate	85	80	96000	
Polytechnic	70	65	60000	

(² These numbers have been rounded off.)

It is assumed that the project leads to an improvement in these indicators for graduates of lead and network institutions (in comparison to individuals from institutions that have not been directly assisted by the project). The assumption is that as a result of Program interventions, over the life of the project, these indicators will move closer towards rates achieved in the more well-performing institutions (e.g., IITs and the better performing REC's). Hence, e.g., it is assumed that the employment probabilities of graduates in lead institutions will improve by roughly one percent per year, while for graduates in network institutions will improve by about 0.3% per annum relative to individuals in similar institutions that have not been assisted by the project (Table 4.4).

These assumptions may be somewhat arbitrary and the IRR is likely to be sensitive to changes in parameters. Hence, uncertainty has been incorporated into the model through assuming a distributional form for these parameters - with standard errors estimated from the sample of data we have on institutions. Given that comprehensive data on these parameters is not available, it has been assumed that they fit a normal distribution (standard errors are displayed in parentheses in Table 4.4 below).

Table 4.4: Annual Increases in Graduation, Employment, Wages and Reduction in Search Times Due to Project (standard errors in parentheses)

	Graduation Rates (%)	Probability of Employment (%)	Annual Starting Wages (Rs.)	Average Search Time (Months)
<i>Lead...</i>				
Post Graduate	1.0(0.5)	1.0(0.5)	3600(600)	0.2(0.05)
Graduate	1.0(0.5)	1.0(0.5)	2400(450)	
Polytechnic	0.8(0.4)	0.8(0.4)	1800(360)	
<i>Network...</i>				
Post Graduate	0.3(0.2)	0.3(0.2)	2400(450)	0.1(0.03)
Graduate	0.3(0.2)	0.3(0.2)	1800(360)	
Polytechnic	0.2(0.1)	0.2(0.1)	1200(240)	

Result of the analysis

Based on the assumptions specified above, and total project costs of \$314 million, the model predicts an Internal Rate of Return for the project of 14%*. As specified above, uncertainty has also been incorporated into various parameters in the model to estimate their impact on the rate of return. Using Monte Carlo simulation techniques, this allows us to compute the variability of the rates of return under different parameter assumptions. The chart below (Figure 4.2) provides the result of this analysis based on 10,000 simulations. It predicts a rate of return is centered around 14% and predicts that the 90% confidence interval of the IRR lies between 6% and 21%.

{*The current capacity utilization at the post-graduate level is around 50%. While the above analysis is based on full capacity utilization, if we assume that the capacity utilization at this level will only be at around 60% during the project, the overall rate of return will be around 12% }.

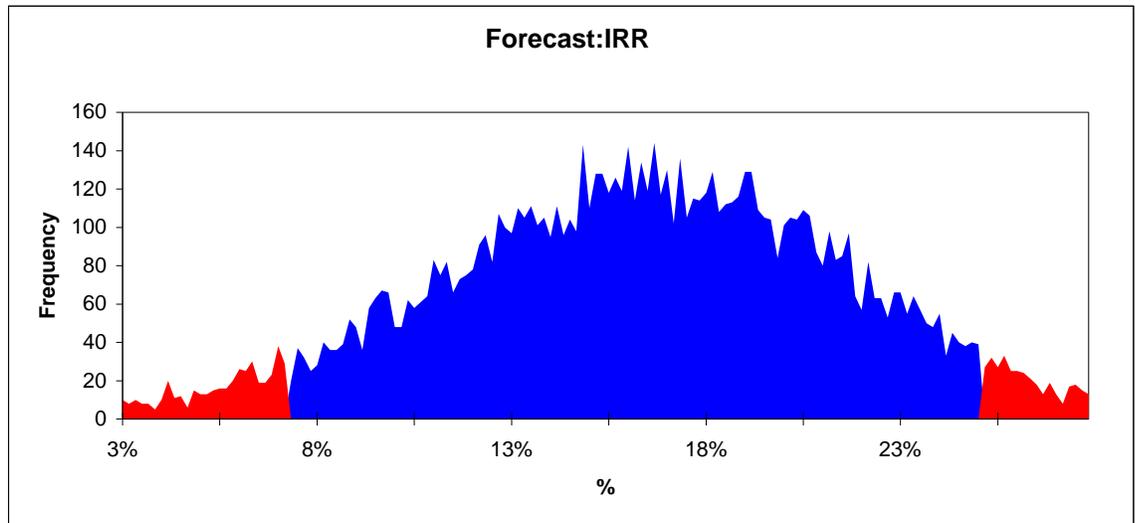


Figure 4.2: Internal Rates of Return

Alternatively, this implies that there is a 14% likelihood that the rate of return for the project will be less than 10%.

Risks scenarios

The simulations above were based on a “base” case scenario. The rates of return have also been estimated using different scenarios—a “high” case scenario and a “low” case scenario. Under the “low” scenario—rates of return have been estimated assuming the system does not achieve the desired level of internal efficiency (e.g., pass rates improve marginally) or the desired level of external efficiency (e.g., improvements in employment rates and productivity are marginal). Alternatively, under the “high” scenario, significant gains in the internal or external efficiency are assumed—pass rates, probability of finding employment and wages are at levels higher than in the base case, owing to factors such as high quality of education provided and a robust demand for engineering labor. The internal rates of return under these different scenarios are shown below (Table 4.5):

Table 4.5 : IRR under Different Scenarios of Internal and External Efficiency

Scenario	Low	Base Case	High
<i>Annual Increase in</i> ³			
Graduation Rates (%)	0.3	1.0	1.5
Employment Probability (%)	0.3	1.0	1.5
Wages (Rs.)	1200	2400	3600
Rate of Return (%)	3	16	23

³ Owing to space constraints we have only listed the data on annual increases under the three scenarios only for graduates in lead institutions. The actual computations are made based on similar assumptions made for post-graduates, graduates and polytechnic students for both lead and network institutions. ..)

In a case where the project significantly under-performs—low impact in terms of increasing pass rates and low impact in increasing the relevance of the education provided to labor market demand then the IRR will be below -3%. However, if the project over-performs, the IRR could be as high as 23%.

Rates of return have also been computed under scenarios that the total number of beneficiaries are only a

fraction of the potential beneficiaries of the project shown in Table 4.2 – i.e., not all students in lead and network institutions derive benefits from the project. It is apparent that the rates of return are sensitive not only to shifts in graduation rate, employment and wages, but also to the number of project beneficiaries (Table 4.6). For example, if only 50% of potential beneficiaries (as defined in Table 4.2) from both lead and network institutions derive benefits from the project, the rate of return will be 3%.

Table 4.6: Rates of Return under Different Scenarios of Number of Beneficiaries ⁴

Lead Institutions (No. of beneficiaries)	Network Institutions (No. of beneficiaries)	Rates of Return (%)
0.5	0.5	3.0
1.0	0.5	8.0
0.5	1.0	10.5
1.0	1.0	14.0

⁴ The number of beneficiaries are defined as a % of potential beneficiaries as defined in Table 4.2.)

The analysis shows that, under a “base case” scenario, the IRR will be around 14%. Simulations done incorporating uncertainty in the model, conclude that the IRR will lie between 6% and 21% (a 90% confidence interval).

Rates of return under several alternative risk scenarios have also been computed. The results show that the rates of return are sensitive to changes in assumptions on number of beneficiaries, graduation rates, employment probability and wages.

It will be necessary to monitor these variables during the life of the project, and especially to conduct a quasi-experimental impact evaluation to evaluate the labor market benefits for project participants in comparison to non-participants. Monitoring indicators are discussed in more detail below.

5. Criteria for Success and Monitoring Indicators

To be able to evaluate whether the project is achieving its intended objectives, the project will monitor some key performance indicators. The table below lists the main indicators that will be monitored during the program at both the institutional and system-wide level, the instruments and techniques to be used to monitor these indicators and the capacity requirements in order to be able to do this. In many cases, capacity already exists (either at the institutional or system-wide level) to monitor these indicators. However, the project is going to assist in developing capacity to monitor other indicators (Table 4.7).

Table 4.7: Performance Indicators

Indicators	Measurement Instruments/Techniques	Capacity needs and Level of Collection of Information
<i>Institutional Level.....</i>		
% employed within 6 months of graduation and wages obtained.	Follow-up surveys of students 6 months after graduation	Capacity needs to be developed to conduct follow-up surveys and analyze information
Unit cost in different disciplines (per student and per graduate).	Financial records of institutions and number of students and graduates	Capacity must be built in institutions to compute costs based on a standard format.
% of revenue raised through fees and self-generated sources and % of resources going to different uses	Financial records of Institutions	Capacity currently exists to collect this information.

(research activities, equipment, maintenance, salaries, etc.)		
% pass out rate of graduates and % of graduates with 1st division.	Academic records of institutions.	Capacity currently exists to collect this information.
<i>Institutional and System-wide Level.....</i>		
Satisfaction of employers with the quality of output coming out of the system.	Annual establishment surveys	Capacity will need to be developed at institutions to conduct and analyze local labor market surveys. Such capacity exists at the national level.
Dissemination of information to students and employers on type and quality of education provided at different institutions.	Dissemination of information through websites/print media.	Information (e.g., on types of courses, graduation rates, employment rates, etc.) will need to be collated and published.
Number and value of joint research, design and development projects, consultancies, training programs.	Financial and administrative information	Information can be collected at institutional level and collated system-wide. Capacity exists for this
Professional outputs (publications, products, designs, patents, etc.) from participating institutions.	Administrative information	Information can be collected at institutional level and collated system-wide. Capacity exists for this
<i>System-wide Level...</i>		
Comparison of labor market outcomes of graduates in relation to control group (are graduates of institutions assisted through program performing better relative to a comparable control group) and is the intervention cost-effective?	Quasi-experimental impact evaluations	Capacity need to be developed to design and conduct quasi-experimental impact evaluations
Total state and GOI resources going to the lead and network institutions. This should be available from state + GOI financial data.	GOI financial records	Capacity exists to collect this information.
Number of private providers being supported.	GOI data	Capacity exists to collect this information.
Number of accredited institutions and programs (both public and private).	NBA data	Capacity exists to collect this information.
Development and utilization of EMIS [this may be deleted]	Overall Program Key Performance Indicators	Capacity need to be developed to ensure that analysis of outcomes feeds back into the policymaking process

References

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- Dhananjaya M. H. & Bhashyam A. T., 2002. *Unit Costs and Sources of Financing for Engineering Colleges.* (study conducted for World Bank and GOI)
- World Bank, 2000. *India: Scientific and Technical Manpower Development in India (Report No. 20416-IN).*

Annex5: FinancialSummary

INDIA: Technical/EngineeringEducationQualityImprovementProgram-PhaseI

YearsEnding
2003-2007

	IMPLEMENTATIONPERIOD						
	Year1	Year2	Year3	Year4	Year5	Year6	Year7
TotalFinancingRequired							
ProjectCosts							
InvestmentCosts	22.7	75.0	92.5	85.4	32.3	0.0	0.0
RecurrentCosts	0.6	1.2	1.2	1.5	1.6	0.0	0.0
TotalProjectCosts	23.3	76.2	93.7	86.9	33.9	0.0	0.0
TotalFinancing	23.3	76.2	93.7	86.9	33.9	0.0	0.0
Financing							
IBRD/IDA	18.6	61.0	74.8	69.4	26.3	0.0	0.0
Government	4.7	15.2	18.9	17.5	7.6	0.0	0.0
Central	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Provincial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Co-financiers	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UserFees/Beneficiaries	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TotalProjectFinancing	23.3	76.2	93.7	86.9	33.9	0.0	0.0

Mainassumptions:

1. TheProgram'sfirstphasewouldbecompletedwithin5yearsfromeffectiveness;
2. Theselectionofinstitutionsinthefirstcyclewouldbecompletedandfundsallocatedtothemsoonafter effectiveness;
3. Thebalanceofthefundsundercompetitivefundingwouldbeallocatedtoinstitutionsselectedinthe secondorthirdcyclebythesecondyearofthefirstphaseoftheProgram
4. Mostoftheprocurementofgoodswouldoccurinthesecondandthirdyearofthefirstphaseofthe Program.
5. Expenditureonservices(training,consultancy,workshops,seminars,etc.)wouldoccurthroughthe entirefirstphaseperiod.Appointmentofadditionalstaffwouldbephasedasperneedsofinstitutions.
6. Flowoffundswouldoccurwithoutdelayonaquarterlybasis.

Annex6: ProcurementandDisbursementArrangements

INDIA: Technical/EngineeringEducationQualityImprovementProgram-PhaseI

Procurement

The components of the proposed Program and their procurement methods are summarized in Table-A and the procurement methods and prior review thresholds are represented in Table-B

A. Program Description and Procurement Arrangements

The Program spread over 10-12 years is expected to be implemented in 3 phases, each of about 5-year duration. It has 2 components with distinct modes of funding—Institutional Development (US\$304.5 million in the Phase I) and System Management Capacity Improvement (US\$9.5 million). Phase-1 will constitute about 30% of the total Program funding and cover about 80-100 institutions.

A.1 Component-1: Institutional Development through Competitive Funding (US \$304.5 million)

This component covers 3 major groups of activities (related to academic excellence, networking of institutions and services to community and economy). It would be funded on a competitive basis. Well-performing eligible engineering education institutions from eligible states would be selected in clusters (lead along with network institutions), based on their project proposals (in the range of US\$1-3 million each for networked institutions to US\$7-10 million each for lead institutions), through an open competition. Selection of states would be carried out for each phase, and selection of their institutions would be carried out in 2-3 cycles during each phase, allowing institutions to compete and join the Program.

Lead/Network Institutions would be free to design their own projects for achieving their self-determined goals for development, and would thus be free to propose resource requirements matching the proposed project activities. A procurement plan related to this component is not feasible as educational institutions to be included under this component would be selected over an extended period of time, based on the merits of their individual and widely differing development proposals; procurement plans of these institutions would however be detailed in their respective development proposals.

The procurement arrangements to be undertaken will be the responsibility of institutions for their respective activities proposed under the component, either directly for small value contracts or through the SPFUs/NPIU for goods and equipment to be procured through NCB/ICB . The institutions have the capacity to carry out small civil works at their level and through NCB using the services of PWD/procurement consultants .

Considering the nature of activities, this component would be financed as Institutional Development sub-projects. The details of procurement for this component would be as under:

A.1.1 Civil Works : The Program envisages 3 types of civil works activities: (a) refurbishment of existing infrastructure; (b) construction of buildings related to the academic excellence sub-component, which would include: (i) laboratories and workshops for strengthening teaching and training facilities for the existing programs, and (ii) laboratories, workshops, classrooms, student hostels, etc., related to new programs in emerging technology areas; and (c) improvement of facilities.

The majority of civil works (approximately 250 contracts) are expected to be less than US\$50,000

equivalent value, and these will be executed soliciting three quotations or Unit/Piece Rate System or Force Account procedure as a last resort. Institutions will undertake these works at their level. A few of the civil works are expected to be in the range of US\$50,000–300,000 equivalent value. These would be procured through National Competitive Bidding (NCB) for which institutions will appoint consulting firms as procurement agents, if required. However, percentage charges, if any, for services rendered by any State or Central PWD/State Department for implementation of construction will not be financed under the Program.

A.1.2 Goods : This procurement category includes equipment, vehicles, furniture; and books, software, learning resources and educational materials.

Procurement of equipment and furniture (*for laboratories, workshops, libraries, computer centers, community programs, networking, offices, and campus facilities*) and vehicles (*for activities related to service to community and economy*) would be phased on an annual basis in accordance with the requirement of institutional project activities, and where required, will be closely sequenced by each institution with the civil works program. Because of the likely wide variation in the type of goods required by individual institutions that would get selected over an extended period of time during Phase-I of the Program, there would be little scope for bulk buying to form ICB packages costing more than US\$200,000 equivalent value. Substantial equipment procurement is expected to be undertaken through NCB (in packages ranging from US\$50,000 to US\$200,000 in equivalent value) for strengthening and modernizing laboratories, workshops, libraries and computer centers. Institutions would also have large requirements for both high-tech and proprietary equipment for postgraduate and research programs, and these are expected to be procured through Direct Contracting (in packages costing US\$20,000 or less in equivalent value) and International Shopping (in packages costing less than US\$50,000 in equivalent value). Equipment of routine nature, furniture and vehicles would be procured through National Shopping (in packages costing less than US\$50,000 in equivalent value). There would be approximately 5000 contracts with an average value of US\$ 40,000, 500 contracts with an average value of US\$100,000 and 30 contracts above US\$200,000.

It is envisaged that of the total expected expenditure on goods and equipment procurement, 2% may be through ICB, 25% through NCB and the remaining 73% through Other methods (National and International Shopping and Direct Contracting).

Because of the low volumes of different books, proprietary software, learning resources and educational material to be procured under a very wide variety of subjects, preparation of attractive packages to solicit quotations/bids would not be possible; direct contracting with the authorized dealers/suppliers would be the most appropriate method for procurement with each contract not exceeding US\$50,000 equivalent value. In addition, small items costing below US\$500 each would also be procured under Direct Contracting up to an aggregate of US\$1.0 million.

A.1.3 Technical Assistance, Studies, Training and Workshops: The Program will fund services required for implementation of such activities as training and fellowship programs, workshops and seminars, etc. Services of consultants, both individuals and firms (engaged as per *Guidelines for Selection and Employment of Consultants by World Bank Borrowers*) for procurement of civil works (including supervision wherever provided) and goods, estimated to cost less than US\$500,000 for consultant contracts would be procured using Quality and Cost-based Selection with shortlist. For development of academic aspects of institutional development sub-projects, consultants would be engaged on the basis of selection under a fixed budget (paragraphs 3.1 and 3.5 of the Consultant Guidelines). For conducting policy research studies, and for performance reviews of reforms, quality and efficiency costing

less than US\$100,000 equivalent per contract would be awarded on Selection based on Consultant Qualifications (paragraphs 3.1 and 3.7 of the Consultant Guidelines).

A.1.4 Miscellaneous Costs : These would cover salaries of agreed additional faculty and staff, stipends/scholarships, expenses incurred on operation and maintenance (operation and maintenance of equipment and vehicles, hiring cost of vehicles and offices, hiring of off-campus buildings for community programs and programs for unorganized sector of the economy, maintenance of buildings, travel expenses and office expenses) and consumables such as laboratory and workshop supplies, telephone, stationary, electricity, water, etc. identified solely for the benefit of the project. The total miscellaneous cost would be limited to 15% of the total for each institutional project.

A.2 Component-2: System Management Capacity Improvement (US\$9 .5million)

This component would support, at the central and state levels, establishment of Program management structures; conduct of engineering education related research studies; conduct of performance, quality and efficiency audits of institutions by SPFUs and NPIU; and training of education policy planners, managers and administrators within India and abroad. States/UT and GOI will be responsible for their respective procurement activities either directly or through consultants.

A.2.1 Civil Works : No civil works are proposed under this component.

A.2.2 Goods (US\$1.01million): The goods to be procured would include office and communication equipment, furniture, vehicles, books, and computer software. Because of the low volumes required by individual SPFUs and NPIU, equipment, furniture and vehicles would be procured by each through National Shopping including DGS & DRate Contract in packages costing less than US\$50,000 equivalent value. There would be no NCB/ICB as all contracts (approximately 100) would be below US\$50,000. Books and proprietary software costing less than US\$50,000 equivalent value, required by each SPFU and NPIU in low volumes, would be procured through Direct Contracting.

A.2.3 Technical Assistance, Studies, Training and Workshops (US\$2.62million) : The Program will fund services required for Program preparation, conduct of training workshops, organization of seminars, conduct of research studies, and conduct of different types of audits (quality, performance and efficiency), providing guidance in procurement, etc. Consultant services would be procured as per *Guidelines for Selection and Employment of Consultants by World Bank Borrowers*.

A.2.4 Miscellaneous Costs (US\$5.87million) : These would be financed on a declining basis and would cover salaries of agreed additional staff for the NPIU and SPFU, expenses incurred on operation and maintenance (operation and maintenance of equipment and vehicles, hiring cost of vehicles and offices, maintenance of buildings, travel expenses and office expenses) and consumables such as telephone, stationary, electricity, water, etc. identified solely for the benefit of the project.

B. Procurement Implementation Capacity

Inasmuch as the institutions that would participate in the Program in Component-1 cannot be identified at this stage, it has not been possible to make a specific procurement assessment. However, the specified questionnaire was circulated to a sample of 6 institutions (which represent by and large the profile of institutions likely to get selected under the Program) to assess their procurement capacity.

Based on the responses to the questionnaire and in-depth discussion with these institutions, it was

concluded that the institutions have the capacity to procure small civil works themselves, and larger works using the services of State PWDs or procurement consultants. This capacity can be used for carrying out small works at institutional level with some training and guidance by the NPIU in Bank procurement methods, and by hiring services of procurement consultants in accordance with *Guidelines for Selection and Employment of Consultants by World Bank Borrowers*.

It was also assessed that the institutions have limited capacity for equipment procurement. Institutions are not conversant with Bank's procurement procedures of NCB and ICB, and have largely been following State government procedure of inviting open tenders in small value packages. Institutions at best would be able to manage procurement in packages not exceeding US\$50,000 equivalent value essentially using the National Shopping method. For NCB/ICB they would need hands-on assistance from NPIU/SPFUs.

The NPIU will carry out ICB procurement for all institutions. In addition, NPIU would also carry out NCB procurement for central institutions as required. The SPFUs would carry out NCB procurement for the respective states sponsored institutions. The SPFUs could also carry out NCB procurement for the central institutions located in the state if so desired by the latter. All the concerned staff would be formally trained in procurement at ASCI, Hyderabad or NIFM, Faridabad and such other institutions as may be identified later. The need for hiring a Procurement agency at the National level would be reviewed after one year of the Program effectiveness.

Procurement methods (Table A)

Bank-financed works and goods will be procured using *the Guidelines for Procurement under IBRD Loans and IDA Credits* of January 1995, revised January, August 1996, September 1997 and January 1999. Services will be procured using the *Guidelines for Selection and Employment of Consultants by World Bank Borrowers* of January 1997, revised September 1997, January 1999 and May 2002. The procurement methods applicable to the various expenditure categories are summarized below. For procurement under the Program, the Bank's standard bidd documents (as modified for India specific conditions) shall be used.

Contracts for civil works estimated to cost over US\$50,000 equivalent will be carried out following National Competitive Bidding (NCB) procedures acceptable to the Bank. Each contract estimated to cost equivalent to US\$50,000 or less will be procured following procedures acceptable to the Bank: (a) National Shopping; (b) Unit/Piece Rate System; or (c) through Force Account, as a last resort.

Contract for the purchase of goods valued more than US\$50,000 but less than US\$200,000 would be awarded on the basis of NCB procedures acceptable to the Bank. Items or group of items valued at US\$50,000 equivalent or less per contract may be procured on the basis of International and National Shopping procedures. Proprietary equipment of US\$20,000 or less per contract in the case of the Institutional Development component; books, proprietary software, learning resources and educational materials of value US\$50,000 or less per contract; and other items or small group of items valued at less than US\$500 equivalent per contract may all be procured through Direct Contracting.

For procurement of equipment, vehicles and furniture, DGS & D rate contracts will be treated "equivalent" to National Shopping.

Contracts for procurement of consumables, maintenance of equipment and vehicles under the Miscellaneous costs category may be awarded through: (a) Direct Contracting; or (b) National Shopping procedures.

All NCB contracts to be financed from the Credit under the Program would follow procedures satisfactory to the Bank/Association, which are:

1. Only the model bidding documents for NCB agreed with the Government of India Task Force (as amended from time to time) shall be used for bidding.
2. Invitation to bid shall be advertised in at least one widely circulated national daily newspaper, at least 30 days prior to the deadline for the submission of the bids.
3. No special preference will be accorded to any bidder when competing with foreign bidders, state-owned enterprises, small-scale enterprises or enterprises from any given state.
4. Except with the prior concurrence of the Bank/Association, there shall be no negotiation of price with the bidders, even with the lowest evaluated bidder.
5. Except in cases of force majeure and/or situations beyond the control of the state/UT, extension of bid validity shall not be allowed without the prior concurrence of the Bank/Association: (a) for the first request for extension if it is longer than eight weeks; and (b) for all subsequent requests for extension irrespective of the period.
6. Re-bidding shall not be carried out without the prior concurrence of the Bank/Association. The system of rejecting bids outside a pre-determined margin or "bracket" of prices shall not be used.
7. Rate contracts entered into by DGS & D will not be acceptable as a substitute for NCB procedures. Such contracts will be acceptable for any procurement under National Shopping procedures.

C. Assessment of Borrowers' Readiness to Implement the Program

The GOI has completed the first stage of Program implementation by announcing the Program and selecting 6 eligible States (Haryana, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra and Uttar Pradesh) for participation in Phase-1 of the Program. It has also developed the mechanism for selection of institutions through open competition, and this process would be activated soon after negotiations. About 80-100 institutions would be selected within 12 months of Program commencement. Selections will be based on project proposals prepared by institutions in a prescribed format. This format specifically requires preparation of procurement plans, at least for the first year, complete with lists and brief specifications and schedule of requirements. Institutions will thus be able to start procurement by Direct Contracting and National Shopping soon after their selection. Procurement by ICB/NCB/International Shopping would commence in about 6 months from Program effectiveness by which time the Procurement cells in NPIU and SPFUs would be in place.

D. Review by the Bank of Procurement Decisions

Procurement Planning

Procurement plans of institutions will be reflected in their project proposals. As institutions under Component 1 cannot be identified prior to their actual selection, their procurement plans cannot be known, and be subjected to any prior approval process. This being a highly competitive Program in which institutions have to demonstrate their preparedness to implement all project-related activities in accordance with the declared schedule, it can be safely assumed that all institutions would have prepared, at the proposal stage itself, their procurement plans for timely completion of the related project activities.

Under Component 2, States and NPIU have small annual requirements of computers, office and communication equipment and furniture. These will be procured by National Shopping and Direct Contracting. Though initial procurement planning has been carried out by NPIU and States, these plans

being of low value need not be subjected to the Bank approval process.

Prior Review

The first NCB civil works contract regardless of value from each institution, all civil work contracts above US\$300,000 equivalent value, all goods contracts above US\$200,000 value and the first NCB contract for goods from each SPFU/NPIU regardless of value will be subject to prior review by the Bank as per provisions set forth in paragraphs 2 and 3 of Appendix-1 of the *Guidelines for Procurement under IBRD Loans and IDA Credits* of January 1995, revised January, August 1996, September 1997 and January 1999. All consultancy contracts with firms of value more than US\$100,000 and with individuals of value more than US\$50,000 would be subject to prior review by the Bank as per provisions set forth in paragraphs 2 and 3 of Appendix-1 of *Guidelines for Selection and Employment of Consultants by World Bank Borrowers* of January 1997, revised September 1997, January 1999 and May 2002.

Post Review

The contracts below the prior review threshold for works, goods and consultancy contracts shall be subject to post review as per procedure set forth in paragraph 4 of Appendix-1 of the *Guidelines for Procurement under IBRD Loans and IDA Credits* of January 1995, revised January, August 1996, September 1997 and January 1999 and paragraph 4 of Appendix-1 of *Guidelines for Selection and Employment of Consultants by World Bank Borrowers* of January 1997, revised September 1997, January 1999 and May 2002. About 5% of the contracts are expected to be post-reviewed. The Project provides for a financial audit to be conducted by independent auditor to be hired by NPIU and SPFUs for expenditures incurred as well as asset verification and technical audit. In addition to the review of the audit reports and the random ex-post reviews conducted by firms engaged by the Region for post award reviews on the India portfolio as a whole, Bank staff would conduct post award review during supervision missions.

Procurement Information

Each institution will quarterly prepare a progressive statement giving details of bids floated, bids rejected, contracts awarded, contracts completed and percentage utilization of funds allocated for various physical resources. These statements will be submitted to their own BOG and the SPFU. The SPFUs will in turn compile their state-wide progressive statements quarterly and submit the same to the NPIU. The NPIU will compile the progressive statements nationally for each quarter, and present the same to the NPD for review. The NPIU will also prepare progressive statements bi-annually for Joint Review Missions.

E. Proposed Procurement Arrangements

The Program components, their estimated costs, and proposed methods of procurement have been summarized in Table-A. Figures in parenthesis are the respective amount to be financed by IDA/Bank.

Table A: Project Costs by Procurement Arrangements
(US\$ million equivalent)

Expenditure Category	Procurement Method ¹				Total Cost
	ICB	NCB	Other ²	N.B.F.	
1. Institutional Development sub-projects	6.09 (4.87)	76.13 (60.90)	222.28 (177.53)	-	304.50 (243.30)
2. Goods ³	-	-	1.01	-	1.01

			(0.79)		(0.79)
3. Consultants services ³	-	-	1.22 (0.97)	-	1.22 (0.97)
4. Training and workshops ³	-	-	1.40 (1.40)	-	1.40 (1.40)
5. Incremental Operating costs including salaries ³	-	-	5.87 (3.54)	-	5.87 (3.54)
Total	6.09 (4.87)	76.13 (60.90)	231.78 (184.23)	-	314.00 (250.00)

1 / Figures in parenthesis are the respective amounts financed by IDA

2/ Includes civil works and goods to be procured through national shopping, consulting services, services of staff of the Program management offices and contracted staff for institutional project implementation, training, technical assistance services, and incremental operating costs related to managing the Program and implementing institutional projects.

3/ Categories 2-5 of expenditure refer only to Component-2: System Management Capacity Improvement.

Prior review thresholds (Table B)

Table B: Thresholds for Procurement Methods and Prior Review

Expenditure Category	Contract Value (Threshold)	Procurement Method	Contracts Subject to Prior Review/Estimated Total Value Subject to Prior Review
Civil Works	(a) Civil works estimated to cost the equivalent of US\$50,000 or less per contract maybe executed by: (i) Comparison of bids solicited from at least 3 qualified contractors (ii) Unit/Piece Rate System through qualified contractors (iii) By Force Account as a last resort in a manner satisfactory to the Association	National Shopping	Post Review only
		Rate Contract	Post Review only
		Force Account	Post Review only
	(b) Civil works estimated to cost more than the equivalent of US\$50,000 per contract.	National Competitive Bidding (NCB)	First works contract by each institution under NCB regardless of value and all contracts above US\$300,000 by prior review in accordance with paragraphs 2 and 3 of Appendix 1 to the <i>Guidelines for Procurement under IBRD Loans and IDA Credits</i> of January 1995, revised January, August 1996, September 1997

			and January 1999. All others by post review.
Goods			
(a) Equipment	(i) US\$50,000 equivalent or less per contract	International Shopping and National Shopping (includes DGS & Drate contracts).	Post Review only
	(ii) Proprietary equipment of US\$20,000 equivalent or less per contract	Direct Contracting	Post Review only
	(iii) Contracts of more than US\$50,000 equivalent but less than US\$200,000 equivalent.	National Competitive Bidding (NCB)	First bidding document and first contract from each SPFU/NPIU by Prior Review.
	(iv) Contracts of more than US\$200,000 equivalent	International Competitive Bidding	First bidding document from NPIU and all contracts for prior review
(b) Furniture	US\$50,000 equivalent or less per contract	National Shopping	Post Review only
(c) Books, Proprietary Software, Learning Resources and Educational Materials	US\$50,000 equivalent or less per contract	Direct Contracting	Post Review only
(d) Vehicles	US\$50,000 equivalent or less per contract,	National Shopping procedures (includes DGS & Drate contracts).	Post Review only
(e) Small Items	US\$500 equivalent or less per contract up to an aggregate of US\$1,000,000.	Direct Contracting	Post Review only
Services Procurement agent, research contracts, professional services, training, workshops and fellowships.	Consultant services may be procured by: (a) More than US\$200,000 equivalent per contract.	Quality- and Cost-Based Selection (QCBS)	Prior Review of all consultant contracts shall be governed by the provisions of paragraphs (i), (ii) and (iii) below: (i) With respect to each contract for the employment of consulting firm estimated to cost the equivalent of US\$ 100,000 or more, the procedure set forth in paragraphs 1.2 and 5 of Appendix 1 to the <i>Guidelines for Selection and Employment of Consultants by World Bank Borrowers</i> of January 1997, revised September 1997, January 1999 and May 2002

			shall apply.
	(b) US\$100,000 equivalent or less per contract.	Quality-and Cost-Based Selection (QCBS) with shortlist (would comprise entirely of national consultants for all contracts below US\$500,000) Selection based on Consultant's Qualification (CQ) Selection based on a Fixed Budget (SFB)	(ii) With respect to each contract for the employment of individual consultants estimated to cost the equivalent of US\$50,000 or more, the qualifications, experience, terms of reference and terms of employment of the consultant shall be furnished to the Association for its prior review and approval. The contract shall be awarded only after the said approval has been given. (iii) Terms of Reference for all consultant contracts estimated to cost the equivalent of US\$12,000 or more per contract in the case of firms, and the equivalent of US\$5,000 or more per contract in the case of individuals shall be furnished to the Association for its prior review and approval. The contract shall be awarded only after the said approval has been given.
	All other cases		Post Review
Miscellaneous			
Incremental operating costs.	Expenses incurred on maintenance of equipment, vehicles and buildings, hiring cost of vehicles and offices, and consumables may be executed by: (i) Each package not exceeding US\$5000, or (ii) On the basis of National Shopping	Direct Contracting National Shopping	Post Review only Post Review only

Total Value of Contracts subject to prior review : Around 2.5%

Overall Procurement Risk Assessment : As NPIU which would coordinate all procurement activities is the same agency which has handled two Bank projects earlier, no separate procurement assessment is being made. As regards the participating institutions, a sample group has been assessed and their capacity described above. The **Overall Risk Assessment** is **Average**.

Frequency of procurement supervision missions proposed: One every six months (includes special procurement supervision for post-review/audits).

Disbursement

Allocation of credit proceeds (Table C)

Disbursement in respect of Program Component-1: Institutional Development through competitive funding, will be on the basis of Institutional Development sub-projects financed under the component. In respect of Program Component-2: Systems Management Capacity Improvement, the disbursements will be made on the basis of statement of expenditure for (a) goods contracts costing less than \$200,000 equivalent each; (b) consultants' services under contracts costing less than \$100,000 equivalent each, in case of firms, and \$50,000 equivalent each, in the case of individuals; (c) books and instructional material; (d) training, fellowships and workshops; and (e) incremental operating and maintenance costs defined as salaries of additional staff for the NPIU and SPFU, expenses incurred on operation and maintenance of equipment and vehicles, hiring cost of vehicles and offices, maintenance of office buildings, travel expenses, office expenses and consumables such as telephone, stationary, electricity, water, etc.

Retroactive Financing: Retroactive financing up to an amount of US\$1 million (to be confirmed at negotiations) ___ (SDR million equivalent) would cover eligible expenditure for implementing activities of the NPIU and project states after November 1, 2001. Retroactive financing would support salaries of additional staff, staff training, officer rentals and running costs, furniture and equipment, consultancies, travel, and conferences/meetings. The activities would include all advance action taken for designing, testing and establishing the process and criteria for evaluation and selection of institutions under the program, studies undertaken, invitation and evaluation of proposals from states and institutions, training of project staff, etc.

Table C: Allocation of Credit Proceeds

Expenditure Category	Amount in US\$ million	Financing Percentage
Institutional Development Subprojects (component 1)	232.00	80%
Goods (component 2)	0.63	100% of foreign expenditures, 100% of local expenditures (ex-factory cost) and 80% of local expenditures for other items procured locally
Books and learning resources (component 2)	0.16	100%
Consultant services (component 2)	0.97	80%
Training and workshops (component 2)	1.40	100%
Incremental Operating costs including salaries (component 2)	3.54	80% until 12/31/2004, 65% until 12/31/2006, and 25% thereafter
Unallocated	11.30	
Total Project Costs	250.00	
Total	250.00	

Country Issues

The following country issues identified as generic to India, will apply to the Program:

- The Government (Central and State) funded/aided institutions' existing accounting system concentrates mainly on bookkeeping and transactional control over expenditures. There is

no concept of financial management information being used for decision-making. However, a separate Program operations manual is being developed to address this issue, which will form the basis for generation of reliable financial reports including FMR that will provide information regarding procurement along with linkages of financial information with physical performance. The generation of FMRs will also enable timely managerial decision-making.

- The issue of availability of funds on a timely basis to the implementing entities applies to the extent of this being a state sector program also. However, the government order for release of funds to the institutions will also specify the number of installments in which the funds have to be released, thus commitment of funds to the Program by the state is ensured.

The following country issues will not apply:

- Quality and timeliness of audit reports as the audit of NPIU, centrally funded institutions and each SPFU will be done by a firm of chartered accountants with TOR agreed with the Bank.
- Annual audited financial statements will also be generated.

Strengths and Weaknesses

The Program has the following strengths in the area of financial management: (i) The existing NPIU has successfully implemented two Technician Education projects (I&II) and is currently implementing the Third Technician Education Project and the existing finance personnel are retrained in Bank's disbursement procedures and financial reporting requirements. It is expected that there will be significant knowledge sharing between the current NPIU and the NPIU to be created for the Program; (ii) an operations manual has already been prepared and is in use for the Third Technician Education Project which details the fund flow process, accounting arrangements, financial reporting, auditing, etc., and can be adopted for the Program with some modifications; and (iii) a system of submission of accounts from institutions to the states already exists.

The Program has the following significant weaknesses:

Significant weaknesses	Resolution
Staffing: The NPIU and the SPFUs need to be adequately staffed with accounts and finance personnel	GOI will ensure that the NPIU is provided with adequate key finance staff (Financial Management Specialist and Accounts Manager) at all times during Program implementation. Both of them will be appointed by March 2003. However, in the interim, the FMS in the existing NPIU will provide support. Each SPFU to be provided with adequate accounts staff. -Condition for disbursement.
An existing accounting system which primarily focuses on book-keeping and not on financial management	An operations manual with focus on financial reporting and monitoring is being developed based on the existing manual for the Third Technician Education Project.

Funds Flow

This has been discussed in section C-4 of the PAD.

Staffing

NPIU: The finance wing at the NPIU will be headed by a Financial Management Specialist (FMS), who would be a qualified finance professional and would be assisted by a qualified accountant designated as Accounts Manager (AM). Both the FMS and the AM will be supported by adequate staff. The FMS will be responsible for establishment of the agreed financial management arrangements, providing timely financial reports to the stakeholders including the Bank, facilitating smooth and timely flow of the funds to centrally funded institutions and providing overall guidance in respect of the financial management issues including monitoring of expenditures, audit and internal control to the SPFU and the participating institutions. Both the FMS and the Accounts Manager will be appointed by March 2003. However, in the interim the FMS in the existing NPIU will provide support.

SPFUs: At SPFU the finance function will be headed by a Finance Coordinator with adequate accounts staff. (S)he will be responsible for providing timely consolidated financial reports to the state authorities and the NPIU, monitoring of expenditures, providing overall guidance to the institutions, facilitating smooth flow of funds to all institutions and conduct of timely audit and ensuring consolidation of withdrawal/reimbursement claims. The appointment of accounts officers at SPFU is a condition for disbursement.

IPIU: A senior finance staff will be designated as in-charge of the accounts function for the Program funds. (S)he will be responsible for complying with the disbursement procedures, financial reporting requirements, monitoring of project expenditures and audit.

Accounting Policies and Procedures

An Operations Manual has been developed for the Third Technician Education Project. The manual lays down in detail the applicable accounting policies and procedures, accounting system including the Chart of Accounts to enable data to be captured and classified by expenditure center, project components and disbursement categories. A similar operations manual will be developed to meet the requirements of the Program (Condition for disbursement to institutions). Standard books of accounts (cash and bank books, journals, ledgers, etc.) would be maintained at the NPIU, each SPFU and each participating institution.

Audit:

Internal audit is not being recommended as the current system of pre-audit operating at the Central and State funded institutions is considered satisfactory.

External Audit: There are no outstanding audit reports relating to any of the participating States in respect of Technical Education I and II projects. However, all the States proposing to participate in the current program have outstanding audit observations in respect of Technical Education I and II projects implemented earlier. The audit observations generally relate to excess claims filed, claims filed after project closure, claims filed twice etc. which indicate a flaw in the system - specially in preparation and submission of claims. The system needs to be strengthened. The total amount involved - all the states put together - is about Rs. 90 Million. An action plan for the settlement of outstanding issues prepared by the states is under review. The audit arrangement in respect of the current program is provided below :

- NPIU accounts will be audited by a firm of Chartered Accountants acceptable to the Comptroller & Auditor General of India and the Bank. The TOR for the audit will be agreed with the Bank.
- The SPFU accounts (including project expenditure incurred at the institutions) will be audited by

a firm of chartered accountants acceptable to the Bank with TOR agreed with the Bank. At each SPFU, expenditure statements received from the respective participating institutions will be consolidated in the audit report of the SPFU. Each SPFU will thus submit a single consolidated audit certificate to NPIU within six months of the close of the fiscal year for submission to the Bank.

- The participating institutions will be audited through their existing audit mechanism and will submit a report to the SPFU for monitoring and control purpose.
- The centrally funded institutions will be audited by firms of chartered accountants with TOR agreed with the Bank. The audit reports of the centrally funded institutions will be consolidated by a firm of Chartered Accountants.

The Bank will receive all audit reports through the NPIU—of the NPIU, a consolidated audit report for the centrally sponsored institutions, and of each SPFU within six months of close of the fiscal year. Thus the following audit reports will be monitored in the Audit Reports Compliance System (ARCS).

Implementing Agency	Audit	Auditors
NPIU	SOE / Project Audit	A firm of Chartered Accountants
NPIU – one report for all centrally sponsored institutions	SOE / Project Audit	A firm of Chartered Accountants
SPFUs including Institution exp.	SOE / Project Audit	A firm of Chartered Accountants
DEA/GOI	Special Account	Comptroller & Auditor General of India

Reporting and Monitoring:

The financial reporting from the institutions will be on a quarterly basis to the respective SPFU. The institutes will report detailed expenditure by nature of expenditure, e.g. works, goods, services, incremental operating cost etc. The SPFUs will consolidate the expenditure claims of the institutions with their own reimbursement claim and submit to NPIU. Similarly the central institutions will submit their claims directly to NPIU. NPIU will consolidate all the claims received from each SPFU, central institutions and its own, and file withdrawal claim through CAA & A of the GOI to the Bank. From the effectiveness of the program NPIU will also consolidate FMRs for the entire projects and send it to the NPD and Bank on a quarterly basis..

In respect of Program Component-1: Institutional Development (through competitive funding), the expenditures incurred will be reported on activities under each of the sub-components relating to: (i) Promotion of academic excellence, (ii) Networking of institutions for quality enhancement and resource sharing; and (iii) Enhancing quality and reach of services to community and economy; as specified in the government order. The formats for reporting expenditures have been agreed and included in the PIP.

The Quarterly Financial Management Reports will include:

- comparison of budgeted and actual expenditures and analysis of major variances, including on aspects such as sources of funds and application of funds (classified by components, sub-components, summarized expenditure categories, etc.);
- comparison of budgeted and actual expenditure and analysis of major variances on key physical parameters and unit rates for selected key items;
- forecast for next two quarters; and

- information for procurement management of major contracts.

Project Financial Statements and Financial Management reports will be generated manually. The FMR formats have been developed for the Program and included in the PIP.

Information Systems

The financial statements and other information generated by the SPFUs, participating institutions and the NPIU will be in manual mode. The operations manual being developed for the Program will lay down in detail the system of flow of information, the periodicity and the content from each level to the NPIU.

Use of statements of expenditures (SOEs):

Disbursements from IDA credit would initially be made in the traditional system (reimbursement with full documentation and against statement of expenditure) and could be converted to the Financial Management Report (FMR) based disbursement at the option of GOI and the participating States after the Program successfully demonstrates generation of quality FMRs.

Special account:

A Special Account would be maintained in the Reserve Bank of India; and would be operated by the Department of Economic Affairs (DEA) of the Government of India (GOI). The authorized allocation of the Special Account would be US\$ ____ million (to be determined in consultation with the LOA) that represents about 4 months of average estimated disbursements from the IDA credit.

NPIU will submit withdrawal applications to CAA & A in the DEA for onward submission to the Bank for replenishment of the special account for reimbursement.

Action Plan

Action	Responsible Person/ Agency	Completion Date
Finalization of an operations manual	NPIU	December 31, 2002
Appointment of dedicated accounts staff at SPFU	SPFU	Existing staff in state will continue to perform the function till such appointment - not later than March 31, 2003
Action Plan for settlement of outstanding audit observations by the participating States in respect of Technical Education I & II Projects*	NPIU	Acceptable plan to be submitted at Negotiations

* Action plans prepared by five (of six) participating states are under revision.

Financial Covenants

This has been discussed in section G of the PAD.

Supervision Plan

The focus areas during the supervision will be on training of finance personnel at different levels to ensure that the resources are being adequately accounted for, review of funds flow system and resolution of audit issues.

Annex7:ProjectProcessingSchedule

INDIA: Technical/EngineeringEducationQualityImprovementProgram-PhaseI

ProjectSchedule	Planned	Actual
Timetaken toprepare theproject(months)	18	22
FirstBankmission(identification)	09/15/2000	01/08/2001
Appraisalmissiondeparture	08/06/2001	06/28/2002
Negotiations	11/26/2001	09/16/2002
PlannedDateofEffectiveness	01/01/2003	

Preparedby:

Program design, guidelines, working documents, Program Implementation Plan, and Tribal Development Plan prepared by the Department of Secondary Education and Higher Education, MHRD, GOI

Preparation assistance:

National Project Implementation Unit

Bank staff who worked on the project included:

Name	Speciality
Shashi K. Shrivastava	Senior Education Specialist, SASHD--Task Team Leader
Sajitha Bashir	Senior Education Economist
Ralph W. Harbison (late)	Consultant-Policy Planning
C.S. Jha	Consultant-Technical Education
S.A.A. Alvi	Consultant-Project Implementation
Vandana Sipahimalani-Rao	Education Economist
Meera Chatterjee	Senior Social Development Specialist
S. Krishnan	Senior Procurement Engineer
Rajat Narula	Senior Financial Management Specialist
Erik W. Thulstrup	Consultant-Science and Technology Management
Sanjay Rastogi	Consultant-Financial Management
D.K. Srivastava	Consultant-Economist
M.H. Dhananjaya	Consultant-Institutional Management
Ravinder Kaur	Consultant-Social Development
Jamil Salmi	Manager (Education), HDNED-Peer Reviewer
Lauritz Holm-Neilsen	Lead Education Specialist-Peer Reviewer
Amit Dar	Senior Economist-Peer Reviewer
James Keith Hinchliffe	Lead Economist-Advisor
Grant Sinclair	Lead Education Specialist-Advisor
Sara Gonzalez Flavell	Senior Counsel, LEGMS
Gertrude Cooper	Program Assistant
Renu Gupta	Program Assistant

Annex8: Documents in the Project File*

INDIA: Technical/Engineering Education Quality Improvement Program-Phase I

A. Project Implementation Plan

1. Technical Education Quality Improvement Programme of Government of India: *Programme Implementation Plan*, prepared by National Project Implementation Unit (NPIU), August 2002
2. Technical Education Quality Improvement Programme of the Government of India: *Tribal Development Plan*, prepared by National Project Implementation Unit (NPIU), May 2002
3. Technical Education Quality Improvement Project of Government of India: *Working Document for States and Institutions- Document No.3*, prepared by National Project Implementation Unit (NPIU), March 14, 2002
4. Technical Education Quality Improvement Project of Government of India: *Input to Composite Proposal by a Sample Lead Institutions*, April 2002
5. *Technical Education in India-an Overview*
6. Technical Education Project III: *Draft Concept Document*, prepared by National Project Implementation Unit (NPIU), March 18, 1999
7. Third Technical Education Project: *Draft Proposal*, prepared by National Project Implementation Unit (NPIU), October 4, 1999
8. Sub-Sector Development Program for Technical Education in India (2000-2011): *Draft Proposal*, prepared by Educational Consultants India Limited, November 2000
9. Sub-Sector Development Programme for Technical Education in India: *Draft- Programme Description and Guidelines*, prepared by National Project Implementation Unit (NPIU), March 14, 2001
10. Sub-Sector Development Programme for Technical Education in India: *Programme Description and Guidelines- Document No.1*, prepared by National Project Implementation Unit (NPIU), May 25, 2001
11. Sub-Sector Development Programme for Technical Education in India: *Creating an Enabling Environment for Promoting Excellence- Administrative and Procedural Reforms- Document No.2*, prepared by National Project Implementation Unit (NPIU), May 25, 2001
12. Technical Education Quality Improvement Project of Government of India: *Haryana State Report for Appraisal Mission*, prepared by Department of Technical Education, Chandigarh, June 27, 2002
13. Technical Education Quality Improvement Programme of Government of India: *Himachal Pradesh State Report for Appraisal Mission*, prepared by Department of Technical Education, Vocational & Industrial Training, Himachal Pradesh, June 2002
14. Technical Education Quality Improvement Program: *Kerala State Report for Appraisal Mission*, prepared by Higher Education Department, Government of Kerala, June 2002
15. Technical Education Quality Improvement Project of Government of India: *Madhya Pradesh State Report for Appraisal Mission*, prepared by Directorate of Technical Education, Madhya Pradesh, June 20, 2002
16. Technical Education Quality Improvement Project of Government of India: *Maharashtra State Report for Appraisal Mission*, prepared by Department of Higher & Technical Education, Maharashtra State, Mumbai, June 2002
17. Technical Education Quality Improvement Project of Government of India: *Uttar Pradesh State Report for Appraisal Mission*, prepared by Department of Technical Education, Government of Uttar Pradesh, Lucknow, June 12, 2002
18. *Accreditation in Technical Education through NBA*, March 2002

B. Bank Staff Assessments

1. India: Country Assistance Strategy, March 2001, Report No. 21852-IN, The World Bank
2. Sector Study: *Scientific and Technical Manpower Development in India*, August 30, 2000 (Report No. 20416-IN), The World Bank
3. India: Technician Education Project, *Implementation Completion Report*, 1999, (Report Number 19042), The World Bank
4. India: Subsector Program for Technical Education, Aide Memoire: *Reconnaissance Mission (October 25-November 5, 1999)*
5. India: Subsector Program for Technical Education, *Concept Paper, December 1999*
6. India: Third Technician Education Project, *Project Appraisal Document*, August 2000.
7. World Bank, Aide Memoire: *Subsector Program for Technical Education-Concept Review Mission (January 8-19, 2001)*
8. Engineering and Technical Education Quality Improvement Program-I: *Project Concept Document*, October 30, 2001
9. World Bank, Aide Memoire: *Pre-appraisal Mission (April 1-12, 2002)*
10. World Bank, Notes of Discussion, *Appraisal Mission (July 1-24, 2002)*
11. Srivastava & Rao, 2002. *Analysing the Market for Engineering Education in India*.
12. Dhananjaya & Bhashyam, 2002. *Unit Costs and Sources of Financing for Engineering Colleges*.
13. Ravinder Kaur, 2002. *Social Framework for Technical Education-Appraisal of Social Issues in Engineering Education*
14. Thulstrup E. W., 2002. *Changing strategies in S & T Higher Education-a collection of papers for motivation and inspiration*.
15. *Constructing Knowledge Societies: New Challenges for Tertiary Education*, 2002, Draft Report, The World Bank

C. Other

1. Mashelkar Committee Report on *Regional Engineering Colleges (1998)*, MHRD, GOI
2. Rama Rao Committee Report on *Post Graduate Education in Engineering and Technology (1999)*, AICTE
3. Indiresan Committee Report on *Technical Teachers' Training Institutes (November 2000)*, MHRD, GOI
4. Draft Policy Guidelines for *Training Teachers of Polytechnics and Engineering Colleges (May 2000)*, MHRD, GOI
5. *IT Manpower Advisory Committee (2000)*, MHRD, GOI
6. Raju Committee Report on *Networking of Engineering Institutions (2001)*, MHRD GOI
7. Swaminadhan Committee Report on *Mobilization of Additional Resources for Technical Education*, AICTE
8. *India as Knowledge Superpower: Strategy for Transformation, (June 2001)*, Planning Commission, GOI
9. *Tenth Five Year Plan (2002-2007)-Working Group Paper on Technical Education (October 2001)*, Planning Commission, GOI.
10. Kalam and Rajan, 1998, *India 2020: A Vision for the New Millennium*

*Including electronic files

Annex9: Statement of Loans and Credits

INDIA: Technical/Engineering Education Quality Improvement Program-Phase I

30-Jul-2002

ProjectID	FY	Purpose	Original Amount in US\$ Millions			Cancel.	Undisb.	Difference between expected and actual disbursements ^a	
			IBRD	IDA	GEF			Orig	Frm Rev'd
P073094	2003	APCOMMFORESTMANG	0.00	108.21	0.00	0.00	113.68	0.00	0.00
P069889	2002	MIZORAMROADS	0.00	60.00	0.00	0.00	58.99	-3.87	0.00
P050647	2002	UTTARPRADESHWATERSECTORRESTRUC.	0.00	149.20	0.00	0.00	149.76	1.66	0.00
P040610	2002	RAJWSRP	0.00	140.00	0.00	0.00	140.48	-5.00	0.00
P050653	2002	KARNATAKARWSSII	0.00	151.60	0.00	0.00	153.61	-1.59	0.00
P050668	2002	MUMBAIURBANTRANSPORTPROJECT	463.00	79.00	0.00	0.00	545.83	0.00	0.00
P074018	2002	GujaratEmergencyEarthquakeReconstruct	0.00	442.80	0.00	0.00	476.22	54.73	0.00
P071033	2002	KARNTANKMGMT	0.00	98.90	0.00	0.00	105.02	-2.00	0.00
P072539	2002	KERALASTATETRANSPORT	255.00	0.00	0.00	0.00	244.95	-10.05	0.00
P059242	2001	MPDPIP	0.00	110.10	0.00	0.00	105.78	-5.05	0.00
P055454	2001	KERALARWSS	0.00	65.50	0.00	0.00	61.55	4.25	0.00
P050658	2001	TECHNEDUCIII	0.00	64.90	0.00	0.00	60.14	8.62	0.00
P035173	2001	POWERGRDII	450.00	0.00	0.00	0.00	350.16	31.16	0.00
P055455	2001	RAJDPEPII	0.00	74.40	0.00	0.00	72.89	2.07	0.00
P010566	2001	GUJARATHWYS	381.00	0.00	0.00	0.00	331.56	88.56	0.00
P070421	2001	KARNHWYS	360.00	0.00	0.00	0.00	335.56	9.56	0.00
P067543	2001	LEPROSYII	0.00	30.00	0.00	0.00	26.44	4.48	0.00
P067216	2001	KARWSHDDEVELOPMENT	0.00	100.40	0.00	0.00	102.52	4.69	0.00
P038334	2001	RAJPOWERI	180.00	0.00	0.00	0.00	154.21	25.71	0.00
P071244	2001	GrandTrunkRoadImprovementProject	589.00	0.00	0.00	0.00	562.26	61.26	0.00
P035172	2000	UPPOWERSECTORRESTRUCTURINGPROJECT	150.00	0.00	0.00	0.00	76.18	16.18	0.00
P050657	2000	UPHealthSystemsDevelopmentProject	0.00	110.00	0.00	0.00	103.61	16.45	0.00
P049770	2000	RENEGYII	80.00	50.00	0.00	0.00	119.85	15.91	0.00
P045049	2000	APDPIP	0.00	111.00	0.00	0.00	100.15	10.01	0.00
P067330	2000	IMMUNIZATIONSTRENGTHENINGPROJECT	0.00	142.60	0.00	0.00	83.35	14.70	0.00
P009972	2000	NATIONALHIGHWAYSIIIPROJECT	516.00	0.00	0.00	0.00	439.59	81.99	0.00
P010505	2000	RAJASTHANDPIP	0.00	100.48	0.00	0.00	95.21	20.25	0.00
P059501	2000	IN-TAforEconReformProject	0.00	45.00	0.00	0.00	40.38	7.34	0.00
P055456	2000	IN-TelecommunicationsSectorReformTA	62.00	0.00	0.00	0.00	57.85	35.85	0.00
P050667	2000	UPDPEPIII	0.00	182.40	0.00	0.00	95.12	29.53	0.00
P049537	1999	APPOWERAPI	210.00	0.00	0.00	0.00	66.14	66.14	0.00
P050637	1999	TNURBANDEVII	105.00	0.00	0.00	0.00	30.11	-1.61	0.00
P050646	1999	UPSODICLANDSII	0.00	194.10	0.00	0.00	131.49	65.94	0.00
P041264	1999	WTRSHDMGMTHILLSII	85.00	50.00	0.00	0.00	82.64	31.17	0.00
P050651	1999	MAHARASHHEALTHSYS	0.00	134.00	0.00	0.00	112.84	62.62	0.00
P045050	1999	RAJASTHANDPEP	0.00	85.70	0.00	0.00	59.75	58.41	0.00
P045051	1999	2NDNATLHIV/AIDSCO	0.00	191.00	0.00	0.00	101.00	19.17	0.00
P035827	1998	WOMEN&CHILDDEVLPM	0.00	300.00	0.00	0.00	184.10	63.71	0.00
P038021	1998	DPEPIII(BIHAR)	0.00	152.00	0.00	0.00	110.31	96.39	0.00
P010561	1998	NATLAGRTECHNOLOGY	96.80	100.00	0.00	0.00	106.81	71.82	0.00
P035169	1998	UPFORESTRY	0.00	52.94	0.00	0.00	14.93	14.02	0.00
P035824	1998	DIVAGRCSUPPORT	79.90	50.00	0.00	0.00	81.62	64.26	20.96
P010496	1998	ORISSAHEALTHSYS	0.00	76.40	0.00	0.00	62.05	35.14	0.00
P049477	1998	KERALAFORESTRY	0.00	39.00	0.00	0.00	19.96	11.18	0.00
P049385	1998	APECONRESTRUCTURIN	301.30	241.90	0.00	0.00	239.33	161.57	0.00
P009584	1997	ECODEVELOPMENT	0.00	0.00	0.00	2.34	3.98	7.80	0.00
P010531	1997	REPRODUCTIVEHEALTH1	0.00	248.30	0.00	0.00	73.98	73.99	54.99
P010511	1997	MALARIACONTROL	0.00	164.80	0.00	0.00	107.97	103.87	0.00
P009995	1997	STATEHIGHWAYSII(AP)	350.00	0.00	0.00	0.00	131.25	96.25	0.00
P010473	1997	TUBERCULOSISCONTROL	0.00	142.40	0.00	0.00	91.56	103.37	0.00
P036062	1997	ECODEVELOPMENT	0.00	28.00	20.00	5.86	7.00	14.95	1.13
P043728	1997	ENVCAPACITYBLDGTA	0.00	50.00	0.00	0.94	12.02	15.45	0.00
P044449	1997	RURALWOMENSDEVELOPMENT	0.00	19.50	0.00	0.00	14.41	16.08	-2.15

ProjectID	FY	Purpose	Original Amount in US\$ Millions			Cancel.	Undisb.	Difference between expected and actual disbursements ^a	
			IBRD	IDA	GEF			Orig	Frm Rev'd
P049301	1997	A.P. EMERG. CYCLONE	50.00	100.00	0.00	19.00	17.92	41.57	6.98
P035158	1997	APIRRIGATION III	175.00	150.00	0.00	0.00	166.50	148.23	0.00
P010480	1996	BOMBAY SEW DISPOSAL	167.00	25.00	0.00	10.00	48.65	59.47	34.80
P010484	1996	UPRURAL WATER	59.60	0.00	0.00	7.20	21.93	29.13	21.93
P010485	1996	HYDROLOGY PROJECT	0.00	142.00	0.00	19.64	24.79	66.91	32.33
P010529	1996	ORISSA WRCP	0.00	290.90	0.00	0.00	70.60	80.77	0.00
P035170	1996	ORISSA POWER SECTOR	350.00	0.00	0.00	60.00	126.87	186.87	0.00
P035821	1996	DPEPII	0.00	425.20	0.00	0.00	64.74	11.38	0.00
P035825	1996	STATE HEALTH SYS II	0.00	350.00	0.00	0.00	69.83	110.28	0.00
P010461	1995	MADRAS WATSUPII	275.80	0.00	0.00	189.30	12.79	202.09	12.79
P010463	1995	INDUS POLLUTION PREV	143.00	25.00	0.00	68.31	34.90	104.55	4.77
P010464	1995	DISTRICT PRIMARY ED	0.00	260.30	0.00	0.00	50.59	67.43	10.51
P010522	1995	ASSAM RURAL INFRA	0.00	126.00	0.00	0.00	29.93	32.69	46.12
P010476	1995	TAMILNADU WRCP	0.00	282.90	0.00	25.01	48.75	116.35	26.28
P009977	1993	ICDS II (BIHAR & MP)	0.00	194.00	0.00	0.00	9.49	15.52	15.53
P009946	1992	NAT. HIGHWAYS II	153.00	153.00	0.00	2.73	19.32	11.34	11.34
Total:			6087.40	7260.83	20.00	410.33	8025.73	3053.62	298.32

INDIA
STATEMENT OF IFC's
Held and Disbursed Portfolio
April 30-2002
In Millions USD Dollars

FY Approval	Company	Committed				Disbursed			
		IFC		IFC		IFC		IFC	
		Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
	NICCO-UCO	2.59	0.00	0.00	0.00	2.59	0.00	0.00	0.00
1992/96/97	NIIT	0.00	1.58	0.00	0.00	0.00	0.44	0.00	0.00
	Orchid	0.00	0.00	30.00	0.00	0.00	0.00	20.00	0.00
2001	Owens Corning	25.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00
2001	Pennar Steel	0.00	0.07	0.00	0.00	0.00	0.07	0.00	0.00
1997	Prism Cement	13.13	5.02	0.00	9.00	13.13	5.02	0.00	9.00
1981	RCIHL	0.00	1.97	0.00	0.00	0.00	1.97	0.00	0.00
1995	RTL	0.00	0.45	0.00	0.00	0.00	0.45	0.00	0.00
2001	Rain Calcining	13.33	5.46	0.00	0.00	13.33	5.46	0.00	0.00
2001	SAPL	0.00	0.07	0.00	0.00	0.00	0.07	0.00	0.00
1995	SREI	10.00	0.00	5.00	0.00	10.00	0.00	5.00	0.00
1997	Sara Fund	0.00	5.94	0.00	0.00	0.00	5.94	0.00	0.00
1997/00	Spryance	0.00	2.00	0.00	0.00	0.00	2.00	0.00	0.00
1995	Sundaram Finance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	Sundaram Home	10.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986/93/94/95	TCFC Finance Ltd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000/02	TCW/ICICI	0.00	7.15	0.00	0.00	0.00	7.15	0.00	0.00
0	TDICI-VECAUSII	0.00	0.46	0.00	0.00	0.00	0.46	0.00	0.00
1998	TISCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	Tanflora Park	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00
1981/86/89/92/94	Tata Electric	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	Titan Industries	0.00	0.52	0.00	0.00	0.00	0.52	0.00	0.00
1989/90/94	UCAL	0.00	0.53	0.00	0.00	0.00	0.53	0.00	0.00
1987/88/90/93	United Riceland	10.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
1989	VARUN	0.00	0.00	0.36	0.00	0.00	0.00	0.36	0.00
1996	Vysya Bank	0.00	7.30	0.00	0.00	0.00	7.30	0.00	0.00
1991/96/01	WIV	0.00	2.21	0.00	0.00	0.00	2.21	0.00	0.00
2001	Walden-Mgt India	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00
1997	Webdunia	0.00	2.00	0.00	0.00	0.00	0.67	0.00	0.00
1997	AEC	2.97	0.00	0.00	0.00	2.97	0.00	0.00	0.00
2002	Ambuja Cement	0.00	4.94	0.00	0.00	0.00	4.94	0.00	0.00
1989	Arvind Mills	0.00	5.01	0.00	0.00	0.00	5.01	0.00	0.00
1994	Asian Electronic	0.00	5.50	0.00	0.00	0.00	5.50	0.00	0.00
1992/93	BTVL	0.00	20.00	0.00	0.00	0.00	20.00	0.00	0.00
1997	Basix Ltd.	0.00	0.98	0.00	0.00	0.00	0.98	0.00	0.00
2001	Bihar Sponge	0.00	0.05	0.00	0.00	0.00	0.05	0.00	0.00
2001	CCIL	9.00	0.00	0.00	11.50	5.50	0.00	0.00	7.00
1984/91	CEAT	19.60	0.00	0.00	0.00	19.60	0.00	0.00	0.00
2001	CESC	18.00	0.00	0.00	40.20	18.00	0.00	0.00	40.20
1997	Centurion Bank	4.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00
1990/92	Chinai	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995/97	Chowgule	5.04	4.58	0.00	7.73	5.04	4.58	0.00	7.73
2000	Duncan Hospital	7.00	0.00	0.00	0.00	7.00	0.00	0.00	0.00
1994	EEPL	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00
1997									
1997									
	Total Portfolio:	197.95	188.89	50.36	68.43	148.82	158.90	40.36	63.93

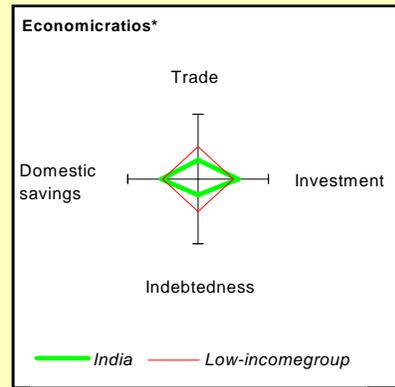
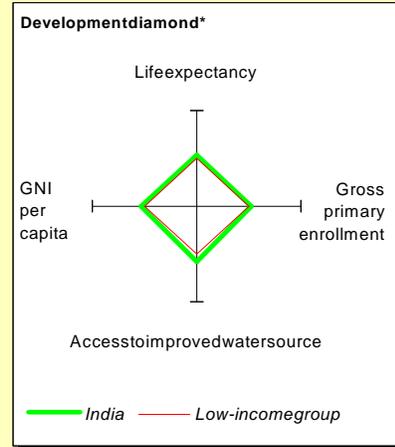
Approvals Pending Commitment

FYApproval	Company	Loan	Equity	Quasi	Partic
2002	ICICICDO	0.00	12.19	0.00	0.00
2002	MMFSL	10.00	7.00	0.00	0.00
1999	SarshataliCoal	4.00	0.00	0.00	0.00
2000	APCL	7.10	0.00	1.90	0.00
2000	IL&FS-GF	40.00	0.00	0.00	0.00
2000	OrissaWESCO	11.00	0.00	0.00	0.00
2000	OrissaNESCO	28.00	0.00	0.00	0.00
2001	GTFFact	10.00	0.00	0.00	0.00
2001	GIWindFarms	9.79	0.98	0.00	0.00
2002	TELCOI	67.00	0.00	0.00	0.00
TotalPendingCommitment:		186.89	20.17	1.90	0.00

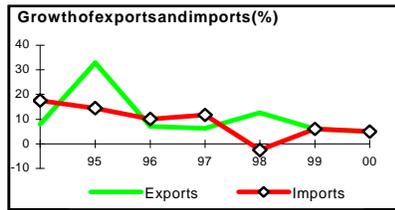
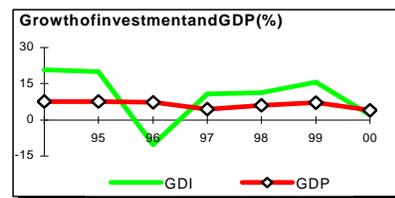
Annex10:CountryataGlance

INDIA: Technical/Engineering Education Quality Improvement Program-Phase I

POVERTY and SOCIAL	India	South Asia	Low-income		
2000					
Population, mid-year (millions)	1,015.9	1,355	2,459		
GNI per capita (Atlas method, US\$)	450	460	420		
GNI (Atlas method, US\$ billions)	454.8	617	1,030		
Average annual growth, 1994-00					
Population (%)	1.8	1.9	1.9		
Laborforce (%)	2.3	2.4	2.4		
Most recent estimate (latest year available, 1994-00)					
Poverty (% of population below national poverty line)	35		
Urban population (% of total population)	28	28	32		
Life expectancy at birth (years)	63	63	59		
Infant mortality (per 1,000 live births)	71	74	77		
Child malnutrition (% of children under 5)	45	47	..		
Access to an improved water source (% of population)	88	87	76		
Illiteracy (% of population age 15+)	43	45	38		
Gross primary enrollment (% of school-age population)	100	100	96		
Male	109	110	102		
Female	90	90	86		
KEY ECONOMIC RATIOS and LONG-TERM TRENDS					
	1980	1990	1999	2000	
GDP (US\$ billions)	182.9	316.9	445.2	457.0	
Gross domestic investment/GDP	20.9	25.2	24.3	24.0	
Exports of goods and services/GDP	6.1	7.3	12.0	14.0	
Gross domestic savings/GDP	17.3	22.5	21.2	21.4	
Gross national savings/GDP	18.9	22.0	23.2	23.4	
Current account balance/GDP	-1.9	-3.2	-1.1	-0.6	
Interest payments/GDP	0.3	1.2	0.8	0.8	
Total debt/GDP	11.3	26.4	22.0	22.0	
Total debt service/exports	9.8	32.4	15.3	12.7	
Present value of debt/GDP	15.5	
Present value of debt/exports	91.2	
	1980-90	1990-00	1999	2000	2000-04
(average annual growth)					
GDP	5.8	6.0	7.1	3.9	5.4
GDP per capita	3.5	4.1	5.2	2.0	3.8
Exports of goods and services	5.9	11.7	6.0	5.0	7.3



STRUCTURE of the ECONOMY	1980	1990	1999	2000
(% of GDP)				
Agriculture	38.6	31.3	26.2	24.9
Industry	24.2	27.6	26.0	26.9
Manufacturing	16.3	17.2	15.2	15.8
Services	37.2	41.1	47.8	48.2
Private consumption	72.7	65.9	65.9	65.4
General government consumption	10.0	11.6	12.9	13.2
Imports of goods and services	9.7	9.9	15.1	16.6
	1980-90	1990-00	1999	2000
(average annual growth)				
Agriculture	3.1	3.0	1.3	-0.2
Industry	6.9	6.4	4.9	6.3
Manufacturing	7.4	7.0	4.2	6.7
Services	7.0	8.0	9.5	4.8
Private consumption	5.8	4.8	2.8	4.2
General government consumption	4.2	6.9	12.0	6.5
Gross domestic investment	6.6	7.9	15.7	2.0
Imports of goods and services	5.9	9.5	6.0	5.0

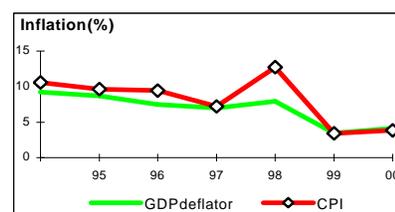


Note: 2000 data are preliminary estimates.

*The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

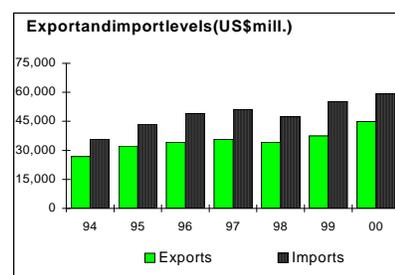
PRICES and GOVERNMENT FINANCE

	1980	1990	1999	2000
Domestic prices (% change)				
Consumer prices	..	12.8	3.4	3.8
Implicit GDP deflator	11.6	10.4	3.5	4.1
Government finance (% of GDP, includes current grants)				
Current revenue	18.9	19.9
Current budget balance	-4.4	-4.2
Overall surplus/deficit	-10.6	-10.6



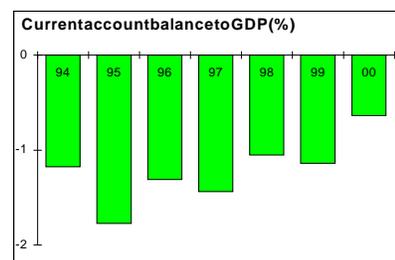
TRADE

	1980	1990	1999	2000
<i>(US\$ millions)</i>				
Total exports (fob)	8,501	18,477	37,542	44,894
Tea	..	535	1,183	1,394
Iron	..	970	916	1,158
Manufactures	5,105	12,996	29,714	34,511
Total imports (cif)	15,862	27,914	55,383	59,264
Food	1,348	557	2,417	1,432
Fuel and energy	6,669	6,028	12,611	15,650
Capital goods	2,416	5,836	8,965	8,785
Export price index (1995=100)	28	51	116	122
Import price index (1995=100)	27	46	150	162
Terms of trade (1995=100)	105	109	77	75



BALANCE of PAYMENTS

	1980	1990	1999	2000
<i>(US\$ millions)</i>				
Exports of goods and services	11,249	23,028	53,251	63,764
Imports of goods and services	17,821	31,485	67,028	75,656
Resource balance	-6,572	-8,457	-13,777	-11,892
Net income	325	-3,753	-3,559	-3,821
Net current transfers	2,693	2,068	12,256	12,798
Current account balance	-3,554	-10,142	-5,080	-2,915
Financing items (net)	2,564	7,650	11,482	8,771
Changes in net reserves	990	2,492	-6,402	-5,856
Memo:				
Reserves including gold (US\$ millions)	6,823	5,834	38,036	42,281
Conversion rate (DEC, local/US\$)	7.9	17.9	43.3	45.7



EXTERNAL DEBT and RESOURCE FLOWS

	1980	1990	1999	2000
<i>(US\$ millions)</i>				
Total debt outstanding and disbursed	20,695	83,717	98,158	100,367
IBRD	827	7,685	7,816	7,063
IDA	5,142	13,312	18,930	20,804
Total debt service	1,426	8,191	10,108	9,862
IBRD	137	1,087	1,389	1,421
IDA	50	211	469	554
Composition of net resource flows				
Official grants	750	461	382	336
Official creditors	908	2,334	1,068	589
Private creditors	789	1,606	-1,658	4,340
Foreign direct investment	..	97	2,093	1,828
Portfolio equity	..	6	3,024	2,760
World Bank program				
Commitments	2,503	2,186	817	2,064
Disbursements	826	1,981	1,460	1,742
Principal repayments	86	586	1,228	1,392
Net flows	739	1,395	232	350
Interest payments	101	712	630	583
Net transfers	639	683	-398	-233

