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Report No: PAD1651

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF US$201.5 MILLION

TO THE

REPUBLIC OF INDIA

FOR A

TECHNICAL EDUCATION QUALITY IMPROVEMENT PROJECT III

June 6, 2016

Education Global Practice
South Asia Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective as of April 30, 2016)
Currency Unit = INR
INR 66.33 = US$1

FISCAL YEAR
April 1 – March 31

ABBREVIATIONS AND ACRONYMS

AICTE	All India Council for Technical Education
AISHE	All India Survey of Higher Education
ATU	Affiliating Technical University
BoG	Board of Governors
CPA	Central Project Advisor
DC	Direct Contracting
DGS&D	Director General of Supplies & Disposals
DHE	Department of Higher Education
DLI	Disbursement Linked Indicator
eSAR	e-Self Assessment Report
EA	Environmental Assessment
EAP	Equity Action Plan
EEP	Eligible Expenditures Program
EIRR	Economic Internal Rate of Return
EMF	Environment Management Framework
ERP	Enterprise Resource Planning
FA	Framework Agreement
FM	Financial Management
FMM	Financial Management Manual
GDP	Gross Domestic Product
GoI	Government of India
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
HR	Human Resources
ICB	International Competitive Bidding
IDA	International Development Association
IDG	Institutional Development Grant
IDP	Institutional Development Plan
IPPF	Indigenous Peoples Policy Framework
ISP	Implementation Support Plan
IT	Information Technology
IUFR	Interim Unaudited Financial Report
LFP	Labor Force Participation
LIB	Limited International Bidding
LIS	Low Income States

M&E	Monitoring and Evaluation
MHRD	Ministry of Human Resource Development
MIS	Management Information System
MOOC	Massive Open Online Course
MOU	Memorandum of Understanding
NAAC	National Assessment and Accreditation Council
NBA	National Board of Accreditation
NCB	National Competitive Bidding
NIT	National Institute of Technology
NPV	Net Present Value
NPD	National Project Director
NPIU	National Project Implementation Unit
NSC	National Steering Committee
NSS	National Sample Survey
PDO	Project Development Objective
PG	Postgraduate
PIP	Project Implementation Plan
PMSS	Procurement Management Support System
R&D	Research and Development
SC	Scheduled Castes
SPFU	State Project Facilitation Unit
SPT	State Project Team
SSC	State Steering Committee
SSS	Single Source Selection
ST	Scheduled Tribes
TEQIP	Technical Education Quality Improvement Project
ToR	Terms of Reference
UG	Undergraduate
UGC	University Grants Commission
UT	Union Territory

Regional Vice President:	Annette Dixon
Country Director:	Onno Ruhl
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INDIA

Technical Education Quality Improvement Project III

TABLE OF CONTENTS

PAD DATA SHEET

India

Technical Education Quality Improvement Project III (P154523)

PROJECT APPRAISAL DOCUMENT

SOUTH ASIA

GED06

Report No.: PAD1651

Basic Information			
Project ID P154523	EA Category B - Partial Assessment		Team Leader(s) Tara Béteille, Tobias Linden
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [ ]		
	Financial Intermediaries [ ]		
	Series of Projects [ ]		
Project Implementation Start Date 01-Jul-2016	Project Implementation End Date 30-Sept-2020		
Expected Effectiveness Date 01-Nov-2016	Expected Closing Date 30-Sept-2020		
Joint IFC No			
Practice Manager/Manager	Senior Global Practice Director	Country Director	Regional Vice President
Keiko Miwa	Claudia Maria Costin	Onno Ruhl	Annette Dixon

Borrower: Department of Economic Affairs, Ministry of Finance, Republic of India			
Responsible Agency: Ministry of Human Resource Development			
Contact:	R. Subrahmanyam	Title:	Additional Secretary
Telephone No.:	91-11-23383202	Email:	subrahyd@gmail.com

Project Financing Data(in US$, millions)		
[ ] Loan	[ ] IDA Grant	[ ] Guarantee

[X] Credit	[ ] Grant	[ ] Other	
Total Project Cost:	403.00	Total Bank Financing:	201.50
Financing Gap:	0.00		

Financing Source	**Amount**
Borrower	201.50
International Development Association	201.50
Total	403.00

Expected Disbursements (in US$, millions)

Fiscal Year	2017	2018	2019	2020	2021	
Annual	12.00	63.00	73.50	52.00	1.00	
Cumulative	12.00	75.00	148.50	200.50	201.50	

Institutional Data

Practice Area (Lead)

Education

Contributing Practice Areas

–

Cross Cutting Topics

[ ] Climate Change
[ ] Fragile, Conflict & Violence
[X] Gender
[X] Jobs
[ ] Public Private Partnership

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Education	Tertiary education	100		
Total		100		

☑ I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.

Themes

Theme (Maximum 5 and total % must equal 100)

Major theme	Theme	%
Human development	Education for the knowledge economy	70
Trade and integration	Export development and competitiveness	10
Trade and integration	Technology diffusion	10
Public sector governance	Decentralization	10
Total		100

Proposed Development Objective(s)

The project development objective (PDO) is 'to enhance quality and equity in participating engineering education institutes and improve the efficiency of the engineering education system in focus states'.

Components

Component Name	**Cost (US$, millions)**
Improving quality and equity in engineering institutes in focus states	318.00
System-level initiatives to strengthen sector governance and performance	85.00

Systematic Operations Risk- Rating Tool (SORT)

Risk Category	**Rating**
1. Political and Governance	Moderate
2. Macroeconomic	Low
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Moderate
8. Stakeholders	Low
9. Other	n.a.
OVERALL	Moderate

Compliance

Policy

Does the project depart from the CAS in content or in other significant respects?	Yes [ ] No [X]
Does the project require any waivers of Bank policies?	Yes [ ] No [X]
Have these been approved by Bank management?	Yes [ ] No [ ]
Is approval for any policy waiver sought from the Board?	Yes [ ] No [X]

Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No [ ]

Safeguard Policies Triggered by the Project	**Yes**	**No**
Environmental Assessment OP/BP 4.01	**X**	
Natural Habitats OP/BP 4.04		**X**
Forests OP/BP 4.36		**X**
Pest Management OP 4.09		**X**
Physical Cultural Resources OP/BP 4.11	**X**	
Indigenous Peoples OP/BP 4.10	**X**	
Involuntary Resettlement OP/BP 4.12		**X**
Safety of Dams OP/BP 4.37		**X**
Projects on International Waterways OP/BP 7.50		**X**
Projects in Disputed Areas OP/BP 7.60		**X**

Legal Covenants

Name	**Recurrent**	**Due Date**	**Frequency**
National Steering Committee		December 1, 2016	

Description of Covenant

The Recipient shall establish by no later than within one (1) month of the Effective Date and thereafter maintain throughout the Project implementation period, a National Steering Committee ("NSC"), chaired by the Secretary of MHRD's Department of Higher Education, with a mandate, composition and resources satisfactory to the Association and detailed in the Project Implementation Plan.

Name	**Recurrent**	**Due Date**	**Frequency**
National Project Directorate	X		

The Recipient shall maintain throughout the Project implementation period, a National Project Directorate ("NPD") within MHRD's Department of Higher Education, with a mandate and resources satisfactory to the Association, headed by a National Project Director and assisted by staff in numbers and with terms of reference, qualifications and resources satisfactory to the Association and detailed in the Project Implementation Plan.

Name	**Recurrent**	**Due Date**	**Frequency**
National Planning Implementation Unit	X		

The Recipient, through MHRD, shall vest responsibility for overall implementation of the Project at the central level in the National Project Implementation Unit ("NPIU"). To this end, the Recipient shall maintain the NPIU throughout the Project implementation period with a

mandate and resources satisfactory to the Association, headed by a Central Project Advisor and assisted by staff in numbers and with terms of reference, qualifications and resources satisfactory to the Association and detailed in the Project Implementation Plan.

Name	Recurrent	Due Date	Frequency
State Steering Committee		December 1, 2016	

The Recipient, through MHRD, shall cause each Participating State to establish by no later than within one (1) month of the Effective Date and thereafter maintain throughout the Project implementation period, a State Steering Committee ("SSC") with a mandate, composition and resources satisfactory to the Association and detailed in the Project Implementation Plan.

Name	Recurrent	Due Date	Frequency
Memorandum of Understanding between MHRD and respective state government	X		

The Recipient, through MHRD, shall enter into a memorandum of understanding with each Participating State, under terms and conditions satisfactory to the Association, each of which shall include, *inter alia*, the following (a) the Participating State's obligations to carry out the Project in accordance with the Project Implementation Plan, the Procurement Guidelines, the Consultant Guidelines, the Safeguards Instruments and the Anti-Corruption Guidelines; and (b) the delegation of authority by the respective state government to Boards of Governors, Department Management Committees and University Executive Councils.

Name	Recurrent	Due Date	Frequency
Memorandum of Understanding between Participating Institutes and MHRD or respective state government	X		

The Recipient, through MHRD, shall make part of the proceeds of the Credit available to each Participating Institute. To this end, the Recipient, through MHRD, shall: (a) enter into a memorandum of understanding with each Participating Institute operating at the central level; and (b) enter into, and cause each Participating State to enter into, a memorandum of understanding with each Participating Institute operating at the state level within the respective Participating State, under terms and conditions satisfactory to the Association.

Name	Recurrent	Due Date	Frequency
Project Implementation Plan		December 1, 2016	

The Recipient, through MHRD, shall, not later than within one (1) month of the Effective Date, prepare and adopt the Project Implementation Plan, in form and substance satisfactory to the Association, and thereafter ensure that the Project is carried out in accordance with the Project Implementation Plan as agreed with the Association.

Name	Recurrent	Due Date	Frequency
Financial Audit	X		Annual

The Recipient, through MHRD, shall have the Project Financial Statements audited in accordance with the provisions of Section 5.09 (b) of the General Conditions. Each audit of the Financial Statements shall cover the period of one fiscal year of the Recipient. The audited Financial Statements for each such period shall be furnished to the Association not later than nine (9) months after the end of such period.

Name	Recurrent	Due Date	Frequency
Independent Verification Agency	X		

The Recipient, through MHRD, shall appoint one or more independent verification agent(s) for purposes of verifying/certifying the achievement of the DLI Targets for DLIs 1(b), 1(c), 1(d) and 2(b), under terms of reference and qualifications satisfactory to the Association.

Name	Recurrent	Due Date	Frequency
Safeguards	X		

The Recipient shall carry out, and shall ensure that the Participating States and the Participating Institutes carry out, the Project in accordance with the provisions of the Safeguards Instruments.

Conditions

Source Of Fund	Name	Type
IDA	Project Implementation Plan	Disbursement condition

Description of Condition

No withdrawal shall be made for payments made prior to the date of the Financing Agreement for EEP expenditures under Category (1) unless and until the Recipient has adopted the Project Implementation Plan, in form and substance satisfactory to the Association

Team Composition

Bank Staff

Name	Role	Title	Specialization	Unit
Tara Béteille	Team Leader (ADM Responsible)	Senior Economist	Education/Economics	GEDDR
Tobias Linden	Team Leader	Lead Education Specialist	Education	GEDDR
Satyanarayan Panda	Procurement Specialist	Procurement Specialist	Procurement	GGODR
Supriti Dua	Financial Management Specialist	Financial Management Specialist	Financial Management	GGODR

Francisco Marmolejo	Team Member	Lead Education Specialist	Education	GEDDR
Karthika Radhakrishnan	Team Member	Operations Analyst	Education/Operations	GEDDR
Kurt Larsen	Team Member	Senior Education Specialist	Education	GEDDR
Ling Jessica Diana Lee	Team Member	Education Spec.	Education	GEDDR
Juan Carlos Alvarez	Senior Counsel	Senior Counsel	Legal	LEGES
Neha Pravash Kumar Mishra	Safeguards Specialist	Senior Environmental Specialist	Environment	GENDR
Ritu Sharma	Team Member	Program Assistant	Administrative	SACIN
Rudraksh Mitra	Team Member	Consultant	Education/Economics	GEDDR
Satya N. Mishra	Safeguards Specialist	Social Development Specialist	Social Development	GSURR
Victor Manuel Ordonez Conde	Team Member	Senior Finance Officer	Finance	WFALN
Javier Botero Alvarez	Team Member	Senior Education Specialist	Education	GEDDR

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
India					

I. STRATEGIC CONTEXT

A. Country Context

1. India is a lower-middle-income country with a per capita gross domestic product (GDP) of US$1,632 (2014 U.S. dollar value). GDP grew at 7.9 percent per year from 2001–11. This growth was driven primarily by engineering-intensive sectors such as information and communication technology, construction, and manufacturing. From 2005–12, 137.5 million people were brought out of poverty. Between 2002 and 2012, under-five-year mortality decreased from 84 to 55 per 1,000 live births, primary school net enrolment increased from 81 to 93 percent, secondary school gross enrolment increased from 48 to 71 percent, and the gross enrolment in tertiary education went up from 10 to 25 percent.

2. As of 2016, the Indian economy is poised to become one of the fastest-growing emerging market economies. GDP growth reached 7.3 percent in 2015 and is predicted to reach 7.5 percent in 2016, more than twice the global average of 3.1 and 3.6 percent per year, respectively. India's growth, especially in the context of the Government's 'Make in India' strategy and focus on domestic value addition, is expected to be driven by engineering-intensive sectors.

3. A serious concern is the low quality of technical skills among labor market entrants in engineering-intensive sectors (World Bank 2011; World Bank 2015)[1], since expanding high-quality, value-added manufacturing and services depends on a world-class technical workforce. Further, within the next 15 years, India will have the largest, and among the youngest, labor forces in the world, with the potential of being unemployed if they do not acquire skills needed by the economy. A second fundamental concern is the highly inequitable distribution of skills among labor market entrants, with differences stark across caste, gender, and income groups, all magnified by differences between regions (annex 5). Nearly 50 percent of the population lives in India's low income states (LIS), hill states, and states of the North East (henceforth, focus states) with poverty rates close to 48 percent—and faces the reality of poor development outcomes.

B. Sectoral and Institutional Context

4. Engineering education in India has grown rapidly in recent years. The intake in undergraduate (UG) engineering courses grew at 16.5 percent annually between 2006–07 and 2013–14. In 2006–07, about 7 percent of higher education students were in engineering courses, while today, 22.8 percent are enrolled in engineering courses. The private returns to technical education, mainly comprising engineering education if one focuses on enrollments,[2] are substantial and significantly higher than the returns to general education (Carnoy and others

[1] Andreas Blom and Hiroshi Saeki (2011). "Employability and Skill Set if Newly Graduated Engineers in India". Policy Research Working Papers, World Bank and Rudraksh Mitra, Tara Beteille and Toby Linden (2015). "Making Engineering Graduates in India Employable". Downloaded from: http://www.edu-leaders.com/article/2015/11/06/making-engineering-graduates-india-employable

[2] In India, technical education covers engineering, technology, management, architecture, town planning, pharmacy, applied arts and crafts, hotel management, and catering technology. The majority of technical education students are in engineering. Estimates for rates of return in the economic analysis use the total for technical education (versus engineering education) due to data limitations.

2014).[3] The present value of the incremental earning of technical graduates over senior secondary completers is 280 percent higher than that of general graduates. Private returns to technical education are nearly as high in focus states (250 percent higher than general graduates).

5. Engineering education in India comes under the Ministry of Human Resource Development (MHRD) at the national level and the Departments of Technical Education at the state level. The All India Council for Technical Education (AICTE) is the statutory national body mandated to promote the quality of technical education through planned and coordinated development and regulation and maintenance of norms and standards. Quality assurance is done through accreditation by two autonomous bodies under the MHRD, the National Board of Accreditation (NBA), which undertakes program-level accreditation, and the National Assessment and Accreditation Council (NAAC), which accredits institutes as a whole. The University Grants Commission (UGC) grants institutes autonomy.

6. At the state level, Affiliating Technical Universities (ATUs) affiliate the majority of engineering colleges (of all types, i.e., government, government-aided, and private unaided [henceforth private]). The ATUs grant affiliation based on inspections of technical colleges to ensure they comply with regulatory guidelines. Fifteen ATUs affiliate a total of 4,171 technical colleges (All India Survey of Higher Education [AISHE] 2013–14). The majority of these colleges are engineering colleges, and 84.6 percent are private (accounting for 83 percent of UG intake).[4] The ATUs serve key functions for *all* their affiliated colleges, including managing admissions and examinations, setting curricula, and granting degrees. Further, 70 percent of students pursuing a PhD do so through an academic department of the ATU (AISHE 2013–14).

7. There are three key areas of concern countrywide, but especially troubling in the poorer states: employability, research, and equity. A recent study conducted in 2014–15 by the Federation of Indian Chambers of Commerce and Industry and the World Bank found that employers were not satisfied with the technical skills of recent graduates. This is in line with an earlier Federation of Indian Chambers of Commerce and Industry-World Bank study (2009) which showed significant deficits in technical skills.

8. India's technical research output is small. Data from the latest research and development (R&D) survey in 2010 showed that India had among the lowest number of researchers in R&D per million, at 160, versus 890 in China and 710 in Brazil.[5] In 2013–14, 2,540 people completed their PhD in engineering in India; in the United States, 8,963 people did the same. A number of top-ranked engineering institutes, such as the Indian Institutes of Technology and select colleges funded under the Technical/Engineering Education Quality Improvement Project (TEQIP) I and II undertake R&D; however, this is too little, and concentrated in too few institutes and states (generally high-income states) to meet the needs of the economy. Further, more R&D is needed for generating more PhDs to meet the shortage of faculty in engineering.

[3] Martin Carnoy, Prashant Loyalka, Maria Dobryakova, Rafiq Dossani, Isak Froumin, Katherine Kuhns, Jandhyala Tilak, and Rong Wang. *University expansion in a changing global economy: Triumph of the BRICs?*. Stanford University Press, 2013.
[4] Lok Sabha Un-starred Question No. 2965 for July 30, 2014; Un-starred Question No. 3925 for December 17, 2014.
[5] United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute of Statistics Data Centre: Science, Technology and Innovation.

9. There are significant inequalities, particularly across caste, gender, and income groups, each amplified in the poorer states. In focus states, 16.8 percent of those in higher education study engineering courses, against 28.4 percent in other states. Access to engineering courses is particularly poor for students from poorer households in focus states. While the percentage of those in higher education enrolled in engineering rises with each quintile of household consumption expenditure, from 17.6 percent to 32.4 percent in other states, it is 9.4 percent to 24.4 percent in focus states. Even for those who are able to enroll, the challenge is not over, with specific groups such as students from Scheduled Castes/Scheduled Tribes (SC/ST) backgrounds and female students having lower transition rates from the first year to the second year, relative to other students, leading to higher dropout rates from students in this category (annex 5).

10. Improving these outcomes in the poorer states involves addressing at least three key challenges. First, the focus is on compliance with input-based norms rather than on enhancing learning outcomes. The problem is exacerbated by the lack of autonomy at the college level in decision making on academic, managerial, financial, and administrative matters. Institutes have limited authority in determining the goals and priorities of their institutes; selecting leaders, faculty appointments, student admissions, and the structure and content of programs; carrying out financial management (FM); and ultimately, improving student learning. The absence of systematic efforts to assess and benchmark student learning limits feedback to the system and individual colleges on how and where they need to improve.

11. The second key challenge relates to faculty vacancies and qualifications. Although the average faculty vacancy rate is low at 13.5 percent across all AICTE-approved institutes (as of 2014–15), this number is misleading because vacancies are often met by hiring guest lecturers on short-term (less than one year) contracts, creating a lack of stability in faculty and making medium-term institutional planning and development impossible. Moreover, vacancy rates in some participating states are significantly higher. In five of the focus states, vacancy rates exceed 20 percent. Bihar and Nagaland report the highest vacancy rates, at 40 and 44 percent, respectively. Institutes located in remote areas are especially disadvantaged as vacancies cannot be filled even by guest lecturers. Faculty vacancy levels typically debar many colleges from getting NBA accreditation. Faculty morale is often low as there are few opportunities for faculty to collaborate or avail of professional development offerings.

12. A third major challenge relates to weak incentives and inadequate resources for research. Private colleges, which form the bulk of the sector, rarely have money to invest in research, and their affiliating universities rarely have facilities to encourage collaboration across institutes. Indian industry has generally underinvested in R&D carried out in technical education institutes due to the non-excludable nature of R&D, knowledge spillovers, financial market failures, and the inherent risks of the R&D process. With little financial autonomy, faculty and the leadership of government colleges have little motivation to undertake research, since the revenue generated cannot be retained by them. The problem is exacerbated by an overall lack of opportunity for student and faculty exchange across institutes in the country and abroad.

13. The Government of India (GoI) projects, TEQIP I and TEQIP II, with an all-India focus, have attempted to address these problems in a number of ways. Specific achievements include (a) helping 17 regional engineering colleges get upgraded to National Institutes of Technology (NITs); (b) improving quality by helping institutes become autonomous and obtain accreditation;

(c) establishing Boards of Governors (BoGs) in colleges that help institutes build both autonomy and accountability; (d) building a performance culture where institutes receive additional funds based on performance against benchmarks; (e) increasing transition rates across all categories of students; (f) doubling of student placement activities; and (g) improving research outputs—between 2009–10 and 2014–15, the number of publications in refereed journals in engineering fields almost doubled from 7,032 to 13,929 in TEQIP II institutes.[6] Given that only a small percent of institutes from the poorer states were able to participate in TEQIP I and II, the impact of the project on these states has been lower than in states with more institutes.

14. The success of TEQIP I and II has established the Bank's role in supporting ambitious reform-driven projects in engineering education in India. The Bank's engagement in TEQIP I and II has also helped it build key networks, within project institutes as well as top-ranking Indian engineering and management institutes, which have been leveraged to initiate a range of quality and governance improvement efforts within project institutes. These networks are expected to play an important role in both helping TEQIP III achieve its objectives and sustaining the reforms undertaken in the TEQIP series. The Bank will continue to incorporate lessons from projects in other parts of the world.

C. Higher Level Objectives to which the Project Contributes

15. The project is aligned with India's 12th Five Year Plan (2012–17), based on the pillars of faster, sustainable, and inclusive growth, which emphasizes increasing the supply of highly skilled workers to drive the economy, as well as helping LIS catch up. TEQIP III also supports the Country Partnership Strategy for 2013–17 (Report No. 76176-IN) in the engagement areas of integration and inclusion. Both engagement areas foresee an increase in high quality workers to drive and sustain economic growth in India and prioritize LIS participation.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

16. The project development objective (PDO) is 'to enhance quality and equity in participating engineering education institutes and improve the efficiency of the engineering education system in focus states[7]'.

B. Project Beneficiaries

17. Project activities will benefit UG and postgraduate (PG) students and faculty associated with the ATUs funded under the project (in part through their affiliated colleges) and with

[6] Recently, the GoI launched a new scheme, Rashtriya Uchchatar Shiksha Abhiyan, to cover all of higher education, modelled on many of the TEQIP I and II reforms.

[7] Participating institutions are AICTE-approved colleges and the teaching departments of ATUs selected under Subcomponents 1.1 and 1.3, and ATUs under Subcomponent 1.2 and 1.3. "Focus States" means the Recipient's states and union territories of Andaman and Nicobar Islands, Assam, Bihar, Chhattisgarh, Himachal Pradesh, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Rajasthan, Sikkim, Tripura, Uttar Pradesh and Uttarakhand, or any successor(s) thereto; and any other of the Recipient's states or union territories as may be agreed in writing with the Association from time to time. All remaining states are referred to as "other states".

colleges funded under the project. It is estimated that, by project closing, roughly 3,093,355 UG and PG students (of which 30 percent will likely be female and 20 percent SC/ST) and 116,849 faculty and staff would have benefitted.[8]

C. PDO Level Results Indicators

18. Progress toward the PDO will be measured by the following Key Performance Indicators:

- Average score of students participating in tests designed to measure technical and critical thinking skills (disaggregated by SC/ST, gender)
- Percentage of NBA-accredited programs in participating institutes, disaggregated by UG programs (**Disbursement Linked Indicator [DLI] 1a**) and PG programs
- Number of participating ATUs that publicly declare final semester examination results before the start of the next academic year (**DLI 1b**)
- Transition rate of UG engineering students from the first year to the second year in participating institutes (disaggregated by SC/ST, gender)
- Percentage of students from traditionally disadvantaged groups (disaggregated by SC/ST, gender) in total enrolment in participating institutes

III. PROJECT DESCRIPTION

A. Project Components

19. The project will support two components: (a) Improving quality and equity in engineering institutes in focus states and (b) System-level initiatives to strengthen sector governance and performance. Previous phases of TEQIP underscore the need for more intensive effort in focus states, and engaging system-level entities to catalyze profound changes in the engineering education system in these states.

Component 1: Improving Quality and Equity in Engineering Institutes in Focus States (Total: US$318 million; IDA: US$159 million)

20. This component will focus on improving quality and equity in engineering education in all government and government-aided colleges and technical universities, including the ATUs, in Andaman and Nicobar Islands (a union territory [UT]), LIS, states in the North East of India, and hill states. These states and UT have been chosen to ensure equitable development of the engineering education system across the country, given their lower performance relative to well-performing states (referred to as "other states" throughout).

Subcomponent 1.1: Institutional Development for Participating Institutes

[8] The total estimates for student beneficiaries are based on AICTE e-governance cell 2015-16 data. Specific assumptions were made for other states as institutes in these states will be selected post-effectiveness. TEQIP II data for these states was used to arrive at faculty and staff numbers, female students and SC/ST students.

21. The project will provide support, through Institutional Development Grants **(IDG)**, to eligible Participating Institutes in Focus States to develop and implement Institutional Development Plans **(IDP)** designed to, *inter alia*: (a) improve student learning; (b) improve student employability; (c) ensure equity; and (d) enhance faculty productivity, and motivation to teach and produce research. All government and government-aided colleges, new NITs, and non-affiliating technical universities in Subcomponent 1.1, totaling about 90 institutes, will receive funds once they have the enabling mechanisms required for project success in place (see annex 2). IDPs will specify the key needs of an institute, and proposed activities, timelines, and measures of success. Key activities are detailed in annex 2. Importantly, each IDP will contain a Twinning Plan with a high-performing TEQIP I/II institute, to be formalized into a Twinning Agreement. The project will fund procurement expenses, including refurbishment, minor civil works, and equipment, up to a maximum of 60 percent of an institute's fund allocation.

22. Each institute will receive specialized support from the National Project Implementation Unit (NPIU) and its State Project Teams (SPT), and mentors in framing its IDP, which will be based on iterative consultations with a range of stakeholders, including faculty, administrators, students, parents, and industry. The AICTE will provide mentorship support to all colleges in the North East, given its experience in implementing the North East Quality Improvement Program. Autonomous colleges under this subcomponent will receive up to INR 15 crore (about US$2.3 million) and non-autonomous colleges will receive up to INR 10 crore (about US$1.5 million) (which will be increased to up to INR 15 crore if they attain autonomy). The NITs will receive up to INR 15 crore under this subcomponent. Funding will be linked to performance. Poorly performing institutes will be mentored intensively, but will receive reduced funding from the project if they fail to make serious efforts to improve.

23. This sub-component will support two additional core activities. First, MHRD/NPIU will help develop enabling mechanisms in selected institutes where such mechanisms are lacking, thereby making these institutes eligible for IDGs. MHRD/NPIU will do so by providing such institutes 'seed persons' (expert mentors), technical assistance, and seed money. Only institutes that build the enabling mechanisms by September 2018 will receive the IDGs. Second, the sub-component will aim to increase the availability of high-quality faculty in a sustainable manner (Faculty Recruitment Plan). The implementation of the Plan will follow a feasibility analysis undertaken under Component 2.

Subcomponent 1.2: Widening Impact through ATUs

24. This sub-component will provide support to eligible Affiliating Technical Universities in Focus States to develop and implement Action Plans designed to reform, *inter alia*, academic curricula, learning assessment and examination, student job placement and data management and administration, in order to improve teaching, learning and research outcomes and opportunities for institutes affiliated to them. Each ATU will receive up to INR 20 crore (about US$3 million). The goal will be to demonstrate mechanisms through which the ATUs can improve the performance of all the colleges affiliated to them—government, government-aided, and private—and thereby catalyze profound changes in the engineering education system. Project ATUs will help pilot reforms in assessment of student learning outcomes (under Component 2).

25. Institutes under Subcomponent 1.1 and ATUs under Subcomponent 1.2 will sign Memorandums of Understanding (MOUs) with MHRD or the respective state government (as the case may be), which will set out annual (or semiannual) performance benchmarks to be met, for successive rounds of funding to be released. Commitment from the state finance department, technical education department, and the ATU will be sought through a state-level steering committee (State Steering Committee [SSC]).

Subcomponent 1.3: Twinning Arrangements to Build Capacity and Improve Performance of Participating Institutes

26. This subcomponent will support high-performing TEQIP I/II state-government engineering institutes (including ATUs) in other states for undertaking twinning arrangements with institutes (including ATUs) in focus states/UTs, with the primary objective of supporting the priorities identified by the latter in their IDPs (and action plans). Twinning arrangements will be formalized through Twinning Agreements between the two institutes. The focus of these agreements will be knowledge transfer, exchange of experience, optimizing the use of resources, and developing long-term strategic partnerships. The exact nature of twinning activity would be determined mutually between the two institutes, but could include interactions at four levels: BoG, institute's management/leadership, staff (teaching and nonteaching), and students. For instance, activities could entail faculty and student exchange, joint conferences, and management coaching between the members of the two BoGs, the two principals, and the deans.

27. Institutes/ATUs under Subcomponent 1.3 will be chosen on a competitive basis, depending on their performance under TEQIP I/II and their plans for twinning activities. Subcomponent 1.3 institutes—all having obtained academic autonomy from the UGC—will receive an initial allocation of INR 2 crore (about US$300,000) so that they have the incentive to participate effectively in twinning activities as well as continue their own institutional development, upon which such twinning depends. These institutes will be eligible for up to INR 7 crores (about US$1.1 million) depending on performance in their Twinning Agreements.

Component 2: System-level Initiatives to Strengthen Sector Governance and Performance (Total: US$85 million; IDA: US$42.5 million)

28. This component will support the MHRD and key apex bodies in engineering education, including the AICTE and NBA, to strengthen sector governance, management, accountability mechanisms and performance in the overall system of engineering education. First, this component will support the design and implementation of a low-stakes assessment system to track student learning (academic, higher order thinking, and non-cognitive skills) at different points of the UG program. Surveys of students, faculty, nonteaching staff, and administrators will deepen insight into how institutes address specific problems related to student learning.

29. Second, this component will provide technical assistance to the MHRD/NPIU for developing and implementing faculty appraisal systems, as well as carrying out feasibility studies for faculty recruitment in focus states. Third, it will support MHRD/NPIU and apex bodies in strengthening the quality of twinning arrangements. In particular, AICTE will assist with the mentoring and twinning requirements of colleges in the North East. Fourth, the component will promote industry collaboration in research and student job placement. Fifth, it

will help streamline data management across all institutes. The AICTE's e-governance cell will lead an effort to harmonize data management by the AICTE, AISHE, NBA, and TEQIP. Technical assistance will also be available to the NBA to help strengthen its analytical and institutional capacity to use planning, information, and data to manage the organization in a more efficient way. Sixth, this component will support a major push to drive innovations in technology-based learning, including designing massive open online courses (MOOCs) for faculty and students; and research, including linking government and government-aided engineering institutes and the ATUs in all states to the National Knowledge Network. Finally, this component will build the capacity of policy planners and administrators at multiple levels, as well as the NPIU, to undertake superior project management. Activities will include supporting a web-based project Management Information System (MIS); undertaking relevant surveys, studies and reviews; providing technical assistance to the respective Departments of Technical Education; and all related workshops and trainings.

B. Project Financing

30. **Lending instrument.** The project will use an Investment Project Financing lending instrument using a results-based financing modality. TEQIP II had initiated a system whereby institutes received project funds based upon achievement of six-monthly benchmarks, thereby building a culture focusing on results and accountability. A results-based financing modality allows for a natural extension of the emphasis on achievement of results rather than inputs.

31. **The Eligible Expenditures Program (EEP)**. The EEP is defined as actual expenditures on Component 1 activities under TEQIP III as incurred by MHRD under the pre-identified budget line for TEQIP in the GOI annual budget. These EEPs are relevant to the PDO. Broad categories of expenditure in the EEP include refurbishment and minor civil works; equipment; faculty, student and non-teaching staff training; sponsored research; student support services and job placement; software and maintenance; and exchange programs. Expenditures related to faculty salaries in focus states will be financed in year 4 in the EEP following finalization of Faculty Recruitment Plans for individual states, and subject to FM assessment of the related implementation arrangements (including the possibility of routing through the state treasury if recommended by feasibility analysis).

32. **DLIs.** The DLIs reflect GoI's priorities for strengthening the engineering education system in focus states. The DLIs include outcomes, intermediate results, implementation performance targets, and institutional change indicators targeted on improving the teaching and learning environment in selected institutes as well as institutionalize long-term improvements in the overall system of engineering education in focus states. The DLI results are critical to achieving the PDO. With respect to disbursement, the DLIs are independent of each other; noncompliance with a DLI means that disbursement associated with that DLI will be withheld, yet disbursement with other DLI targets will not be affected. DLIs vary in whether they can be carried forward to following years or met early. Some DLIs are scalable. (See annex 1 for details.)

33. **Project Cost and Financing**. Funding for Component 1 will be results based and project funds will be disbursed against an EEP (up to a capped amount and against achievement of agreed DLIs targets). Component 2 will use direct reimbursement of project expenditures by

national agencies. Total project costs are estimated to be US$403 million, of which IDA will finance US$201.5 million.

	IDA		GoI	Total
Component	**Reimbursement through EEPs and DLIs (US$, millions)**	**Non DLI (US$, millions)**	**(US$, millions)**	**(US$, millions)**
Component 1	159.0	0.0	159.0	318.0
Component 2	0.0	42.5	42.5	85.0
Total Cost	**159.0**	**42.5**	**201.5**	**403.0**

C. Lessons Learned and Reflected in the Project Design

34. **Performance-based funding leads to excellence.** Under TEQIP II, institutes received additional funds based on satisfactory performance. While only 33.5 percent met the benchmark satisfactorily in 2013, most recently, 87.5 percent of institutes met these benchmarks, demonstrating the importance of performance-based funding for achieving results. Under TEQIP III, performance-based measures will continue in the relationship between the MHRD and project institutes and also be incorporated into the relationship between the GoI and the Bank for the first time in the higher education sector.

35. **Modeling excellence and well-designed Twinning Arrangements are important for knowledge generation and transfer.** Both TEQIP I and II focused on excellence through intensive engagement with a limited number of competitively selected institutes. As a result, 65 percent of TEQIP institutes are already autonomous and nearly 77 percent of the remaining has applied to the UGC for autonomy after completing all the necessary work. Similarly, TEQIP institutes receive much higher ratings when applying for accreditation. Finally, TEQIP I and II led to substantial increases in R&D activity. These activities will be continued in TEQIP III, where high-performing institutes in more advanced states will be funded on a competitive basis and expected to undertake twinning activities with institutes in focus states.

36. **Equity goals require focused efforts on transition rates.** By focusing on the transition rates of students from first to second year, disaggregated by gender and caste, TEQIP II has helped institutes design activities to help disadvantaged students. In TEQIP III, these activities will be continued, drawing on the latest insight from behavioral studies on interventions that help disadvantaged students manage the social and cultural change of studying in a college.

37. **Establishing an environment conducive to reform requires low-cost but high-impact interventions.** TEQIP I/II institutes that improved their performance did so based on a number of low-cost interventions, such as empowering a high-quality BoG, using mentorship input systematically, and/or having capable leadership.

38. **Systemic reform in engineering education should include private institutes.** Both TEQIP I and II included a relatively small number of private institutes (10–15 percent of project institutes). TEQIP III will aim to reach all private colleges in focus states by working with the ATUs in these states. Further, activities targeted at apex national bodies such as the AICTE and NBA are also expected to help improve the quality of education in private colleges.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

39. The implementation arrangements for TEQIP III will build on the well-functioning implementation arrangements for TEQIP I and II, with appropriate improvements. TEQIP III is a Central Sector Scheme, so the MHRD will fund 100 percent of the project costs. Overall responsibility will lie with the Department of Higher Education (DHE) of the MHRD. The MHRD will constitute a National Steering Committee (NSC) assisted by a small National Project Directorate headed by the National Project Director (NPD). The MHRD will delegate the day-to-day implementation to the NPIU, which will undertake all implementation-related activities in accordance with the Project Implementation Plan (PIP), prepared by MHRD and agreed with the World Bank. The PIP contains detailed arrangements and procedures for all operational and technical aspects necessary for effective implementation of the project (see annex 3). The NPIU will operate state-level implementation units, called the State Project Teams (SPTs), in each focus state/UT. The SPTs will be professionally competent and dedicated state-level structures, with the objective of enhancing program implementation capacity in participating institutes and strengthening the engineering education system in focus states (see annex 3). The SPTs will work closely with the SSC and the State Department of Technical Education in focus states, seeking guidance as necessary and providing regular updates to the Secretary of Technical Education in the state. Each SPT will be accountable to the MHRD/NPIU against a predetermined set of performance goals. In other states, a basic version of the SPTs will operate with the primary objective of ensuring that activities, outputs, and outcomes in the Twinning Agreement are met and all related supporting activities are undertaken as in the PIP.

40. The MHRD will enter into an MOU with each state, and each institute will enter into an MOU with MHRD or the respective state (as appropriate). At the institutional level, the BoG (or equivalent) will be the body with overall accountability, while the principal and senior management are responsible for institutional project design and day-to-day implementation, coordinated by an Institutional Development Unit.

B. Results Monitoring and Evaluation

41. TEQIP II built a strong web-based MIS for project monitoring and evaluation (M&E) that facilitated performance-based mechanisms. Under Component 2, TEQIP III will build on existing MISs and ensure that the MIS is adapted to each institute's needs, allowing it to report on TEQIP III indicators and other indicators deemed useful for the institute's internal decision making. The MIS will also be designed to generate the data required for the AICTE approval and NBA accreditation processes, to enable institutes to meet all demands for data through an integrated system. In addition, the project will work with the AICTE, NBA, and ATUs to harmonize their reporting requirements, to further simplify the reporting process for institutes. Training provided to M&E staff at the national, state, and institutional levels will strengthen M&E capacity. The project will also support the development of enterprise resource planning (ERP)/MIS at selected institutes to promote more effective administration and decision making. To avoid duplication, the ATU ERP/MIS will be linked to the institutional MIS of TEQIP III institutes. For non-TEQIP III institutes, data will be collected thorough web-based systems linked to the ATU ERP/MIS.

C. Sustainability

42. The overall project focus on institutional development is with sustainability in mind. The project's emphasis on well-functioning governance bodies, more delegated authority to manage their affairs, and capacity to generate own revenues involves changing the behavior of key players. As in TEQIP I and II, institutes will be required to put aside specific funds for the ongoing maintenance and development of the institute once the project period ends. The ATU activities target significant improvements in the way the ATUs function, for all their affiliated colleges, such that project reforms spread to other institutes. Finally, the emphasis on all engineering institutes in focus states is intended to change the way the system operates and enable the engineering institutes to utilize other funding more effectively.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

43. The overall risk rating for this project is Moderate. This being the third phase of the project, lessons from previous phases have been incorporated, lowering risks on most categories. However, **Institutional Capacity for Implementation and Sustainability** and **Fiduciary** have been rated **Substantial**. The project faces risks, primarily due to the inclusion of new states (in the North East) with weak implementation capacity and state-level and institutional issues in several focus states. The following mitigation measures have been taken: (1) Building commitment from state governments and institutes during preparation, and incorporating the commitment in MOUs between the central and state governments as well as between MHRD, state governments and their institutes; (2) Designing and implementing a sustainable Faculty Recruitment Plan; (3) Twinning poorly-performing institutes with high-performing institutes; and (4) regular training of executing agency staff at the central and state level. Regarding fiduciary risk, the project has secured commitment from states to introduce a direct fund transfer system from the central government to institutes, which will increase the speed and transparency of fund flows. Executing agencies will provide training in financial management to participating institutes.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

44. This project will impact overall sector governance as well as the quality of learning, employability, and research in the technical education sector as a whole. While the private returns to technical education are substantially higher than other streams, and the private sector plays a significant role in providing technical education, several factors indicate the need for public investment and reforms in the sector. First, technical education is expensive, leading to inequalities in access, particularly across income groups. For instance, students in the top income quintile are enrolled in technical education at almost twice the rate of those in the bottom quintile, at 59.4 percent as against 30.7 percent. Second, access to technical education in focus states is significantly lower, with 42 percent of those in higher education studying technical courses against 55 percent in other states. In addition, per capita expenditure on technical education in the age group 18–23 years is significantly lower in the focus states. In 2012–13, plan expenditure on technical education in other states was almost five times higher at INR 299

(about US$5) versus INR 66 (about US$1) per capita per year in the age group 18–23 years,[9] while non-plan expenditure was almost twice as high, at INR 9,102 (about US$140) versus INR 4,627 (about US$70). Third, gaps in the quality monitoring and accreditation system restrict the influence of market forces in improving quality. Fourth, R&D output is low; as is overall spending on R&D. Finally, there are significant opportunities to leverage investments for generating system-wide improvements in a cost-effective manner, such as reforms in the ATUs.

45. A cost-benefit analysis of the project yields an economic internal rate of return (EIRR) of 41 percent, based on an assessment of overall project costs and the priced benefits accruing in focus states for which data are available. Benefits accrue through higher enrolment in technical education, completion rates, labor force participation (LFP) and wage premiums for technical education graduates, and increased R&D output from universities. A risk analysis estimates the risk of project failure to be 8.5 percent.

B. Technical

46. TEQIP III's emphasis on strengthening engineering education in focus states through activities targeted at all engineering institutes in these states, and by bringing the expertise of high-performing institutes through Twinning Arrangements, is expected to lead to long-term improvements in engineering education in these states. Importantly, the results-based financing approach allows a focus on achievement of results rather than inputs. The core element of the project design—providing IDGs to institutes—has been tested extensively in the Indian context and other countries and has shown to be effective in enabling higher education institutes to improve. The approach shows that promoting institutional autonomy is essential to enable institutes to pursue their own excellence, building on their specific strengthens and responding to the stakeholders they serve. Over time, at the system level, this approach improves student outcomes as well as research. This approach is also relatively simple, with most of the funds being spent by institutions according to their priorities.

47. For these positive results to be captured, the project is designed to address four issues. First, along with increased autonomy, institutes must operate within a system of clear accountability. Second, many institutes do not have the knowledge inside their institute to tackle new issues effectively, such as changing pedagogy, using technology in the learning process, developing social and emotional skills, designing student assessment which is reliable and valid across time, or supporting all students to succeed rather than allowing poorly performing students to drop out. Third, system-level processes and procedures affect the ability of institutes to operationalize their autonomy in practice. Moreover, the weakest institutes suffer negatively from all these aspects, and hence need a different approach to develop. Finally, meaningful institutional development takes time, typically more than one period cycle. As the third project in the sector, TEQIP III has a greater chance of securing long-term sustainable development.

C. Financial Management

48. FM systems under TEQIP I and II have been strengthened over the years of program operations. However, the following areas may need attention to further strengthen overall FM

[9] Analysis of Budget Expenditure on Education, MHRD 2014.

implementation: (a) timely budget allotments and fund releases to various executing agencies; (b) strengthening capacity at executing agencies by introducing robust training plans and training modules; (c) effective integration of external, internal, and performance audit observations; (d) timely compliance in response to audit observations; (e) enhancement of the computerized FM system; (f) effective monitoring and supervision support by the NPIU and its SPTs; and (g) improved internal control environment at the participating institutes.

49. TEQIP III is implemented as a Central Sector Scheme, implying that it is 100 percent funded by the GoI, through the MHRD's budget. Funds under the project will be transferred directly by MHRD to the participating institutes. This system will ensure that funds are electronically transferred directly to the bank accounts of participating institutes, minimizing tiers involved in fund flow and thereby reducing delay in payment and minimizing cost of holding money. The FM arrangements will be governed by a Financial Management Manual (FMM). The FM arrangements for funding under the Faculty Recruitment Plan will be designed and agreed separately, post feasibility study and relevant assessments (see annex 3 for details).

50. **Disbursement arrangements.** The project will be 100 percent prefunded by budgetary allocations.[10] On Component 1, once the DLI targets are met and verified, the project will initiate claims with the office of the Controller of Aid Accounts and Audit. However, the claim will be restricted to the cumulative expenditures under the EEP. On Component 2, the disbursement will be the reimbursement of actual expenditure against agreed activities. Reporting to the Bank will be through agreed formats in the form of Interim Unaudited Financial Reports (IUFRs). The disbursements shall be 50 percent of the eligible expenditures as reported through the IUFRs. Audits of states will be conducted by firms of chartered accountants in accordance with ToRs acceptable to the Bank. The audit will cover project financial statements from all institutions. MHRD will provide a consolidated report on audit of the project, including a consolidation of project expenditure and key observations forming part of state audit reports within nine months of the close of the financial year, that is, by December 31. Given the existing implementation challenges and multiplicity of spending/executing agencies, FM risk is rated Substantial.

D. Procurement

51. Procurement of all goods, refurbishment and renovation, and non-consulting services under both components will be carried out in accordance with the Bank's Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers (January 2011), as updated in July 2014. Selection of consulting services to be financed out of the proceeds of the financing shall be done in accordance with the requirements set forth or referred to in the Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits by World Bank Borrowers (January 2011), as updated in July 2014, and the provisions stipulated in the Financing Agreement. TEQIP III implementing agencies remain similar to those in TEQIP I and II, though many colleges and ATUs will be funded for the first time. Procurement will be undertaken by about 200 education institutes and by the NPIU and its SPTs. The decentralized procurement poses a challenge in ensuring high compliance with guidelines. Procurement performance in TEQIP II was initially slow, but improved dramatically in the last 24 months (see annex 3 for

[10] IDA advance has not been requested under the project.

details). The main actions to ensure high compliance are: (a) procurement training of responsible personnel in institutes and widespread dissemination of the procurement manual; (b) continue to use the Procurement Management Support System (PMSS)/similar system; and (c) clear supervision responsibility, including post-procurement review of sample contracts annually. Procurement preparations and capacity are adequate, but the procurement risk is still rated Substantial due to the decentralized procurement and many new participating institutes.

E. Social (including Safeguards)

52. **Social impacts and application of Bank safeguards policies.** The project will finance limited construction activities, including refurbishment/upgrading of higher education facilities such as classrooms and library buildings within the existing premises. These activities are not expected to cause any significant social impacts. Likely social impacts, which will be limited in nature, may include temporary construction-related impacts. No civil work involving compulsory land acquisition or involuntary resettlement shall be financed. Therefore, the Bank's OP/BP 4.12 on Involuntary Resettlement has not been triggered. The project institutions, especially those in the focus states, are located in areas inhabited by tribal communities. Therefore, the Bank's OP/BP 4.10 on Indigenous Peoples has been triggered.

53. **Social assessment and mitigation measures.** The GoI has prepared an Equity Action Plan (EAP)/ Indigenous Peoples Policy Framework (IPPF) which addresses issues of gender equality and social inclusion, with special attention to the needs of the ST and SC students and faculty members fulfilling the requirements of OP 4.10 with free, prior, informed consultation held with the primary stakeholders. The EAP/IPPF is a revised version of the EAP prepared for TEQIP II which has been finalized using mostly qualitative research methodologies, including intensive stakeholder interviews and focus groups discussions with male, female, SC and ST students, and faculties from various social backgrounds, including ST and SC groups, and poor and disadvantaged communities. Key recommended actions in the EAP/IPPF, including specific actions to address concerns raised by women students and faculty, are given in annex 3. The overall project also proposes to monitor carefully and report on the impact of project interventions on vulnerable groups, on a regular and timely basis so that corrective actions can be taken. The emphasis on focus states will have a positive impact on equity. The EAP/IPPF has been disclosed by the GoI and shall be locally disclosed in each participating institution. It has also been disclosed on the Bank's Infoshop on December 2, 2015. The institutional arrangements will integrate professional capacity and expertise to plan and implement actions in fulfillment of the EAP/IPPF. The NPIU and its SPTs and project institutes will have a nodal officer responsible for monitoring and supporting the implementation of the EAP/IPPF. The Bank safeguards team will work closely with the implementation agencies through field visits and training support.

54. **Citizen engagement.** Under the Project, beneficiary satisfaction surveys will be conducted with students, faculty, non-teaching staff and employers at the start, mid-point and close of project. The information received will support the Project to (a) measure the level of beneficiary satisfaction about the teaching and learning environment in colleges, including gender aspects and (b) receive feedback from employers about the effectiveness and efficiency of the Project interventions. Two intermediate level indicators (9 and 10) have been included in the Results Framework to periodically track beneficiary feedback. Additionally, the Project will (a) hold regular workshops before launching activities in colleges to allow stakeholders, media,

and public representatives the opportunity to interact with the Project officials and other relevant personnel; (b) implement the EAP to ensure access and rights of all persons in accessing the facilities under the Project; and (c) ensure all official public documents and the Project website include contact information for conveying any issue on the Project activities.

F. Environment (including Safeguards)

55. While the project interventions, on the whole, will have a positive impact on the engineering education sector, specific interventions under the project, such as refurbishment/retrofitting/major repair works of academic blocks/laboratories/libraries, may have some potential but limited adverse environmental impacts in the local context. Therefore, these activities are central to the approach and design from an environmental management and safeguards perspective for the project. Environmental impacts which require attention pertain to location; design; construction and work site safety management; and operation/maintenance aspects of physical assets. Also, any refurbishment/repair/retrofitting works may require specific student and worker safety measures during construction if it involves removal of asbestos (which can be identified only when the civil works assessment is carried out during implementation). The Bank's safeguards policies on Environmental Assessment (OP/BP 4.01) and Physical Cultural Resources (OP/BP 4.11) have been triggered, and the project is designated as Category B. On the whole, with proper management, the project interventions are unlikely to cause large-scale, significant, or irreversible damage to the natural, physical, or social environment.

56. An Environmental Assessment (EA) study was undertaken by the NPIU for the project with guidance from the Bank team. The study included a specific comprehensive questionnaire targeted at TEQIP II institutes to learn from their experiences. Current processes, systems, and capacity of the implementation agencies from an environmental management perspective were also reviewed. To effectively plan, design, and integrate environmental dimensions into the overall project preparation and implementation, an Environment Management Framework (EMF) has been prepared and incorporated into the PIP, with detailed recommendations (annex 3). The EMF has been disclosed by the GoI and shall be locally disclosed in each participating institution. It has also been disclosed on the Bank's Infoshop on December 2, 2015.

G. World Bank Grievance Redress

57. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project-affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of the Bank's non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

Annex 1: Results Framework and Monitoring

India

Technical Education Quality Improvement Project III (P154523)

Results Framework (including DLIs)

Project Development Objectives							
PDO Statement The PDO is to enhance quality and equity in participating engineering education institutes and improve the efficiency of the engineering education system in focus states.							
These results are at	Project Level						
Project Development Objective Indicators							
Indicator Name	Baseline[a]	Cumulative Target Values					
		YR1 FY2017[b] (July 2016–March 2017)	YR2 FY2018 (April 2017–March 2018)	YR3 FY2019 (April 2018–March 2019)	YR4 FY2020 (April 2019–March 2020)	YR5 FY2021 (April 2020–September 2020)	End Target (September 2020)
1. Average score of students participating in tests designed to measure technical and critical thinking skills[c]		[No target as the test will be designed and piloted during this period]	**Test administered for first time and baseline established**	**Test administered for second time and 5 percent increase over baseline**		**Test administered for third time and 5 percent increase over previous cycle**	
2. NBA-accredited programs in participating institutes (a) UG programs (DLI#1a) (b) PG programs	**50%**	**(a) Focus States** -Applied and accredited: 2 **Other States** -Accredited: 1	**(a) Focus States** -Applied and accredited: 5 **Other States** -Accredited: 4	**(a) Focus States** -Applied and accredited:15 **Other States** -Accredited: 8	**(a) Focus States** -Applied and accredited: 20 **Other States** -Accredited:15	**(a) Focus States** -Applied and accredited: 20 **Other States** -Accredited: 15	**(a) Focus States** -Applied and accredited: 20 **Other States** -Accredited: 15

Indicator will track increase in percentage points		**(b) Focus States** - Applied and accredited: 2 **Other States** Accredited: 1	**(b) Focus States** -Applied and accredited: 5 **Other States** Accredited: 15	**(b) Focus States** -Applied and accredited: 15 **Other States** Accredited: 8	**(b) Focus States** -Applied and accredited: 20 **Other States** Accredited: 15	**(b) Focus States** -Applied and accredited: 20 **Other States** Accredited: 15	**(b) Focus States** -Applied and accredited: 20 **Other States** Accredited: 15
3. Number of participating ATUs in focus states that publicly declare final semester examination results before the start of the next academic year (DLI#1b)	0		**1**	**3**	**6**	**6**	**6**
4. Transition rate of UG engineering students from the first year to second year in participating institutes. (Disaggregated by SC/ST groups and gender)	**Focus States**- All: 50 -SC/ST: 40 -Female: 45 **Other States** -All: 67 -SC/ST: 54 -Female: 64	**Focus States** -All: 51 -SC/ST: 41 -Female:46 **Other States** -All: 68 -SC/ST: 56 -Female: 66	**Focus States** -All: 53 -SC/ST: 43 -Female:48 **Other States** -All: 70 -SC/ST: 58 -Female:68	**Focus States** -All: 55 -SC/ST: 45 -Female: 50 **Other States** -All: 75 -SC/ST: 60 -Female:70	**Focus States** -All: 60 -SC/ST: 50 -Female:55 **Other States** -All: 77 -SC/ST: 65 -Female:75	**Focus States** -All: 60 -SC/ST: 50 -Female:55 **Other States** -All: 77 -SC/ST: 65 -Female:75	**Focus States** -All: 60 -SC/ST: 50 -Female:55 **Other States** -All: 77 -SC/ST: 65 -Female:75
5. Percentage of students from traditionally disadvantaged groups in total enrolment in participating institutes (a) SC/ST (b) Women	**SC/ST: 15** **Women: 26**	**SC/ST: 16** **Women: 26.5**	**SC/ST: 17** **Women: 27**	**SC/ST: 18** **Women: 28**	**SC/ST: 20** **Women: 30**	**SC/ST: 20** **Women: 30**	**SC/ST: 20** **Women: 30**

Note: a. Baseline data, wherever unavailable, is from TEQIP II.

b. Financial year is the Indian financial year; and FY2017 means the financial year ending in March 2017 and so forth. The Indian financial year is being used for consistency with the DLI matrix; however, for specific indicators in the Results Framework (such as indicator number 4 on transition rates), the correct reporting cycle will align with the academic year ending June (versus March). Reporting cycles by indicator are detailed in the PIP.

c. The project will pilot low-stakes testing to measure the progress of cohorts of students in project institutes. The test will be designed as part of the project and is expected to test the following areas: technical skills in physics, mathematics, and informatics; critical thinking and creativity; and quantitative literacy skills. The exact

measure to be tracked and the improvement to be expected will be determined once the test is finalized. The indicator will be considered met if the average score increases by at least 5 percent from the previous test cycle.

Intermediate Results Indicators							
		Cumulative Target Values					
Indicator Name	Baseline	YR1 FY2017	YR2 FY2018	YR3 FY2019	YR4 FY2020	YR5 FY2021	End Target
Core sector indicators							
1. Direct project beneficiaries (Number) - (Core)	1,469,441	1,496,759	1,541,801	1,614,472	1,690,643	1,690,643	3,210,204 (cumulative)
2. Female beneficiaries (Percentage - Sub-Type: Supplemental) - (Core)	26	26.5	27	28	30	30	30
Quality indicators							
3. Percentage of participating institutes in focus states with UGC autonomy	42.5	**45**	**50**	**55**	**65**	**65**	**65**
4. Percentage of PhD students in total enrolment in engineering disciplines in participating institutes Indicator will track percent increase over baseline	**Focus States: 1.6** **Other States: 2.5**	**Focus States:10** **Other States**:10	**Focus States:30** **Other States:30**	**Focus States:70** **Other States:70**	**Focus States:100** **Other States:100**	**Focus States:100** **Other States**:100	**Focus States:100** **Other States**:100
5. Percentage of sanctioned faculty positions in participating institutes filled by regular or contract faculty, contracted according to AICTE norms	**Focus States: 40** **Other States: 65**	**Focus States: 42** **Other States: 66**	**Focus States: 50** **Other States**: 68	**Focus States: 65** **Other States: 70**	**Focus States: 85** **Other States**: 85	**Focus States: 85** **Other States: 85**	**Focus States: 85** **Other States: 85**

6. Number of faculty trained in either their subject domain, pedagogy, or management in participating institutes	0	**Focus States:500** **Other States: 1,000**	**Focus States: 1,000** **Other States: 2,000**	**Focus States: 2,500** **Other States: 3,000**	**Focus States: 5,000** **Other States: 6,000**	**Focus States: 5,000** **Other States: 6,000**	**Focus States: 5,000** **Other States: 6,000**
7. Percentage of externally funded R&D projects and consultancies in total revenue in participating institutes	**Focus States:** 2 **Other States:** 10	**Focus States: 3** **Other States: 11**	**Focus States: 4** **Other States: 12**	**Focus States: 5** **Other States: 13**	**Focus States: 7** **Other States**: 15	**Focus States: 7** **Other States: 15**	**Focus States: 7** **Other States: 15**
8. Participation of affiliated institutes in participating ATUs in newly designed research-hub related activities (number)	0	**Focus States: 5** **Other States: 20**	**Focus States: 10** **Other States: 30**	**Focus States: 15** **Other States: 60**	**Focus States: 30** **Other States:150**	**Focus States: 30** **Other States:150**	**Focus States: 30** **Other States: 150**
9. Student, Staff, and Faculty Satisfaction Survey		Report on first round published and action plan prepared		15 percent increase in average satisfaction level over the previous round Report on second round published and action plan prepared		15 percent increase in average satisfaction level over the previous round Report on third round published and action plan prepared	
10. Employer satisfaction with engineers recruited in the past year		First round of employer satisfaction survey conducted Report on first round published		10 percent increase in average satisfaction level over the previous round		10 percent increase in average satisfaction level over the previous round	

		and action plan prepared		Report on second round published and action plan prepared		Report on third round published and action plan prepared	
Equity							
11. Number of engineering education institutes in focus states that meet the enabling mechanisms for participation in the project (DLI#1c)	21	55	87				
System efficiency							
12. Percentage of eligible transactions, in the previous six months, against which funds are released in full to participating institutes by the MHRD, within 10 calendar days of the date on which the participating institute requests the payment (DLI#2c)	0		50	95	95	95	95
13. Percentage of participating institutes with a BoG, Department Management Committee or equivalent that meets at least 4 times every calendar and which publicly discloses the minutes of all meetings (DLI#2a)	**Focus States:** 35 **Other States:** 60		**Focus States: 60 Other States**: 80	**Focus States: 80 Other States:** 95	**Focus States: 95 Other States:** 95	**Focus States: 95 Other States:** 95	**Focus States: 95 Other States:** 95
14. Number of participating ATUs with MIS capable of producing annual report against prescribed indicators	0	**MIS designed: Focus States:** At least 1 ATU **Non-LIS:** At least	**MIS developed: Focus States:** At least 3 ATUs **Non-LIS:** At least	**MIS functional: Focus States:** At least 5 ATUs **Non-LIS**: At least	**MIS functional: Focus States:** At least 5 ATUs **Non-LIS:** At least	**MIS functional: Focus States:** At least 5 ATUs **Non-LIS:** At least	**MIS functional: Focus States:** At least 5 ATUs **Non-LIS:** At least

		1 ATU	2 ATUs	3 ATUs	3 ATUs	3 ATUs	3 ATUs
15. Percentage of participating institutes that produce and publish an annual report in the prescribed format in accordance with the requirements set out in the PIP (DLI#2b)	0	**Focus States: 20** **Other States: 20**	**Focus States: 60** **Other States: 60**	**Focus States: 75** **Other States: 75**	**Focus States: 85** **Other States: 85**	**Focus States: 85** **Other States: 85**	**Focus States: 85** **Other States: 85**

Definitions and Descriptions of Monitoring Indicators

NOTE: Unless otherwise specified, participating institutes are those under Component 1. An institute is considered as 'participating' for these indicators if an MOU has been signed between the institute and the state government or MHRD/NPIU (as the case may be). All indicator values achieved at each date of reporting will be rounded down to the nearest whole number, including for verifying whether a DLI has been achieved.

Indicator	Description
PDO Level Results Indicators	
1. Average score of students participating in tests designed to measure technical and critical thinking skills	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. The project will pilot low-stakes testing, at the UG level, to measure the progress of cohorts of students in project institutes. The test will be designed as part of the project and is expected to test the following areas: technical skills in physics, mathematics, and informatics; critical thinking and creativity; and quantitative literacy skills. The test will be voluntary. Average scores of students from institutes from which at least 20 percent of students, in the relevant year, appeared for the tests will be considered for this indicator. The indicator will be considered met if the average score increases by at least 5 percent from the previous cycle. *Source:* Results submitted by the testing agency to the NPIU. Project MIS.
2. NBA-accredited programs in participating institutes (a) UG programs (b) PG programs	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. NBA accreditation of the program(s) offered by an institute is **applied for** if the institute offering the program has completed the following steps: (a) Registration with the NBA (b) Completion of the online application form for NBA accreditation of the program(s) and payment of the accreditation fee (c) Submission of the e-self assessment report (eSAR) for the program(s) to the NBA A program is **accredited** if the NBA has accredited it for two or five years. A program will continue to be considered accredited for six months after the date on which its accreditation expires, conditional on it having applied for renewal. If a program has been accredited by the NBA at any time previously, for two or five years, it will be considered accredited only if it receives five-year accreditation in subsequent accreditation cycles. The indicator will track the increase in percentage points of programs as defined above. The percentage of programs accredited (and/or applied for) will be calculated out of the total number of AICTE-approved eligible UG/PG programs offered by an institute as of the date of reporting.

Indicator	Description
	Source Project MIS. For the program(s) for which accreditation has been **applied for**, the institute uploads, to the MIS (a) a copy of the receipt for payment of accreditation fees to the NBA; and (b) a copy of the eSAR submitted to the NBA. For the program(s) that have been **accredited**: The institute will upload, to the MIS, a copy of the notification from the NBA on the accreditation status of the program(s).
3. Number of participating ATUs in focus states that publicly declare final semester examination results before the start of the next academic year	Applicable to all ATUs participating under Subcomponent 1.2, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Final semester examinations refer to examinations in all subjects offered to UG students, in engineering disciplines, in the 8th semester. Results will be considered declared on the date when (a) the results of final semester examinations are available on the ATU website. (b) all requests for reevaluation have been completed and reevaluated results are available on the ATU website. *Source:* ATU website. The NPIU will send the Bank a list of the ATUs with a link to the results on the respective websites. Third-party verification report as specified in the verification protocol.
4. Transition rate of UG engineering students from the first year to the second year in participating institutes (a) SC/ST (b) Women	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Defined as the percentage of UG students registered in the fourth semester (in year t), out of those registered in the second semester (in year t-1). Students must have passed all their examinations; if a student does not sit for an examination for any reason, he/she is considered to have not passed the examination, for this indicator. A student is registered in a semester if he/she paid the semester tuition fees to the institute by the end of the first month of the semester. *Source:* Project MIS.
5. Percentage of students from traditionally disadvantaged groups in total enrolment in participating institutes (a)SC/ST (b)Women (Percentage)	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Categories of disadvantaged groups are defined as (a) SC and ST and (b) females. These two categories will be monitored separately. Total enrolment is the number of PG and UG students who have paid the semester tuition fees to the institute by the end of the first month of the semester completed immediately before the time of reporting. Enrolment is of students in all years of their respective program and includes those students who are still enrolled but have not completed their degree program on schedule. *Source:* Project MIS.

Indicator	Description
Intermediate Results Indicators	
1. Direct project beneficiaries (Number) - (Core)	The number of UG and PG students enrolled and teachers and staff/ administrators employed in participating institutes in Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. For this indicator, the colleges (whether government, government aided, or private unaided) affiliated to an ATU participating under Subcomponent 1.2 are also included. Enrolment is the number of PG and UG students who have paid the semester tuition fees to the institute by the end of the first month of the semester completed immediately before the time of reporting. Enrolment is of students in all years of their respective program and includes those students who are still enrolled but have not completed their degree program on schedule. *Source:* Project MIS.
2. Female beneficiaries (Percentage - Sub-Type: Supplemental) - (Core)	As a percentage of the number reported in Intermediate Results Indicator 1. Direct project beneficiaries. *Source:* Project MIS.
3. Percentage of participating institutes in focus states with UGC autonomy	Applicable to all institutes participating under Subcomponents 1.1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. UGC autonomy refers to the delegation of academic powers to an institute, by the UGC, according to the UGC Guidelines for Autonomous Institutes 2012–17. An institute is considered autonomous once it receives a formal notification from the UGC that it has been granted autonomy. *Source:* Project MIS. Institutes will upload the notification of grant of autonomy by the UGC to the MIS.
4. Percentage of PhD students in total enrolment in engineering disciplines in participating institutes	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Total enrolment is the number of PG and UG students who have paid the semester tuition fees to the institute by the end of the first month of the semester completed immediately before the time of reporting. Enrolment is of students in all years of their respective program, and includes those students who are still enrolled but have not completed their degree program on schedule. PhD students may include those who are enrolled part-time or full-time for a PhD at the respective institute. The increase in percentage will be tracked under this indicator. Engineering disciplines are those under the category 'Engineering and Technology', as classified by the AICTE. *Source:* Project MIS
5. Percentage of sanctioned faculty positions, in participating institutes, filled by regular or contract faculty, contracted according to	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. AICTE norms refer to the pay scales, service conditions, and qualifications of faculty as required by the AICTE regulations prevailing at the time of reporting.

Indicator	Description
AICTE norms	*Source:* Project MIS
6. Number of faculty trained in either their subject domain, pedagogy, or management in participating institutes	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Faculty will be considered to have received training if they have attended a total of at least 7 days of training across their subject domain, pedagogy, or management in the last complete academic year. *Source:* Project MIS
7. Percentage of externally funded R&D projects and consultancies in total revenue in participating institutes	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Externally funded R&D projects and consultancies refer to any research and consulting activity funded through a formal agreement entered into by the institute and the external agency commissioning the research/project/consultancy. Total revenue refers to revenue from all sources as declared in the institutes' annual financial statements of the last complete financial year. *Source:* Project MIS. Institutes to upload copies of funding agreements and annual financial statements to the MIS.
8. Participation of affiliated colleges in participating ATUs in newly designed research-hub related activities (number)	Research hub activities refer to all activities to promote collaborative research across the institutes affiliated to an ATU, as specified in the PIP. Applicable to all affiliated colleges of ATUs participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Participation refers to at least one faculty member from an affiliated institute conducting research using the facilities of the research hub. *Source:* Project MIS. ATUs to upload a list of collaborative research activities, participating institutes, and faculty members.
9. Student, Staff, and Faculty Satisfaction Survey	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Satisfaction levels will be assessed based on surveys, representative across project beneficiaries as defined in Intermediate Results Indicator 1. Survey commissioned by the NPIU. Results will be reported separately by each stakeholder group, that is, students, faculty, and nonteaching staff. *Source:* Survey data.
10.Employer satisfaction with engineers recruited in the past year	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Satisfaction levels will be assessed based on sample surveys of employers (with at least 10 percent of new recruits being TEQIP III graduates), representative across industrial sectors and regions, commissioned by the NPIU. Increase in satisfaction will be tracked. *Source:* Survey data.
11. Number of	Applies to all AICTE-approved government and government-aided

Indicator	Description
engineering education institutes in focus states that meet the enabling mechanisms for participation in the project	engineering degree colleges in focus states. An institute must have in place all 8 mechanisms to count toward achievement of the target. The enabling mechanisms for institutes to participate in the project are the following: 1. At least one cohort of students from the institute has completed their UG degrees. A cohort is defined as the set of all students who were admitted to the first year of any UG engineering degree program offered by the institute, in the same academic year. At least one cohort will be said to have passed if 50 percent of all students in any one cohort, admitted at any point in the institute's history, pass all courses required for the completion of their UG degree. *Source:* The institute will submit a copy of the results of the final semester university examinations, of the first cohort, to the NPIU. 2. The institute and the MHRD have signed an MOU which includes commitments to implement the prescribed academic and administrative reforms and the state government has passed any required government orders necessary to set these reforms in place. *Source:* The institute will submit a copy of the signed MOU to the NPIU (through the SPT). The SPTs will collect copies of all government orders. 3. The institute offers at least 3 AICTE-approved programs in engineering disciplines. *Source:* The institute will submit a copy of the notification from the AICTE, approving at least 3 programs in engineering disciplines, to the NPIU. 4. At least 40 percent of sanctioned faculty positions are filled with qualified faculty recruited on regular, contract, visiting or adjunct basis, contracted according to AICTE norms. If the institute has participated in TEQIP II, it is required to fill at least 55 percent of sanctioned positions with regular faculty, contracted according to AICTE norms. *Source:* The institute will submit a letter to the NPIU containing the number of sanctioned faculty positions, the names and academic qualifications of all faculty against each position, whether the terms of employment are regular and contract, and the length of contract for contract faculty, for each position. 5. The institute has constituted a BoG (or equivalent) according to UGC norms if the institute is autonomous or AICTE norms if not. *Source:* Institutes' websites. Institutes will declare the composition of their BoGs, with the professional background of BoG members on their websites, such that a search from the institute's website using the term 'Board of Governors' or 'BoG' yields a link/links to the minutes of meetings of the BoG. 6. The college principal is appointed on a permanent, full-time basis and

Indicator	Description
	does not hold additional charge of another college. *Source:* The State Department of Technical Education will submit a letter, to the NPIU, with the names of the principals of all government and government-aided colleges in the state and the college to which they have been appointed. The letter will contain an undertaking stating that none of the listed college principals hold full-time additional charge of another college and are appointed on a full-time basis to the participating institute. 7. The college will have at least 500 students enrolled across all four years, of which 50 percent of students will be enrolled in AICTE-approved programs. *Source:* The college will submit a list of students along with their university enrolment numbers to the NPIU. The MHRD will verify and forward the same to the Bank. 8. The concerned state government has passed an order allowing the institute to retain all internally generated revenue, such as revenue generated through student fees, consultancies, conferences, and so on. *Source:* The SPT will collect copies of the relevant orders. The NPIU (through the SPTs) will prepare a consolidated table, which provides information against each mechanism for all institutes. The list should include all institutes in each state, regardless of whether an institute has been deemed to have met all 8 mechanisms previously; institutes must continue to meet the mechanism at each date of reporting.
12. Percentage of eligible transactions, in the previous six months, against which funds are released in full to participating institutes by the MHRD, within 10 calendar days of the date on which the participating institute requests the payment	Applicable to all institutes under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. *Definition:* The MHRD will release funds to institutes, against eligible transactions as defined in the PIP, through a direct fund transfer system. Institutes will request funds from the MHRD through an online payment request entered into the direct fund transfer system. The MHRD will examine each payment request and issue an order for the release of funds. Only transactions entered into by institutes that meet the performance benchmarks, defined in the PIP/declared by the NPIU, and are eligible for continued funding will be considered for this indicator. *Source:* The NPIU will submit to the Bank a list of payments against eligible transactions, indicating the following for each payment: (a) the institute to which it was released; (b) the date the payment request was entered by the institute; (c) the date funds were released by the MHRD against the payment request; and (d) the number of calendar days between (b) and (c). Copies of the sanctions for release will be attached.
13. Percentage of participating institutes with a BoG, Department Management Committee or equivalent that meets at	Applicable to institutes under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Participating affiliated colleges and constituent colleges which have autonomous status from the UGC will be required to constitute a BoG. BoG refers to a body with overall responsibility for the strategic

Indicator	Description
least 4 times every calendar year and which publicly discloses the minutes of all meetings	direction and accountability of the college, constituted according to the norms of the UGC, contained in the UGC Approval of Colleges Offering Technical Education by Universities Regulation, 2013, Appendix 16 of Annexure C. Participating affiliating universities and constituent colleges which do not have autonomous status from the UGC will be required to constitute a BoG or equivalent according to the norms of the AICTE. In the participating departments/faculties/non-autonomous constituent colleges of universities, a suitably empowered Department/College Management Committee will be constituted. The Department/College Management Committee will be responsible for the overall strategic direction of the department/faculty/non-autonomous constituent college. The composition and powers of the Department/College Management Committee are set out in the PIP. All participating institutes will declare the composition of their BoGs, Department/College Management Committee, or equivalent with the professional background of the BoG/ Department/College Management Committee members on their websites. Minutes of all BoG/ Department/College Management Committee meetings will be published on institutes' websites within two months of the date of the meeting, such that a search from the institute's website using the term 'Board of Governors' yields a link/links to the minutes. Each SPT will compile a consolidated list of the links at the time of reporting which the NPIU will collate. *Source:* Institutes' websites and a consolidated report prepared by the NPIU.
14. Number of participating ATUs with MIS capable of producing annual reports against prescribed indicators	Applicable to all ATUs under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. MIS refers to a computer-based data management system. Prescribed indicators against which ATUs must report data annually will be specified in the PIP. The data must be published in the ATU's annual report. *Source:* Annual reports of ATUs.
15. Percentage of participating institutes that produce and publish an annual report in the prescribed format in accordance with the requirements set out in the PIP	Applicable to institutes under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. The annual report format will be developed by the NPIU and agreed with the World Bank. It will be declared in the PIP and will include data on a set of prescribed indicators. Publication means placed on the website of the institute and where a search for 'annual report' generates a link to the report. The annual report (for the previous year) must be published by October 31 each year. *Source:* Institutes' website. The NPIU will compile a list of institutes that have published a report in the required format, including data on all prescribed indicators, in the last 12 months.

DISBURSEMENT LINKED INDICATORS

Disbursement-Linked Indicators	Disbursement-Linked Targets				
	Baseline	**Targets to be Achieved in FY2017 (Year 1)**	**Targets to be Achieved in FY2018 (Year 2)**	**Targets to be Achieved in FY2019 (Year 3)**	**Targets to be Achieved in FY2020 (Year 4)**
Results Area 1: To enhance quality and equity in participating engineering education institutes					
DLI #1(a) Percentage of UG programs offered in participating institutes in focus states that are NBA accredited or for which NBA accreditation has been applied	34%	n.a.	5 percentage point increase over baseline	15 percentage point increase over baseline	20 percentage point increase over baseline
DLI Values		n.a.	US$8 million	US$10 million	US$7 million
DLI #1(b) Number of participating ATUs in focus states that publicly declare final semester examination results before the start of the next academic year	0	n.a.	1	3	6
DLI Values		n.a.	US$4 million	US$10 million	US$10 million
DLI #1(c) Number of engineering education institutes in focus states that meet the enabling mechanisms for participation in the project	21	55	87	n.a.	n.a.
DLI Values		US$10 million	US$10 million	n.a.	n.a.
DLI #1(d) Percentage of	0	n.a.	Faculty Recruitment Plan	Faculty recruitment targets	n.a.

Disbursement-Linked Indicators	Disbursement-Linked Targets				
	Baseline	**Targets to be Achieved in FY2017 (Year 1)**	**Targets to be Achieved in FY2018 (Year 2)**	**Targets to be Achieved in FY2019 (Year 3)**	**Targets to be Achieved in FY2020 (Year 4)**
sanctioned faculty positions filled in participating institutes in LIS			for LIS approved by the respective state governments	met in accordance with approved Faculty Recruitment Plans for LIS	
DLI Values		n.a.	US$ 2 million per Low Income State for which a Faculty Recruitment Plan is approved, up to a cumulative maximum total of US$ 12 million	US$ 3 million per Low Income State for which faculty recruitment targets are met, up to a cumulative maximum total of US$ 18 million	
Results Area 2: To improve the efficiency of the engineering education system in focus states					
DLI #2(a) Percentage of participating institutes in focus states with a BoG, a Department Management Committee or equivalent that meets at least 4 times every calendar year and which publicly discloses the minutes of all meetings	35%	n.a.	60%	n.a.	95%
DLI Values		n.a.	US$ 6 million for achieving 50% of participating institutes; and thereafter an additional US$ 2 million for achieving 60% of participating institutes	n.a.	US$ 6 million for achieving 80% of participating institutes; and thereafter an additional US$ 2 million for achieving 90% of participating institutes; and thereafter an additional US$ 2 million for

Disbursement-Linked Indicators	Disbursement-Linked Targets				
	Baseline	**Targets to be Achieved in FY2017 (Year 1)**	**Targets to be Achieved in FY2018 (Year 2)**	**Targets to be Achieved in FY2019 (Year 3)**	**Targets to be Achieved in FY2020 (Year 4)**
					achieving 95% of participating institutes.
DLI #2(b) Percentage of participating institutes that produce and publish an annual report in the prescribed format in accordance with the requirements set out in the PIP	n.a.	n.a.	60%	75%	85%
DLI Values		n.a.	US$10 million	US$8 million	US$6 million
DLI #2(c) Percentage of eligible transactions in the previous six (6) months against which funds are released in full to participating institutes by the MHRD within ten (10) calendar days of the date on which the participating institute requests the payment	n.a.	n.a.	50%	95%	95%
DLI Values		n.a.	US$4 million	US$7 million	US$7 million

DLI Verification Protocol

NOTE: An institute is considered as participating for these indicators if an MOU has been signed between the institute and the state government or MHRD/NPIU (as the case may be). All indicator values achieved at each date of reporting will be rounded down to the nearest whole number, including for verifying whether a DLI has been achieved. Financial year is the Indian financial year; and FY2017 means the financial year ending in March 2017 and so forth.

DLI	Verification Protocol
Results Area 1: To enhance quality and equity in participating engineering education institutes	
DLI #1(a) Percentage of UG programs offered in participating institutes in focus states that are NBA accredited or for which NBA accreditation has been applied	Applicable to all institutes under Subcomponent 1.1 which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. NBA accreditation of the program(s) offered by an institute is **applied for** if the institute offering the program has completed the following steps: (a) Registration with the NBA (b) Completion of the online application form for NBA accreditation of the program(s) and payment of the accreditation fee (c) Submission of the eSAR for the program(s) to the NBA A program is **accredited** if the NBA has accredited it for two or five years. A program will continue to be considered accredited for six months after the date on which its accreditation expires, conditional on it having applied for renewal. If the NBA has accredited a program at any time previously, for two or five years, it will be considered accredited only if it receives five-year accreditation in subsequent accreditation cycles. To avoid double-counting, no program that is accredited will be included in calculating the number of programs that have applied for accreditation. The percentage of programs accredited (and/or applied for) will be calculated out of the total number of AICTE approved eligible UG/PG programs offered by institutes as of the date of reporting. *Source* Project MIS. For the program(s) for which accreditation has been **applied for**, the institute uploads, to the MIS (a) a copy of the receipt for payment of accreditation fees to the NBA. (b) a copy of the eSAR submitted to the NBA. For the program(s) that have been **accredited**: The institute will upload, to the MIS, a copy of the notification from the NBA on the accreditation status of the program(s). This DLI can be carried forward or met early.

DLI	Verification Protocol
DLI #1(b) Number of participating ATUs in focus states that publicly declare final semester examination results before the start of the next academic year	Applicable to all ATUs under Subcomponent 1.2 which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Final semester examinations refer to examinations in all subjects offered to UG students, in engineering disciplines, in the 8th semester. Results will be considered declared on the date when (a) the results of final semester examinations are available on the ATU website. (b) all requests for reevaluation have been completed and reevaluated results are available on the ATU website. Third-party verification required. The verification agency will check, for consistency, a sample of evaluated answer scripts against a marking scheme provided by the ATU. The indicator will be considered met if the sample average score determined by the verification agency is within 10% of the sample average scores awarded by the ATU. In year 3 and 4, the ATU may or may not have been included in previous years when calculating the achievement of this indicator. *Source* ATU website. The NPIU will send the Bank a list of the ATUs with a link to the results on the respective websites. Third-party verification report. This DLI can be carried forward but cannot be met early.
DLI #1(c) Number of engineering education institutes in focus states that meet the enabling mechanisms for participation in the project	Applicable to all AICTE-approved government and government-aided engineering degree colleges and new NITs (as listed in the PIP) in focus states which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. An institute must have in place all eight mechanisms to count toward achievement of the target. The enabling mechanisms for institutes to participate in the project are given below: 1. At least one cohort of students from the institute has completed their UG degrees. A cohort is defined as the set of all students who were admitted to the first year of any UG engineering degree program offered by the institute, in the same academic year. At least one cohort will be said to have passed if 50 percent of all students in any one cohort, admitted at any point in the institute's history, pass all courses required for the completion of their UG degree. *Source:* The institute will submit a copy of the results of the final semester university examinations, of the first cohort, to the NPIU.

DLI	Verification Protocol
	2. The institute, the MHRD and respective state government (where appropriate) have signed an MOU which includes commitments to implement the prescribed academic and administrative reforms and the state government has passed any required government orders necessary to set these reforms in place. *Source:* The institute will submit a copy of the signed MOU to the NPIU. The SPTs will collect copies of all government orders. 3. The institute offers at least three AICTE-approved programs in engineering disciplines. *Source:* The institute will submit a copy of the notification from the AICTE, approving at least three programs in engineering disciplines, to the NPIU. 4. At least 40 percent of sanctioned faculty positions are filled with qualified faculty recruited on regular, contract, visiting or adjunct basis as per AICTE norms. If the institute has participated in TEQIP II, it is required to fill at least 55% of sanctioned positions with regular faculty, contracted according to AICTE norms. *Source:* The institute will submit a letter to the NPIU containing the number of sanctioned faculty positions, the names and academic qualifications of faculty against each position, whether the terms employment are regular and contract, and the length of contract for contract faculty, for each position. 5. The institute has constituted a BoG according to UGC norms if the institute is autonomous, or AICTE norms if not. *Source:* Institutes' websites. Institutes will declare the composition of their BoGs, with the professional background of BoG members on their websites, such that a search from the institute's website using the term 'Board of Governors' yields a link/links to the minutes. 6. The college principal is appointed on a permanent, full-time basis and does not hold additional charge of another college. *Source:* The State Department of Technical Education will submit a letter, to the NPIU, with the names of the principals of all government and government-aided colleges in the state and the college to which they have been appointed. The letter will contain an undertaking stating that none of the listed college principals hold full-time additional charge of another college, and are appointed on a full-time basis to the participating institute. 7. The college will have at least 500 students enrolled across all four years, of which 50 percent of students will be enrolled in AICTE-approved programs. *Source:* The college will submit a list of students along with their university enrolment numbers to the NPIU. The MHRD will verify and forward the same to the Bank. 8. The concerned state government has passed an order allowing the institute to retain all internally generated revenue, such as revenue generated through student fees, consultancies, conferences, and so on.

DLI	Verification Protocol
	Source: The SPTs will collect copies of the relevant orders to the NPIU. The NPIU will prepare a consolidated table, which provides information against each mechanism for all institutes, as collected by the SPTs. The list should include all institutes in each state, regardless of whether an institute has been deemed to have met all eight mechanisms previously; institutes must continue to meet the mechanism at each date of reporting. There will be independent verification of the information provided by the NPIU. Both DLI targets can be met early, but only the year 1 target may be carried forward up to year 2.
DLI #1(d) Percentage of sanctioned faculty positions filled in participating institutes in LIS	Applicable to institutes participating under Subcomponent 1.1 from LIS which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. LIS are Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, and Uttar Pradesh. In years 1 and 2, a feasibility study will be conducted to examine the causes of high rates of faculty vacancies and to identify solutions across states. Based on the findings of this study, an action plan for filling faculty sanctioned positions will be developed for each state. The action plan for each state will be approved by the respective state government. Each action plan will include a set of targets specifying the percentage of sanctioned positions to be filled in subsequent years, by permanent faculty appointments based on contractual norms agreed in the action plan. The action plans may also include new sanctioned positions to be filled. *Source:* For year 2, a copy of each action plan, duly approved by the respective state government, will be submitted to the NPIU. A state government may submit its approved plan at any time. For year 3, each institution will submit to the respective SPT, a letter containing the number of sanctioned faculty positions, the names and academic qualifications of faculty against each position, and the details of the contractual terms of each faculty required to assess whether the norms agreed in the action plan are adhered to. The SPT will collate a list of participating institutions in the state, with the percentage of faculty positions filled according to the agreed norms, to be consolidated at the NPIU level. Third-party verification required. The verification agency will assess the percentage of faculty positions filled in compliance with the contractual norms agreed in the action plan for each state. The target for year 2 can be met early and can be carried forward to year 3 only. The target for year 3 can be met early, subject to the Faculty Recruitment Plan being approved for each state considered to have met the year 3 target, and carried forward.

DLI	Verification Protocol
Results Area 2: To improve the efficiency of the engineering education system in focus states	
DLI #2(a) Percentage of Participating Institutes in Focus States with a BoG or a Department Management Committee that meets at least 4 times every calendar year and which publicly discloses the minutes of all meetings	Applicable to institutes under Component 1.1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. Participating affiliated colleges and constituent colleges, which have autonomous status from the UGC will be required to constitute a BoG. BoG refers to a body with overall responsibility for the strategic direction and accountability of the college, constituted according to the norms of the UGC, contained in the UGC Approval of Colleges Offering Technical Education by Universities Regulation, 2013, Appendix 16 of Annexure C. Participating affiliating universities and constituent colleges which do not have autonomous status from UGC will be required to constitute a BoG according to the norms of the AICTE. In the participating departments/faculties/non-autonomous constituent colleges of universities, a suitably empowered Department/College Management Committee will be constituted. The Department/College Management Committee will be responsible for the overall strategic direction of the department/faculty/non-autonomous constituent college. The composition and powers of the Department/College Management Committee are set out in the PIP. All participating institutes will declare the composition of their BoGs, Department/College Management Committee, with the professional background of BoG/ Department/College Management Committee members on their websites. Minutes of all BoG/ Department/College Management Committee meetings will be published on institutes' websites within two months of the date of the meeting, such that a search from the institute's website using the term 'Board of Governors' yields a link/links to the minutes. Each SPT will collect a consolidated list of the links at the time of reporting. *Source:* Institutes' websites and a consolidated report prepared by NPIU. This DLI can be carried forward. The year 4 target can be met only in a financial year after the financial year in which the year 2 target is met. An institute included in the achievement of the target in year 2 may or may not be included toward the targets in subsequent years.
DLI #2(b) Percentage of participating institutes that produce and publish an annual report in the prescribed format in accordance with the requirements set out in the PIP	Applicable to all institutes participating under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project The annual report format will be developed by the NPIU and agreed with the World Bank. It will be declared in the PIP and will include data on a set of prescribed indicators. Publication means placed on the website of the institute and where a search for 'annual report' generates a link to the report. The annual report for the preceding year must be published by October 31 each year. *Source:* Institutes' website. The NPIU will compile a list of institutes that have published a report in the required format, including data on all prescribed indicators, in the last 12 months. Additionally, there will be third party verification of a sample of reports drawn from institute's websites.

DLI	Verification Protocol
	Targets in each year can be met early, but the target for year 3 can be met only in a year after the target for year 2 has been met (whenever that is) and the target for year 4 can be met only in a year after the target for year 3 has been met (whenever that is).
DLI #2(c) Percentage of eligible transactions in the previous six (6) months against which funds are released in full to participating institutes by the MHRD within ten (10) calendar days of the date on which the participating institute requests the payment	Applicable to all institutes under Component 1, which have signed an MOU with the MHRD or respective state government (as the case may be) for participation in the project. *Definition:* The MHRD will release funds to institutes, against eligible transactions as defined in the PIP, through a direct fund transfer system. Institutes will request funds from the MHRD through an online payment request entered into the direct fund transfer system. The MHRD will examine each payment request and issue an order for the release of funds. Only transactions entered into by institutes that meet the performance benchmarks, defined in the PIP/declared by the NPIU, and are eligible for continued funding will be considered for the purpose of this indicator. For year 4, the six-month period over which the DLI is measured must lie entirely in FY2021. *Source:* The NPIU will submit to the Bank a list of payments against eligible transactions, indicating the following for each payment: (a) the institute to which it was released; (b) the date the payment request was entered by the institute; (c) the date funds were released by the MHRD against the payment request; and (d) the number of calendar days between (b) and (c). Copies of the sanctions for release will be attached. In year 2 and year 3, the DLI can be met early but cannot be carried forward.

Annex 2: Detailed Project Description

India: Technical Education Quality Improvement Project III (P154523)

1. The PDO is 'to enhance quality and equity in participating engineering education institutes and improve the efficiency of the engineering education system in focus states'. The project will consist of two components: (a) Improving quality and equity in engineering institutes in focus states and (b) System-level initiatives to strengthen sector governance and performance.

Component 1: Improving Quality and Equity in Engineering Institutes in Focus States (Total: US$318 million; IDA: US$159 million)

2. This component will focus on improving quality and equity in engineering education for better learning outcomes and employability of UG and/or the research pursued under PG programs in *all* government and government-aided colleges and technical universities, including the ATUs, in focus states.[11] These states/UT face multiple institutional and system-level challenges; addressing them will require a focused state-level approach.

Subcomponent 1.1: Institutional Development for Participating Institutes

3. The project will provide support, through IDGs, to eligible Participating Institutes in Focus States to develop and implement IDPs designed to, *inter alia*, improve the learning outcomes and employability of undergraduates, and the research pursued under post-graduate programs. All (about 90) government and government-aided colleges, new NITs, and technical universities (non-affiliating) in Subcomponent 1.1 will receive funds in *two* cycles, based on whether enabling mechanisms required for project success are in place. These mechanisms are: (a) the state government has passed any required government orders necessary for project-prescribed academic and administrative reforms to take place; (b) at least 500 students have enrolled full-time; (c) at least one batch of Bachelor of Technology students has graduated, with at least 50 percent of students clearing the final exams; (d) at least 55 percent of sanctioned faculty positions have been filled with regular faculty if the institute participated in TEQIP II, and at least 40 percent of sanctioned faculty positions have been filled with qualified faculty recruited on regular, contract, visiting or adjunct basis (as per AICTE norms) if it did not participate in TEQIP II; (e) a full-time permanent Principal has been appointed without dual full-time charge, such as principalship of another college; (f) at least three branches of programs have been offered; (g) a BoG has been operational according to UGC norms (or AICTE norms if the college is non-autonomous); and (h) authority from the relevant state government retains and uses Internal Revenue Generation funds.

4. Institutes with these mechanisms in place will receive funds in Cycle 1 as determined by their plans for improvement articulated in the IDPs. The project will fund refurbishment, minor civil works, and procurement up to a maximum of 60 percent of an institute's basic fund

[11] "Focus States" means the Recipient's states and union territories of Andaman and Nicobar Islands, Assam, Bihar, Chhattisgarh, Himachal Pradesh, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Rajasthan, Sikkim, Tripura, Uttar Pradesh and Uttarakhand, or any successor(s) thereto; and any other of the Recipient's states or union territories as may be agreed in writing with the Association from time to time. Other states refer to all states that are not focus states.

allocation. The IDPs will specify key needs of an institute, activities, timeline for activities, and measures of success. Importantly, all IDPs will include a Twinning Plan with a high-performing state-government engineering institute in a non-focus state, with the objective of capacity building and knowledge transfer. These Twinning Plans will be formalized into Twinning Agreements, based on a match between participating institutes and high-performing ones. The IDPs will be based on consultations with a wide range of stakeholders, including faculty, institute administrators, students, parents, and industry. Each institute will receive specialized support from the NPIU (and its SPTs) and a high-performing TEQIP II mentor and/or a mentor proposed by the AICTE or NBA, with experience in state engineering colleges in framing their IDPs. Autonomous colleges under this subcomponent will receive up to INR 15 (about US$2.3 million) crore and non-autonomous colleges will receive up to INR 10 crore (about US$1.5 million) (which will be increased to at most INR 15 crore if they attain autonomy). The NITs will receive up to INR 15 crore under this subcomponent.

5. Project institutes are expected to undertake some or all of the following activities: (a) improve student learning (training faculty and staff, investing in cutting-edge hardware and software, increasing capacity for PG education, establishing teaching and research programs in cutting-edge technology areas, improving non-cognitive skills of students, providing smart classrooms, improving transition rates of all categories of students, increasing interaction with industry, and instituting academic reforms including program flexibility, campus Wi-Fi, e-library, and campus environment plan); (b) improve student employability (student career counseling and placement and increasing interaction with industry); (c) ensure equity as proposed through activities in the EAP; and (d) increase faculty productivity and motivation (joint publications and sponsored research, consultancy, and other revenue-generating activities). In addition, activities under this subcomponent will focus on addressing a fundamental system-level challenge—recruitment and retention of high-quality faculty—including, through a Faculty Recruitment Plan based on a feasibility analysis to be undertaken under Component 2.

6. Cycle 2 institutes will receive ‘seed persons’, technical assistance from the MHRD/ NPIU (and its SPTs), and seed money to motivate and facilitate these institutes to achieve the abovementioned enabling mechanisms. Seed persons are expert mentors who can work with the state government and the colleges to identify a path to achieve the enabling mechanisms and help with the preparation of the IDPs. Only institutes that have built the enabling mechanisms listed above by September 2018 will receive project funds to be used in accordance with their IDPs. Their allocation will be available, on a rolling basis, as soon as these mechanisms are met. The activities to be funded under the IDPs will be the same as for Cycle 1 institutes. Seed money will be used for specific activities as specified in the PIP with the objective of motivating faculty and students to work toward improving their institute and to provide some immediate support to students’ learning. These will include training of staff in FM and procurement processes and providing campus Wi-Fi, an e-library, a campus environment plan, and smart classrooms. These funds will be managed by the MHRD/NPIU.

7. In each participating state/UT, a well-reputed academic nominee will serve as lead mentor for the state and coordinate the work of the other mentors in the state/UT. Lead mentors will also guide the SPTs and Departments of Technical Education in the participating state/UT.

8. Funding for implementing IDPs will be based on maintaining the enabling mechanisms, institutes' efforts, and performance. All institutes will sign MOUs which will set out annual (or semiannual) performance benchmarks to be met, such as achieving autonomy from the UGC within a specified time and reducing faculty vacancy rates, for successive rounds of funding to be released. Additional resources will be available for well-performing institutes, while poorly performing institutes will be mentored intensively, but will receive reduced funding from the project if they fail to make serious efforts to improve.

9. All decisions related to implementation of the activities in institutes will rest with an institute's BoG, subject to any requirements set out in the Procurement Manual and FMM or the PIP. Any government rules or order related to the enhanced academic, administrative, and financial autonomy of an institute will apply to all the activities of a given institute, not just to those activities funded under the project. In addition, state governments whose institutes are participating in the project will be required to commit to allowing institutes under TEQIP II not participating in TEQIP III to retain their BoG and enhanced powers, including the power to spend resources in the Four Funds[12] for sustainability. Commitment from the state finance department, technical education department, and ATU will be sought through a state-level steering committee with representatives from these bodies and the lead mentor. The AICTE will provide mentorship support to all colleges in states in the North East, given its experience implementing the North East Quality Improvement Program. All institutes will put aside at least 8 percent of their revenue in a Sustainability Fund to be used by institutes after the project closes.

Subcomponent 1.2: Widening Impact through ATUs

10. This sub-component will provide support to eligible ATUs in focus states to develop and implement Action Plans designed to reform, *inter alia*, academic curricula, learning assessment and examination, student job placement, and data management and administration, in order to improve teaching, learning and research outcomes and opportunities for institutes affiliated to them. Each ATU will receive up to INR 20 crore (about US$3 million). Each ATU will prepare an action plan, similar in principle to the IDPs, with similar consultations and support guiding the preparation of the plans. The ATUs are expected to undertake reforms in the following areas, according to their individual priorities: (a) academic reforms (promoting applications for autonomy from the UGC and accreditation [NAAC, NBA], helping colleges design/review curriculum, faculty development, research hubs, and short-term courses/diplomas, preparing MOOCs, facilitating access of institutes to the MOOCs, and developing credit-based systems such that students in colleges could use select e-learning courses as part of their degree programs); (b) learning assessment and examination reforms; (c) student placement and industry linkage through career counseling, placement, and research and entrepreneurship development; and (d) improving data management and administration (establishing/improving ERP/MIS for student, staff, and faculty data, improving FM and procurement, a modern HR system for efficient personnel management, and improving institutional governance). As in Component 1.1, action plans will also specify the activities envisaged and Twinning Plans with a well-performing ATU from a non-focus state.

[12] To sustain development activities initiated in project institutions under TEQIP II post project closure, all project funded institutes are required to have established Four Funds: C*orpus Fund, Faculty Development Fund, Equipment Replacement Fund and Maintenance Fund.* Importantly, institutions are required to contribute this amount from their own funds and not from the project funds.

11. Participating ATUs are expected to assist all affiliated colleges through opportunities for accessing modern teaching and research facilities (IT facilities, e-learning courses, and laboratories). The ATUs could administer merit-based research grants for faculty and students that encourages interdisciplinary and inter-collegial/departmental collaborations. The goal of these pilot interventions will be to demonstrate mechanisms through which the ATUs can improve the performance of all the colleges affiliated to them—government, government-aided, and private unaided—and thereby catalyze profound changes in the engineering education system.

12. The ATUs will participate in the project based on certain enabling mechanisms being in place. These include: (a) full-time permanent Vice-Chancellor, Registrar, and Head of Examinations appointed, without dual full-time responsibilities; (b) at least 40 percent of sanctioned faculty positions filled with permanent faculty; (c) audit reports completed for the past five years, with observations responded to; and (d) statutes permitting the ATU to grant autonomy following application by a college to the UGC (and administrative procedures in place). The ATUs will sign MOUs with the state governments, which will set out annual (or semiannual) performance benchmarks to be met for funding to be released. Additional resources will be available for the ATUs that have performed well under the Project.

Subcomponent 1.3: Twinning Arrangements to Build Capacity and Improve Performance of Participating Institutes

13. This subcomponent will support high-performing TEQIP I/II state-government engineering institutes (including ATUs) in other states for undertaking twinning arrangements with institutes (including ATUs) in focus states/UTs, with the primary objective of supporting the priorities identified by the latter institutes in their IDPs (and action plans). Subcomponent 1.3 institutes and ATUs will provide training and guidance to build the capacity of participating institutes and ATUs. Twinning arrangements will be formalized through Twinning Agreements between the two institutes. The focus of these agreements will be knowledge transfer, exchange of experience, optimizing the use of resources, and developing long-term strategic partnerships. The exact nature of twinning activity would be determined mutually between the two institutes, but could include interactions at four levels: BoG (or equivalent), institute's management/leadership, faculty and non-teaching staff, and students. Activities could include faculty and student exchange, joint conferences, and management coaching with close contact between the members of the two BoGs, the two principals, and the deans.

14. Institutes/ATUs under Subcomponent 1.3 will be chosen on a competitive basis, depending upon their performance under TEQIP I/II and their plans for twinning activities. Subcomponent 1.3 institutes—all of whom will have obtained academic autonomy from the UGC—will receive an initial allocation of INR 2 crore (about US$300,000) so that they have the incentive to participate effectively in twinning activities as well as continue their own institutional development, upon which such twinning depends. These institutes will be eligible for additional resources, up to INR 7 crore (about US$1.1 million), depending upon how effectively they meet obligations identified in their Twinning Agreements.

Component 2: System-level Initiatives to Strengthen Sector Governance and Performance (Total: US$85 million; IDA: US$42.5 million)

15. This component will support the MHRD and key apex bodies in engineering education, including the AICTE and NBA, to strengthen sector governance, management, accountability mechanisms and performance of the overall system of engineering education. Specific activities will include (a) strengthening student assessment systems; (b) designing and implementing faculty appraisal systems and feasibility studies for the Faculty Recruitment Plan; (c) strengthening twinning and mentoring-related activities; (d) improving industry collaboration in research and student job placement; (e) strengthening AICTE and NBA for system-level endeavors, including better data management to facilitate quality assurance; (f) innovations in technology-driven education; (g) project MIS; and (h) surveys, studies and high-quality project management.

16. With regard to the first, the component will include technical assistance to the MHRD for designing and implementing an assessment system to track student learning at different points of the UG program. The assessment system will track key academic skills in engineering, such as proficiency in mathematics, physics, and computer science, as well as higher-order thinking skills. The skills to be tested could include the ability to (a) evaluate evidence and its use; (b) analyze and evaluate arguments; (c) understand implications and consequences; (d) develop sound and valid arguments; and (e) understand causation and explanation. Additionally, a national eligibility test for teachers, similar to that in general higher education, is proposed. Students' non-cognitive and behavioral skills will also be tracked. These assessments of students will be supplemented by surveys of students, faculty, and administrators to gain deeper insight into how institutes address specific problems related to student learning. All assessments will be designed to provide feedback to institutes on how and where to improve, without putting undue pressure on students.

17. Second, this component will provide technical assistance to the MHRD/NPIU for developing and implementing faculty appraisal systems, as well as carrying out feasibility studies for faculty recruitment in focus states. Third, it will support MHRD/NPIU and apex bodies in strengthening the quality of twinning arrangements. In particular, AICTE will assist with the mentoring and twinning requirements of colleges in the North East. Fourth, the component will promote industry collaboration in research and student job placement.

18. Fifth, it will help streamline data management across all institutes. The AICTE's e-governance cell will lead an effort to harmonize data management by the AICTE, AISHE, NBA, and TEQIP. This activity will include establishing common data definitions and protocols for verification and designing a common platform for uploading and downloading data on engineering colleges for both restricted use and public use purposes, without burdening individual institutes with multiple data requests.

19. Technical assistance will also be available to the NBA to help strengthen its analytical and institutional capacity, and thereby use planning, information, and data to manage the organization in a more efficient way. Activities are expected to include developing a more user-friendly and transparent database for the accredited engineering institutes. Technical assistance will be available for activities undertaken with the Indian Institutes of Technology and Indian Institutes of Management to improve the quality of teaching, learning, and management in all project institutes, with a special strategy for focus states.

20. Sixth, this component will support a major push to drive innovations in technology-based learning and research. Three major activities are envisaged: (a) institutes and ATUs in the project, as well as those government and government-aided institutes that participated in TEQIP I and II but are not participating in TEQIP III and ATUs not in focus states, will be linked to the National Knowledge Network; last mile connectivity will be provided by the project; (b) institutes will also be provided resources to enable them to achieve a Wi-Fi campus, with 24/7 broadband connectivity and Wi-Fi access in all academic and administrative buildings and hostels; institutes will be required to develop an effective plan for maintaining and utilizing these investments, as operating costs would not be provided from the project; (c) developing or establishing technology learning centers at all universities which affiliate engineering colleges, so that these universities can develop and promote the effective use of online learning (MOOCs) for students and faculty among all their affiliated colleges. Universities will be required to develop an effective plan for maintaining and utilizing these investments, as operating costs would not be provided from the project.

21. Finally, this component will strengthen project management through the following activities: (a) web-based ERP/MIS; (b) stakeholder surveys and studies, such as students, faculty, and employers; (c) technical audits; (d) project support and review mechanisms; and (e) project management. Through the data and review activities, the component will build systems to provide reasonable timely, sufficient, precise, and reliable information to improve and assess the performance of the selected institutes. The information will allow institutes, state directorates, the MHRD, and the NPIU to improve evidence-based policymaking and administration. Project management will include building the capacity of technical education policy planners, administrators, and implementers at the central, state, and institutional levels through workshops and trainings. Technical assistance will be available to the respective Departments of Technical Education to build their capacity to support institutional development and technical education reform in institutes and at the state level.

22. An indicative costing table is presented below to summarize the distribution of project expenditures across key categories.

Table 2.1. Indicative Costing of Project Components

S.No.	Costing Parameters	No. of Institutions/ Entities (estimate)	Cost per Institution/ Entity (in INR, crores)	Total Cost (in INR, crores)	Total Cost (in US$, millions)
Component 1: Improving quality and equity in engineering institutes in focus states					
1	Project Institutions under Sub-component 1.1 (Institutional Development Grant)				
	(i) Autonomous Institutions	30	15	450	67.6
	(ii) Non-Autonomous Institutions	48	10	480	72.2
	(iii) New NITs	7	15	105	15.8
	(iv) Faculty Reforms	-	273	273	41.0

S.No.	Costing Parameters	No. of Institutions/ Entities (estimate)	Cost per Institution/ Entity (in INR, crores)	Total Cost (in INR, crores)	Total Cost (in US$, millions)
	(v) 1.2 ATUs in Focus States	**8**	**20**	**160**	24.1
	(vi) 1.3 Grants towards Building Capacity of institutions in focus states and New NITs	**93**	**7**	**651**	97.9
Sub-Total (1)				**2119**	318
Component 2: System-level initiatives to strengthen sector governance and performance					
2	(i) NPIU (non-SPT) operating costs and studies	1	76	76	11.4
	(ii) SPT operating costs	**17**	**15**	**255**	38.3
	(iv) MIS/DFTS	1	30	30	4.5
	(v) AICTE	1	10	10	1.5
	(vi) NBA	1	10	10	1.5
	(vii) Student Learning assessment and examination reform	**-**	**60**	**60**	9.0
	(a) IITs	**-**		**30**	4.5
	(b) IIMs	**-**		**30**	4.5
	(viii) National Knowledge Network	**40**	**1.0**	**40**	9.1
Sub-Total (2)				**541**	85
Grand Total (1 + 2)				**2660**	403

Annex 3: Implementation Arrangements

INDIA: Technical Education Quality Improvement Project III (P154523)

Project Institutional and Implementation Arrangements

1. The implementation arrangements for TEQIP III will build on the well-functioning implementation arrangements for TEQIP I and II, with appropriate improvements. TEQIP III is a Central Sector Scheme, so the MHRD will fund 100 percent of the project costs. Overall responsibility will lie with the Department of Higher Education (DHE) of the MHRD. The MHRD will constitute a National Steering Committee (NSC) assisted by a small National Project Directorate headed by the National Project Director (NPD).

2. The MHRD will delegate the day-to-day implementation to the NPIU, which will undertake all implementation-related activities in accordance with the PIP, prepared by MHRD and agreed with the World Bank. The PIP is a living document, with detailed arrangements and procedures for: (i) disbursement and financial management, including a detailed Financial Management Manual; (ii) procurement, including a detailed Procurement Manual; (iii) environmental and social safeguards management, including the Safeguards Instruments; (iv) monitoring, evaluation, reporting and communication, including the results framework; (v) a verification protocol containing the technical standards and arrangements and procedures for the monitoring, reporting and verification of DLIs; (vi) the Eligible Expenditure Program; (vii) the enabling mechanisms and process for the selection of Participating Institutes and Participating States in the Project; (viii) the terms and conditions for the provision of Institutional Development Grants to Participating Institutes; (ix) the terms and conditions for Twinning Agreements between Participating Institutes under the Project; (x) the establishment, management, mandate and functions of Boards of Governors and Department Management Committees and University Executive Councils; (xi) the mandate, composition and terms of reference for staff of the NSC, NPD, NPIU, and State Steering Committees (SSC); and (xii) such other administrative, financial management, technical and organizational arrangements and procedures as shall be required for the Project, as said plan may be modified from time to time with the prior written agreement of the Association, and such term includes any schedules, annexes and attachments to the Project Implementation Plan.

National-level Implementation Arrangements

3. Three bodies—the NSC, National Project Directorate, and NPIU—will be responsible for overall guidance, policy decisions, and project management, coordination, and implementation. The MHRD will constitute an NSC, chaired by the Secretary of the DHE in the MHRD, with representation as set out in the PIP, from relevant national ministries and agencies, state governments, education experts, and industry representatives.

4. The NSC will meet biannually or as often as may be required. It will be assisted in its functioning by the National Project Directorate. The NSC will provide overall guidance and directions to TEQIP III for maximizing gains from the project. Further, it will review the progress of the project against the indicators in the Results Framework Document and DLI Matrix; review and validate the recommendations of the National Evaluation Committee for

selection of engineering education institutes for participation in the project; take corrective actions with regard to the nonperforming states, UTs, and institutes including the NITs; and review findings from policy reform, thematic, and evaluation studies. The minutes of all NSC meetings will be regularly published on the NPIU's website.

5. The National Project Directorate will be located within the DHE in the MHRD and headed by the NPD. The NPD will be nominated by the MHRD in the rank of Additional Secretary/Joint Secretary. This directorate will consist of a Director in the DHE in the MHRD and adequate support staff. Under the administrative control and guidance of the NPD, it will be responsible for organizing the meetings of the NSC, managing the overall project fund including central fund releases, and monitoring overall utilization of project funds, facilitating smooth and efficient working of the NPIU and ensuring adequate staffing of the NPIU during the project life. The NPD will be assisted by the NPIU.

6. The NPIU will be in charge of the day-to-day implementation of the project at the national and state levels. It will be headed by a CPA. The CPA will be suitably empowered, financially and administratively, to directly perform the following responsibilities: (a) provide technical assistance with regard to core activities such as Twinning and seed money, and disseminate information to states and institutes; (b) prepare Annual Work Plans; (c) organize the selection process with the assistance of a National Evaluation Committee and publish evaluation summaries on the NPIU's website; (d) arrange training for NPIU staff (including staff in the State Project Teams); (e) develop proposals for technical assistance for activities undertaken at the national and state levels; (f) organize meetings of working groups, mentors, and such other committees/groups of experts as may be required from time to time; (g) build capacity of the states/UTs and institutes for implementation of the EAP, EMF, and Disclosure Management Framework requirements; (h) organize professional development programs for engineering education administrators and policy implementers; (i) organize joint review missions and other supervision and implementation support missions, as required; and (j) carry out other related tasks as may be requested by the NPD and the National Project Directorate to achieve the objectives of the project.

7. The project will finance the salaries of the full-time key and support staff in the NPIU and MHRD, fees to consultants, salaries of contractual support staff, expenditure on rent and refurbishment of hired offices, goods, minor works, assessment, surveys, institutional audits, studies, reviews, mentoring, study tours and various training workshops, travel, staff welfare, and other operating costs of the NPIU (including its SPTs) and MHRD through Component 2.

8. The NBA and AICTE will be responsible for carrying out their activities as set out in the project description above. They will also ensure that appropriate staff follow the procurement and FM procedures for the project. Project implementation in the NITs will be overseen directly by the NPIU and the appropriate bureau in the MHRD.

State-level Project Implementation Arrangements

9. The NPIU will operate state-level implementation units, called the State Project Teams (SPTs), in each focus state/UT. The SPTs will be professionally competent and dedicated state-level structures, with the objective of (a) enhancing program implementation capacity in

participating institutes and (b) strengthening the engineering education system in focus states. The SPT will comprise a full-time high-caliber team, hired on market-competitive rates, for management support in key areas of project management, including (a) development of a comprehensive framework for supporting and monitoring the implementation of TEQIP III in the state; (b) knowledge management, including implementation of Twinning Agreements with well-performing institutes from non-focus states; (c) procurement support; (d) FM support; (e) MIS/ERP management, training, support, and maintenance; and (f) all logistics related to project management in the state.

10. The state department responsible for higher technical education will constitute an SSC chaired by the Principal Secretary/Secretary responsible for higher technical education. The composition of the committee is described in the PIP. The SPTs will work closely with the SSC and the State Department of Technical Education in focus states, seeking guidance as necessary and providing regular updates to the Secretary of Technical Education in the state. Since TEQIP III is a Central Sector Scheme, with full funding from the Central Government, each SPT will be accountable to the MHRD/NPIU against a predetermined set of performance goals as described in the PIP and their ToR. Importantly, the SPT's remuneration contracts will be based on performance.

11. In other states, a basic version of the SPTs will operate with the primary objective of ensuring that activities, outputs, and outcomes in the Twinning Agreement are met, and all related supporting activities are undertaken according to the PIP.

Institutional-level Implementation Arrangements

12. The project at the institutional level will be managed by an Institutional Development Unit under the guidance of the BoG (or equivalent). The BoG (or equivalent) will take all policy decisions with regard to smooth, cost-effective, and timely implementation of the institutional subproject. It will monitor progress of all the proposed project activities, resolve bottlenecks, and enable the institute to achieve targets for all key indicators. It will set in motion the implementation of all academic and nonacademic institutional reforms. It holds the ultimate responsibility of ensuring that the institute complies with the agreed procedures for procurement and FM and other fiduciary requirements under the project.

13. Each institute will form an Institutional Development Unit led by the Head of the institute (or Vice-Chancellor or Registrar in the case of the ATUs). This unit will be responsible for the implementation of the institutional subproject, with representation from academic officials of the institute, faculty, senior administrative officers, technical and nontechnical support staff, and students. The head shall be assisted by a senior professor for coordinating the activities of the project. The PIP will provide the details of the structure of the Institutional Development Unit.

14. Colleges under Subcomponent 1.1 will also receive mentoring support for implementation from individual expert mentors assigned to them, mentoring institutes, Indian Institutes of Technology, Indian Institutes of Management, and established NITs.

Financial Management, Disbursements and Procurement

15. The Bank has been engaged with TEQIP since 2001, therefore preparation of TEQIP III is seen in continuum and includes an ongoing analysis of the FM arrangements in the earlier engagements. The assessment was based on reviews of the Financial Monitoring Reports, Audit Reports, Joint Review Mission Documentation, and FMM and Procurement Manual. The reviews also took into account the firsthand experience gained during visits to the states of Assam, Uttar Pradesh, and Andhra Pradesh and other state-level consultations as part of various joint review missions. Key identified gaps and mitigation measures are given in table 3.1.

Table 3.1. Key Identified Gaps and Mitigation Measures

S.No.	Identified Gaps	Mitigation Measures
1	Delayed fund flows	Rolling out direct fund transfer system
2	Irregular Internal Audits	Internal Audit of the SPTs' accounts should be conducted on a quarterly basis in such a manner that all the institutes are also appropriately covered. One suggested way is to follow the hub approach for Internal Audit.
3	Compliance internal and external audit observations	Establish formal audit observation compliance mechanism to ensure timely follow-up of the audit observations of each audit. One suggested way is to set up an Audit Committee in the states to meet biannually/annually.
4	Staff capacity building/training	(a) Develop training modules (online) for encouraging need-based training of FM staff; and (b) develop annual training schedules based on consolidated analysis of observations raised by internal and external auditors; and (c) conduct training of trainers for FM staff of the SPTs.
5	Monitoring by the NPIU and SPFUs	Regular monitoring of FM aspects/issues by the NPIU (including through its SPTs) through a system of quarterly reporting on key financial indicators

16. **Summary assessment.** TEQIP III is a Central Sector Scheme. The project is expected to cover several states, many of which are new to the project and/or have weak implementation capacity, with a total of 200 institutions.[13] About 40 percent of these participating institutes will also be new to the project and its requirements. Given the existing implementation challenges and multiplicity of spending/executing agencies, FM risk is assessed as Substantial. Further, the agreed FM arrangements summarized below are considered adequate to meet the Bank's fiduciary requirements.

17. **Budgeting.** The project will follow the budgeting cycle of the GoI, that is, April to March, and the process will be completed when the project's expenditure (IDA financing and counterpart financing) estimates are included in the Union Government's budget presented and approved by parliament. The project will be budgeted as a separate line on the expenditure side at the union (center) level, as an externally aided project under an identifiable budget head item of the MHRD. The budgeting process for project activities will be as under:

- **National level.** The MHRD will be responsible for preparation of the budget for all project activities, that is, central expenditures including the AICTE and NBA; state-level expenditures; and toward expenditures of eligible institutes including central institutions.

[13] Other states will be determined following project effectiveness.

- **State level.** Following a direct system for fund transfers, the SPT-level expenditures will also be provided for through the NPIU. Hence, no budget provision is required to be provided at the state level.[14]

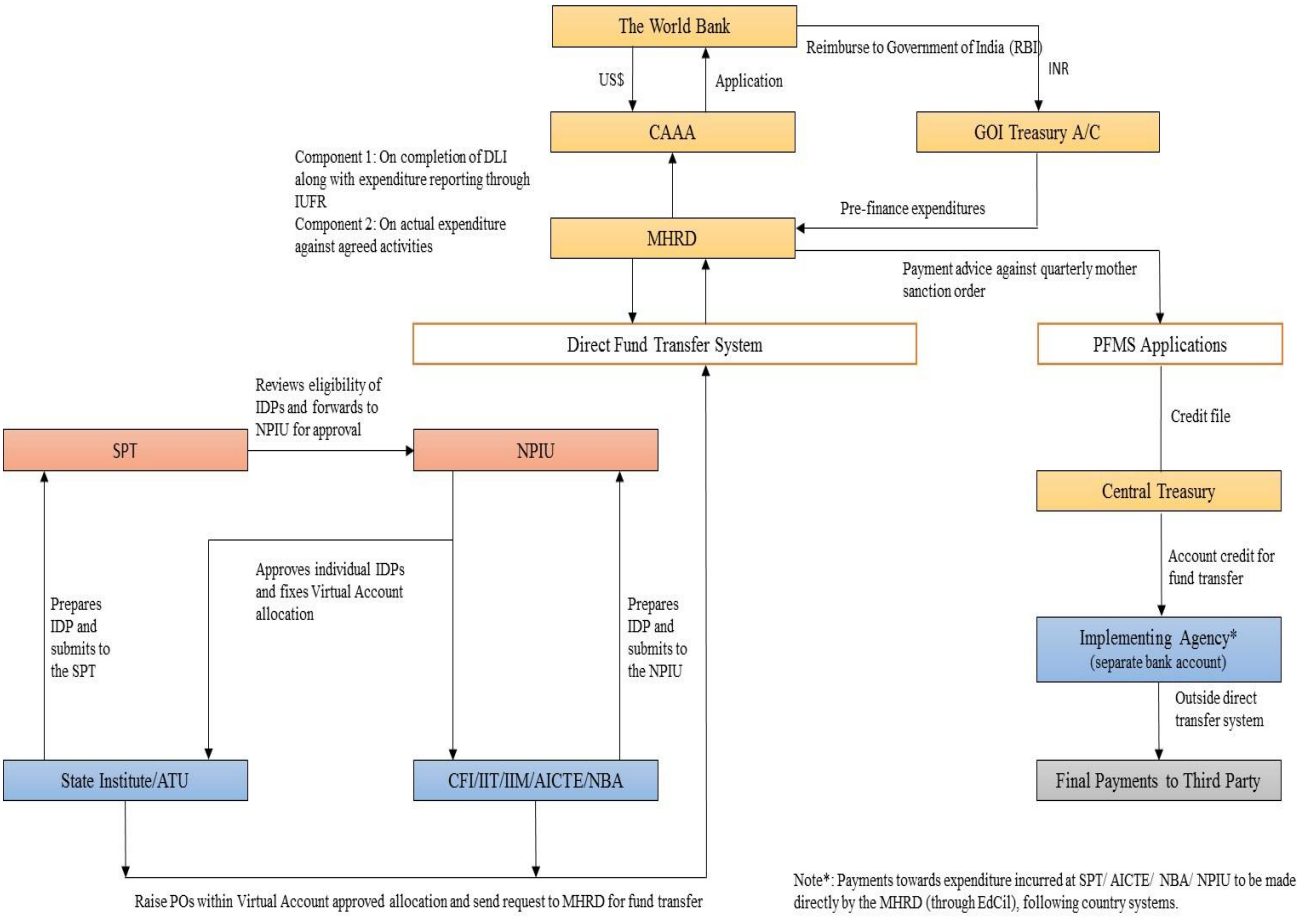
18. **Centralized system for procurement, fund flow, and accounting.**[15] The project is implemented as a Central Sector Scheme, implying that it is 100 percent funded by the union government and implemented by the Central Government machinery. In addition, under TEQIP II, substantial delays were observed in the flow of funds following the state treasury route. With this background, the MHRD has suggested that funds under the project be transferred directly to the institutes/implementing units rolling out an online direct fund transfer system under which funds are directly transferred by the MHRD from the central treasury to the institutes'/implementing units' bank accounts electronically, minimizing tiers involved in fund flow and thereby reducing delay in payment and minimizing cost of holding money. The National Informatics Centre, in collaboration with the Controller General of Accounts' Public Financial Management System, will be developing the system for TEQIP III. This online system, taking into account the project-based System Requirements Specification, is expected to become functional by June 2016.

19. **Flow of funds.** Figure 3.1 reflects the anticipated authorization and flow of funds.

[14] This will hold true only if the Faculty Recruitment Plan for specific states does not envision the active role of the state's Department of Technical Education, Treasury or core-state level body.

[15] The centralized system for procurement, fund flow, and accounting is currently in the design stage. Its functionality and related FM arrangements will be reassessed at the end of the first year of implementation to ensure that the most effective FM arrangements are being followed.

Figure 3.1. Authorization and Flow of Funds



Disbursement

20. The project will be prefunded by budgetary allocations.[16] Figure 3.1 also depicts disbursement arrangement under the program. Component-wise details are as under.

(a) **Component 1** (Total: US$318 million; IDA: US$159 million). Disbursements from the Bank will be contingent on the achievement of a pre-agreed result (DLI) duly verified against execution of agreed EEPs. The **EEP** is defined as actual expenditures on all activities under TEQIP III as incurred by the MHRD, eligible project states/UTs, and institutes. The EEPs are relevant to the PDO and pertain to activities under Component 1. Broad categories of expenditure in the EEP include refurbishment and minor civil works; equipment; faculty, student and non-teaching staff training; sponsored research; student support services and job placement; software and maintenance; and exchange programs. Expenditures related to faculty salaries in focus states will be financed in year 4 in the EEP following finalization of Faculty Recruitment Plans for individual states, and subject to FM assessment of the related implementation arrangements. This is expected by March 31, 2018. According to the Teacher Recruitment Plan, for specific states, salaries may be

[16] IDA advance has not been requested under the project.

funded by routing through the state treasury. These EEPs will be subject to an annual project audit. Disbursements by the Bank under this component will be on achievement and verification of results indicated in the agreed DLIs. The project will submit an IUFR evidencing cumulative expenditure incurred against the identified EEP (refer paragraph above). The Bank will reimburse up to 50 percent of reported EEP, calculated at each disbursement cycle (semiannual), to the GoI. In case in a particular disbursement cycle the EEP is more than the DLI-based disbursement, the balance EEP will be rolled over to the next cycle and will be a part of the subsequent EEP.

(b) **Component 2** (Total: US$85 million; IDA: US$42.5 million). Disbursement will be on the basis of actual expenditure against the agreed activities.

Table 3.2. Categories of Expenditure

Category	Amount of the Credit Allocated (expressed in USD)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Eligible Expenditure Program ("EEP") under Part A of the Project	159,000,000	50%
(2) Goods, works, non-consulting services, consultants' services, Incremental Operating Costs, Training and Workshops under Part B of the Project	42,500,000	50%
TOTAL AMOUNT	201,500,000	

21. **Financial Management Manual (FMM).** The FMM, as prepared for TEQIP II, has been updated to capture (a) implementation experience gained during TEQIP II and (b) changes in project implementation arrangements as envisaged for TEQIP III.

22. The FM arrangements for funding under the Faculty Plan will be designed and agreed separately, post feasibility study, relevant assessments, and finalization of implementation arrangements. As part of due diligence, an FM assessment for the Faculty Plan will be conducted and an action plan would be agreed with the MHRD. Based on the implementation of the action plan, funds will be released for this subcomponent.

23. **Accounting.** It is envisaged that the computerized direct fund transfer system will also have a separate module for accounting under the project. However, since this system is currently at the design stage, as an alternate, the institutes may be asked to continue with their existing system with a separate module for project accounting. Currently, most states/institutes use an off-the-shelf accounting software for recording/compiling information. Books of accounts for the project will be maintained using double-entry bookkeeping principles. Standard books of accounts (cash and bank books, journals, ledgers, and so on) will be maintained at the state and institutes. A Chart of Accounts (standard activity list) will be used to enable data to be captured and classified by expenditure center and type of expenditure. Release of funds to

states/institutes/staff/suppliers will be accounted for as advances in the books of accounts and treated as expenditure only upon submission of expenditure information.

24. **Internal control framework.** The internal control framework for the project will be based on the GoI's financial rules. The FMM of the project sets out the FM framework and procedures to be followed by all implementing agencies. Internal controls in the project will, at minimum, include the following:

(a) Authorization and Approvals: For payments to be made, the financial and administrative authority as amended for the project shall be exercised in accordance with the approved delegation of powers.
(b) Verifications: For each payment, the treasury shall review that the payment claim is appropriately supported by documents, is in compliance with approved policies, and has been approved by a competent authority.
(c) Segregation of Duties: The FM function shall be independent of procurement and administration. There will be dual signatories for approval of expenditures at all levels of implementation.
(d) Physical Controls: All spending units will maintain a fixed assets register for assets procured from credit proceeds. All assets will be tagged and periodically verified.

25. **Staffing.** The finance function in the NPIU will be headed by a finance specialist (chartered accountant in full-time capacity) who will be assisted in his/her functions by an associate and at least two accounts assistants. Within each SPT, there is expected to be a full-time person responsible for oversight of the FM function. At the institute level, there shall be a full-time/part-time official responsible for the FM function.

26. **Financial reporting.** Project expenditures will be reported by the institutes to the SPTs and collated within the NPIU. The NPIU will submit consolidated IUFRs—to be submitted on a semiannual basis within 60 days from the close of the reporting period. The IUFRs will include state-wise and activity-wise expenditure for the previous reporting period and year to date.

27. **Audits** will be conducted by firms of chartered accountants in accordance with ToRs acceptable to the Bank. The audit will cover Project Financial Statements from all institutes and the NPIU (consolidated first at the SPT level). The MHRD will provide a Consolidated Report on the audit of the project, including a consolidation of project expenditure and key observations forming part of the institute and SPT-level audit reports within nine months of close of the financial year, that is, by December 31.

Table 3.3. Audit Time Frame

Audit Report	Implementing Agency	Due Date
Consolidated Project Financial Statements	Institutes	December 31
Project Financial Statements	NPIU	December 31

Procurement

General

28. Procurement for the project will be carried out in accordance with the Bank's Guidelines: 'Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers', dated January 2011 and updated in July 2014 ('Procurement Guidelines'); 'Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers', dated January 2011 and updated in July 2014 ('Consultant Guidelines'); and the additional provisions mentioned in the Legal Agreement. This relates to both Component 1 and Component 2.

29. For procurement under the project, the project authorities, NPIU, MHRD, and GoI have developed a Procurement Manual, which is currently in use for TEQIP II implementation. It is proposed to continue the use of the said manual in TEQIP III, after suitable modifications to take care of the new process and procedures to be followed in the new project. The Procurement Manual is already modified by the NPIU after incorporating the new thresholds and processes. All procurement under the project will be carried out following the agreed procedures according to the provisions of this manual. The requirement to follow the Bank's Procurement and Consultant Guidelines are clearly stipulated in the manual.

30. Procurement remained a challenge for phase I and II of TEQIP for the first few years, but improved to a satisfactory/moderately satisfactory level afterwards. The challenge faced by the project in procurement was mainly in ensuring consistency in processes and procedures followed by the large number of participating institutes spread across the country. Inadequate capacity of the procurement function at the state level also had a severe effect in providing appropriate technical support and carrying out effective oversight and supervision. Positive outcomes realized with the introduction of the PMSS and the capacity-building efforts put in by the NPIU during TEQIP II implementation have brought procurement management to the 'Satisfactory' level with consistency and uniformity across the project institutes. The procurement arrangements and guidelines prepared for the third phase of TEQIP will be similar to those followed for TEQIP II.

Procurement risk assessment

31. Table 3.4 describes major procurement-related risks and the mitigation plan. The risk ratings have been decided based on both the probability of occurrence of various events as well as their likely impact. Based on the risk factors and mitigation measures, the overall residual procurement risk rating for the project is determined as Substantial. The residual rating on procurement will be reviewed and updated periodically by the Bank during project implementation.

Table 3.4. Assessed Procurement Risks and Mitigation Measures

Risk Factor	Initial Risk	Mitigation Measure	Completion Date	Residual Risk
In addition to the issues of scale and staff capacity identified above, procurement of goods, works, and consultant services	Substantial	Each institute will identify a staff member to coordinate and manage the procurement process and train them through a custom-made PMSS developed by the NPIU through a competitively selected agency. It will be made mandatory that at least two	Before project implementation in an institute, if it is expected to do its own procurement	Moderate

Risk Factor	Initial Risk	Mitigation Measure	Completion Date	Residual Risk
dispersed at various parts of the country also has normal country-level macro fiduciary risks of economy, efficiency (and timeliness), transparency, and fairness.		members undergo the training on procurement before the institute can start any procurement in the project. The PMSS will also hold information on commonly procured items and develop Item/Data Bank including standard specifications and addresses of original manufacturers. It is proposed to generate periodic Financial Management Reports from the PMSS. A Procurement Manual, following Bank guidelines and with Standard Bidding Documents, will be used for all procurement under the project. An appropriate internal quality assurance mechanism is being established so that the SPTs at the state level and the NPIU at the national level carry out prior review and post review of procurement undertaken by participating institutes. Thresholds and service standards will be established to ensure this additional layer does not affect smooth project implementation.		
Project will have too many entities handling procurement spread over the whole country, which could lead to issues in consistency and standards, strain supervision capabilities, and lead to fiduciary risks.	Substantial	Supervision will be carried out twice a year and post review plans will be developed and adhered to ensure that procurement meets all the required standards of the project. A Complaint Management Mechanism is being developed as part of the Generally Accepted Accounting Principles and the same would address any procurement complaints and remedy within a dedicated time frame.	Continuous from the start of the project	Substantial
Inconsistencies in the procurement system	Substantial	Use of Bank-approved Standard Bidding Documents	Throughout the project period	Moderate
Lack of transparency, fairness, and a grievance mechanism system in the procurement process	High	Develop a website that will disclose project-related information and establish a grievance mechanism system	During project implementation	Substantial
Non-compliance with agreed procurement	Substantial	- Training and hand-holding provided by the NPIU to institute officials - Prior and post reviews by the Bank	Continuous from year 1	Substantial

Risk Factor	Initial Risk	Mitigation Measure	Completion Date	Residual Risk
arrangements		- Strengthening of complaint management process		
Overall Risk	**Substantial**			**Substantial**

Procurement methods

32. For each contract to be financed by the Credit, the different procurement methods are agreed between the borrower and the Bank in the Procurement Plan. It is mandatory that all the participating institutes and the NPIU follow the Procurement Manual agreed between the borrower and the Bank. The Procurement Plan for the NPIU has been agreed with the Bank. The initial Procurement Plan for each participating institute will be developed by the institute, reviewed by the relevant SPT and approved by the institute BoG (or equivalent) within three months of selection of the institute. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs. These plans and any deviations required, but within the same broad head of expenditure, will be agreed by the respective BoG of the institute. The NPIU will submit to the Bank, the consolidated position of status of procurement plans of the institutes on a six-monthly basis till all procurement plans are cleared and uploaded to the project website. The Bank will review some sample procurement plans during initial supervision missions.

Procurement of goods, works, and non-consulting services

- **International Competitive Bidding (ICB).** There is no ICB contract envisaged for works in the project. However, ICB contracts are expected in goods procurement in the project.

- **National Competitive Bidding (NCB).** Procurement of goods, works, and non-consulting services shall be conducted in accordance with paragraphs 3.3 and 3.4 of the Bank's Procurement Guidelines. For this project, **no major works contracts are foreseen except** refurbishment and renovation activities at the institute levels such as refurbishing of offices and for pilot initiatives (mostly small-value contracts). Additional provisions which shall apply are set out in the FM and Procurement Manual.

- **Selection of consultants.** The project institutes shall use Standard Request for Proposal for selection of consultants. The following methods will be adopted depending on the size and complexity of assignments and as agreed in the Procurement Plan.

  - Quality- and Cost-Based Selection (QCBS)
  - Quality-Based Selection (QBS)
  - Selection under a Fixed Budget (FBS)
  - Least-Cost Selection (LCS)
  - Selection based on the Consultants' Qualifications (CQS)
  - Single-Source Selection (SSS)
  - Individual Consultants

- Short list of consultants for services estimated to cost less than US$800,000 equivalent per contract may be composed entirely of national consultants in accordance with the provision of paragraph 2.7 of the Consultant Guidelines.

33. Domestic preference will be applicable for ICB procurement of goods according to Appendix 2 of the Procurement Guidelines. Table 3.5 describes the various procurement methods to be used for activities financed by the proposed loan.

Table 3.5. Procurement Methods

Category	Method of Procurement	Threshold (US$ equivalent)
Works	NCB	Up to 40,000,000 (with NCB conditions)
	Shopping	Up to 100,000
	Direct Contracting (DC)	According to paragraph 3.7 of Procurement Guidelines
	Force Account	According to paragraph 3.9 of Procurement Guidelines
	Framework Agreement (FA)[a]	According to paragraph 3.6 of Procurement Guidelines
Goods and non-consultant services	ICB	> 3,000,000
	Limited International Bidding (LIB)	Wherever agreed by Bank
	NCB	Up to 3,000,000 (with NCB conditions)
	Shopping	Up to 100,000
	DC	According to paragraph 3.7 of Guidelines
	Force Account (only for NCS)	According to paragraph 3.9 of Guidelines
	FA[1]	According to paragraph 3.6 of Guidelines
	Procurement from United Nations Agencies	According to paragraph 3.10 of Guidelines
Consultants' Services	Selection based on the Consultants' Qualifications (CQS)	Up to 300,000
	SSS	According to paragraphs 3.8–3.11 of Guidelines
	Individuals	According to Section V of Guidelines
	Particular Types of Consultants	According to paragraphs 3.15–3.21 of Guidelines
	Quality- and Cost-Based Selection (QCBS)/Quality-Based Selection (QBS)/Selection under a Fixed Budget (FBS)/Least-Cost Selection (LCS)	For all other cases
	(i) International short list (ii) Short list may comprise national consultants only	> 800,000 Up to 800,000

Note: a. Director General of Supplies & Disposals (DGS&D) rate contracts may be used as FA provided:

- Use of DGS&D rate contracts as FA must be reflected in the Procurement Plan agreed by the Bank for particular goods.
- Before issuing the purchase order, the implementing agency will carry out a price analysis on the specific good that is intended to be purchased. If after this due diligence the implementing agency concludes (and Bank agrees) that the DGS&D rate contracts are more advantageous, DGS&D rate contracts may be used as FA.
- To meet the Bank's requirements for right to audit and Fraud and Corruption, these clauses may be included in the purchase orders (in case the purchasers are directly placing the purchase orders to DGS&D rate

contract holders). On the other hand, if indent is placed through the DGS&D, the purchaser has the option to sign a separate undertaking with the DGS&D rate contract holder, where the Bank's right to audit and F&C clauses could be mentioned.

34. **Prior review by the Bank.** The Bank will prior review the following contracts:

(a) Goods, services (other than consultancies), and IT systems: All contracts more than US$1 million equivalent

(b) Consultancy services: > US$500,000 equivalent for firms and > US$200,000 equivalent for individuals

35. In addition, the justifications for all contracts to be issued on the basis of Limited International Bidding (LIB), SSS, or DC (except for contracts less than US$50,000 in value) will be subject to prior review. The above thresholds are for the initial 18-month implementation period; based on the procurement performance of the project, these thresholds may be subsequently modified and reflected in the Procurement Plan. The Bank will carry out an annual ex post procurement review of the procurement falling below the prior review thresholds provided above. Notwithstanding the foregoing, the Association (Bank) shall be entitled to conduct, at any time, independent procurement reviews of any contract to be financed out of the proceeds of the financing.

36. **Complaint handling mechanism.** The NPIU shall establish a complaint handling mechanism to address complaints/grievances from contractors/suppliers more effectively. On receipt of complaints, immediate action will be initiated to acknowledge the complaint and address it within a reasonable time frame. All complaints during bidding/award stage as well as complaints during contract execution along with the analysis and response of the institute shall invariably be submitted to the Bank for review.

37. **Anticorruption measures and disclosure requirements.** The project shall comply with the disclosure requirements stipulated in the Bank's Procurement Guidelines and Consultant Guidelines dated January 2011 and updated in July 2014. The project shall also publish on its website any information required under the provisions of disclosure, as specified by the Right to Information Act of India.

38. **Use of government institutes and enterprises.** Government-owned enterprises or institutes in India may be hired for activities of a unique and exceptional nature, if their participation is considered critical to achievement of project objectives. In such cases, the conditions provided in clause 1.13 of the Consultant Guidelines will be satisfied.

Environmental and Social (including safeguards)

Environmental

39. While the project interventions, on the whole, will have a positive impact on the technical education sector, specific interventions (under Component 1) envisaged under the project, such as refurbishment/retrofitting/major repair works of existing academic blocks/laboratories/libraries, may have some potential but limited adverse environmental impacts

in the local context. Therefore, these activities are central to the approach and design from an environmental management and safeguards perspective for the project.

40. **Environmental issues/impacts.** Environmental impacts which require attention pertain to (a) location (environmental features of the site and surrounding land uses); (b) design (sanitation, water supply, drainage, solid waste arrangements, wastewater management, ventilation, access, energy efficiency, material usage, fire safety, storage facility, and natural disaster dimension); (c) construction and work site safety management, including occupational health and safety of construction workers, public safety issues, dust and noise, management of materials, their sources and debris/waste material; and (d) operation/maintenance aspects of physical assets such as buildings, laboratories (such as sanitation, waste management, e-waste handling, landscaping, creation/maintenance of activity/sitting spaces, and cleanliness/hygiene in the campus and its various facilities). Also, any refurbishment/repair/retrofitting works may require specific student and worker safety measures during construction if they involve removal of asbestos (which can be identified only when the civil works assessment is carried out during implementation).

41. In view of the project's potential impacts on the environment, the Bank's safeguards policies on Environmental Assessment (OP/BP 4.01) and Physical Cultural Resources (OP/BP 4.11) have been triggered, and the project is designated as Category B. On the whole, with proper management, the project interventions are not likely to cause large-scale, significant, or irreversible damage to the natural, physical, or social environment.

42. **EA.** An EA study was undertaken by the NPIU for the proposed project, with guidance from the Bank team. The study included a specific comprehensive questionnaire targeted at TEQIP II institutes to learn from their experiences as well draw on an accumulation of practices from TEQIP implementation, as well as projects in India financed by the Bank with similar approaches. As part of the EA, the current processes, systems, and capacity of the implementation agencies from an environmental management perspective were also reviewed. The experience under TEQIP I and II has been positive.

43. **EMF.** To effectively plan, design, and integrate environmental dimensions into the overall project preparation and implementation, an EMF has been prepared and incorporated into the PIP. The framework provides guidelines for site selection, design (including that for the physically challenged), construction, and maintenance of environmentally friendly facilities in line with relevant policy, legal, and regulatory requirements of the GoI, state governments, and the environment safeguard policies of the Bank. The mitigation and management measures required to deal with temporary construction-related impacts such as health and safety, labor, accident risks, dust and noise, sanitation, and waste management have also been provided in the EMF. Beyond the regular environment, health, and safety dimensions, the project also offers an opportunity to improve the overall environmental footprint of colleges by creating 'greener facilities' by adopting practices of water efficiency, energy conservation, wastewater recycling, and reuse. Considerations of environment, health, and safety dimensions will help in ensuring the soundness and sustainability of the project and help in achieving the larger quality-related objectives.

44. **Environmental risks and mitigation measures.** The environmental risks associated with the project are moderate. These include environmental issues related to non-availability of fire and electrical safety arrangements, safety signage and do's and don'ts in laboratories and workshops, natural light and ventilation in classrooms and laboratories, first aid and emergency response arrangement, sweeping and cleanliness in hostels and college premises, growth of undesired vegetation resulting in occurrence of snakes and mosquitoes in hostels, inadequate toilets in hostels, improper disposal of solid wastes and wastewater (sewage), and so on. It was also noted that most of the students, research scholars, and faculties are not aware about environmental, health, and safety issues. These risks will be mitigated through:

- Capacity building and staff training in each implementing agency;
- Development of a communications strategy to explain scope, coverage, and limitations of the project; and
- Nomination of a focal person within each implementing agency.

45. **Monitoring of the EMF.** Safeguards monitoring will be an integral part of the implementation and monitoring system of the project. Regular performance monitoring of EMF implementation will be carried out by the internal oversight mechanisms of the project described above. Regular/annual EMF implementation reviews shall be carried out in addition to midterm and end-term evaluations for recording lessons and ensuring implementation quality with necessary capacity-building measures as necessary.

46. **Consultations.** Stakeholder participation is central to design and implementation of the project and provides for information sharing, consultation, and collaboration measures. Guidelines for consultation have been laid out in the EMF to ensure proper consultation and participation of stakeholders at the various stages, including preparation and implementation at the college level. The key elements of the strategy include (a) consultations with primary stakeholders during project planning and implementation; (b) information disclosure and dissemination; (c) grievance review mechanisms; and (d) feedback on EMF implementation through third-party monitoring.

47. In accordance with the Bank's applicable safeguards policies, consultations have been carried out in selected colleges as part of the limited environment and social assessment process. The public consultation process has indicated that the stakeholders strongly support the proposed project. The feedback/inputs from these field-based discussions have been primarily used for preparing the EMF. The project will continue to hold stakeholder consultations as a part of EMF implementation.

Social

48. **Key social impacts and application of Bank safeguards policies.** The project will finance limited construction activities such as establishing/upgrading higher education facilities such as classrooms, library buildings, and so on within the existing premises. These activities are not expected to cause any significant environmental or social impacts. Likely environmental and social impacts, which will be limited in nature, may include temporary construction-related impacts. No civil work involving compulsory land acquisition or involuntary resettlement shall be financed. Therefore, the Bank's OP/BP 4.12 on Involuntary Resettlement has not been

triggered. The project institutions, especially those in LIS, are located in states and communities inhabited by tribal groups. Therefore, the Bank's OP/BP 4.10 on Indigenous Peoples has been triggered.

49. **EAP/IPPF.** The GoI has prepared an EAP or IPPF which addresses issues of gender equality and social inclusion with special attention to the needs of the ST and the SC students and faculty members fulfilling the requirements of OP 4.10 with free, prior, informed consultation held with the primary stakeholders. The EAP/IPPF is a revised version of the EAP prepared for TEQIP II. This EAP/IPPF has been finalized using mostly qualitative research methodologies, including intensive stakeholder interviews and focus groups discussions with male and female students and faculties from various social backgrounds, including ST and SC groups, and poor and disadvantaged communities. The EAP/IPPF draws extensively on the experience of TEQIP I and II. The EAP/IPPF identifies key issues and problems affecting academic performance and overall development of students and recommends a set of actions to address the same.

50. **Summary of recommended actions.** Key recommended actions in the EAP/IPPF include (a) improving the learning efficiency, English language skills, and non-cognitive skills of the students, especially those from socially and economically vulnerable groups including ST and SC; (b) supporting faculty to improve their knowledge levels, pedagogical skills; (c) encouraging institutions of excellence to organize annual technology innovation forums to enable students from various colleges to share experiences and innovations; (d) promoting mentorship among students and teachers (to aid needy students and younger faculty members); and (e) supporting research scholars as a part of the IDPs.

51. **Gender.** A key set of actions relate to sensitivity to gender equality for students and faculty in educational institutions. These actions include ensuring campuses are gender friendly in terms of soft actions (safe campuses) and civil works where necessary (toilets). The EAP also recommends establishing/strengthening Gender Committees to ensure that institutional mechanisms to protect and address the needs and concerns of women students are established.

52. **Citizen engagement.** Under the Project, beneficiary satisfaction surveys will be conducted with students, faculty, non-teaching staff and employers at the start, mid-point and close of project. The information received will support the Project to (a) measure the level of beneficiary satisfaction about the teaching and learning environment in colleges, including gender aspects and (b) receive feedback from employers about the effectiveness and efficiency of the Project interventions. Two intermediate level indicators (9 and 10) have been included in the Results Framework to periodically track beneficiary feedback. Additionally, the Project will (a) hold regular workshops before launching activities in colleges to allow stakeholders, media, and public representatives the opportunity to interact with the Project officials and other relevant personnel; (b) implement the EAP to ensure access and rights of all persons in accessing the facilities under the Project; and (c) ensure all official public documents and the Project website include contact information for conveying any issue on the Project activities.

53. **Objective and scope.** This EAP/IPPF is prepared in line with the GoI's commitment to inclusive growth (*sabka saath, sabka vikas*), and in complying with the Bank's OP 4.10 on Indigenous Peoples. The objective of the EAP is: "To ensure that all students and faculty in the

project institutions have equal opportunity to avail the benefits of the Project with substantial improvement in the performance of students with special attention to the needy and ST and SC categories." All project-assisted institutions will be responsible for preparing and implementing the EAP as an integral part of project implementation for TEQIP III.

54. **Strategy.** Every institution faces a different challenge to improve academic performance. In addition to the caliber of students in an institution, its facilities, management, quality and efficiency of the teaching faculty, and measures to address students' felt needs including relating noncognitive skills and behavioral issues have a bearing on student performance. The project institutions are to make EAP/IIPF to improve learning outcomes for students and employability of graduates with special attention to the needy ones including those from the SC and ST categories, and women students within those categories. The project aims to ensure that all participating institutions improve the transition rate of first year (enrolled) students to the second year (a Key Performance Indicator of the project). Institutional targets are set for all students, with special attention to socially and economically underprivileged groups including SC, ST, Other Backward Castes, and female students. Achievement must be maintained during subsequent years so that high graduation rates are achieved by every institution. All institutions should include the institutional EAP in their Institutional Development Proposals. The EAP should be a part of each institution's MOU with the concerned project authorities.

55. **Monitoring and evaluation.** The EAP/IPPF implementation shall be monitored as a part of the overall project monitoring.

56. **Stakeholder consultation and disclosure.** This document was prepared and finalized through a series of free, prior, and informed consultations with the primary stakeholders, students, and faculty members. The final round of stakeholder consultations were held at the Rajasthan Technical University in Kota on July 8, 2015; at College of Technology and Engineering in Udaipur on July 9, 2015; and at the Institute of Engineering and Technology in Lucknow. The EAP/IPPF has been disclosed by the MHRD on its website and the document shall be locally disclosed at all the participating institutions.

57. **GRMs.** To deal with grievances against any incidence of sexual harassment, every participating institution has a GRM for students and special committees. Any grievances can also be sent to the NPIU (through the SPT as appropriate) which will be documented and addressed through existing GRMs established in the concerned agency.

Monitoring & Evaluation

58. Following from TEQIP I, TEQIP II built a strong web-based MIS which has helped in project M&E, specifically in using performance information to provide incentives to institutes. TEQIP II has built a strong web-based MIS which has helped in project M&E, specifically in using performance information to provide incentives to institutes. In TEQIP III, a special effort will be made to build on existing MISs wherever possible and ensure that the MIS is adapted to each institute's specific needs, allowing it to report on TEQIP III indicators as well as other indicators deemed useful for the institute's own internal decision making. The MIS will also be designed to generate data on the students' performance, with special attention to the vulnerable categories. In addition, the project will work with the AICTE, NBA, and ATUs to harmonize

their reporting requirements, to further simplify the reporting process for institutions. A core database, linked to existing MISs at institutions, will be created and maintained, with server access provided by the MHRD. For institutions without an MIS in place, a supplementing database will be created and linked to the core database. This will enable the MIS to provide policymakers, at the national, state, and institutional levels, a summary analysis of the collected data though an interactive, web-based application capable of generating reports for all TEQIP III indicators and providing the unit-level data required for the computation of each indicator. The system will incorporate a series of validity checks to avoid spurious data entry. An IT firm will be hired for the development, installation, training, and capacity building for the TEQIP III MIS and databases. The MIS will be funded through Component 2. Training provided to M&E staff at the national, state, and institutional levels will strengthen M&E capacity.

59. In addition, the project will also support the development of the ERP/MIS at selected ATUs to promote more effective administration and decision making. To avoid duplication, the ATU ERP/MIS will be linked to the institutional MIS of TEQIP III institutes. For non-TEQIP III institutes, data will be collected thorough web-based systems linked to the ATU ERP/MIS. The development of the ATU ERP/MIS will be funded through Subcomponents 1.2 and 1.3 (grants to ATUs).

60. TEQIP III will strengthen the use of student and faculty surveys in each project institute to provide the BoGs, institutional leaders, and governments information regarding the stakeholders' experience. The information from these periodic surveys will be used to provide timely feedback to improve project performance. TEQIP III will undertake tracer studies on student employment rates. It will also undertake impact evaluations to understand the effectiveness of specific interventions such as behavioral interventions to improve transition rates of students across different social categories and gender. In addition, a two-yearly survey will request feedback from employers on the quality and employability of graduates. Lastly, a bibliometric study summarizing the national and international publication records of the supported institutes will be undertaken regularly.

Annex 4: Implementation Support Plan

INDIA: Technical Education Quality Improvement Project III (P154523)

Strategy and Approach for Implementation Support

1. The Bank's Implementation Support Plan (ISP) for TEQIP III lays out the approach to be followed to help project implementation agencies achieve the expected project results, based on the project's nature and risk profile. The ISP identifies specific actions to (a) better manage key risks identified in the systematic risk rating tool; (b) support increased institutional development; and (c) ensure compliance with the Financing Agreement. For such a purpose, the ISP relies on project design, technical assistance, and monitoring features as enabling tools.

2. **Key risk areas and support strategy.** In addition to ensuring compliance with the Bank's policies and the project's Financing Agreement, based on the project's risk assessment, the following areas have been identified as most critical to concentrate the implementation support efforts:

- **Weak state government commitment could lead to considerable delays in fund flow through the state treasury, affecting timely disbursement of funds to the project institutes.** During implementation, the Bank will support the NPIU (and its SPTs) by organizing regular meetings with lead mentors to build greater ownership and commitment toward the project. Importantly, by building the capacity of the NPIU and its SPTs in focus states to ensure that all government and government-aided colleges benefit from TEQIP III, the project aims to increase state government ownership. Further, the Bank will facilitate the adoption of a transparent integrated FM and procurement system, such that all payments and expenditures can be tracked in real time. Additionally, one of the DLIs tracks a reduction in the time taken for money to be transferred from the MHRD to the institutes/end users.

- **Reluctance to introduce autonomy- and affiliation-related reforms compromised the achievement of quality-oriented goals in specific institutes.** During implementation, the Bank team will work closely with the NPIU, ATUs, and UGC to identify bottlenecks to receiving autonomy and work systematically to address these factors. Often, simple omissions in paperwork lead to considerable delays, and when left unidentified, the delays magnify. Adding to the existing stock of and disseminating good practice examples, from India and other countries, is also an important role for the Bank.

- **Cumbersome processes in government institutes for appointing faculty could hamper the project.** The project emphasizes financial and administrative autonomy and, during implementation, the Bank team will work with the NPIU to facilitate this. Financial and administrative autonomy will allow colleges to generate their own revenue and hire guest faculty and contract staff, thereby reducing the burden of high faculty and non-faculty vacancy rates (as some colleges already do). The project proposes funding the partial costs of contract faculty hired according to

AICTE norms on qualifications and pay, subject to the state government absorbing these costs by the last year of the project.

- **Low involvement of industry in curriculum, placement, and research activities could affect the employability of students and relevance of research.** During implementation, the Bank team will leverage on its contacts with industry and the work being undertaken by the India country office in corporate social responsibility to ensure more regular involvement of industry players in the activities of TEQIP III. Industry participants will continue to be represented in the NSC and also be invited to be part of the review mission teams.

- **Limited technical expertise in the NPIU and SPFUs weakened implementation capacity and the ability to meet the needs of institutes on time.** Importantly, the NPIU has not had a full-time CPA since August 2014 and many SPFUs are inadequately staffed. Under TEQIP III, closer attention will be paid to ensure that the ToR for additional staff meet the project's requirements and vacancies are filled accordingly. Importantly, lead mentors in all focus states will also liaise with the SPTs.

3. The implementation support strategy combines traditional supervision with timely technical assistance and policy advice as necessary. Therefore, the implementation support strategy consists of (a) six-monthly joint reviews; (b) interim but regular technical meetings and field visits by Bank staff; (c) monitoring and reporting by the NPIU on project implementation progress and achievement of results; (d) capacity building of institutes to implement the project and carry out M&E activities at their level; (e) independent validation of results as part of the verification protocols of DLIs; and (f) audit and FM reporting.

4. **Six-monthly joint reviews.** The Bank together with the MHRD and NPIU will formally review the project every six months during the entire period over which the project is active. It is expected that the frequency of implementation support missions will be greater in the first 12 months after project effectiveness. The joint reviews will focus on all aspects of project implementation, including achievement of project outputs and outcomes, FM, and procurement performance, and social and environmental safeguards compliance. The NPIU will share with the Association an Implementation Progress Report in an agreed format at least 15 days before the start of each joint review. The joint review team will identify key issues affecting project performance on an ongoing basis and will prepare a list of key actions to be undertaken by the NPIU toward mitigation and improved implementation.

5. In addition to the review missions, other missions will be undertaken, especially in the first 12 months, to help accelerate implementation and provide technical assistance and advice to the MHRD and NPIU on time. The Bank teams for the reviews and missions will include Bank staff; technical education and M&E specialists; FM, procurement, environmental, and social safeguards specialists; and technical experts in specific areas (assessment experts, for instance). The precise composition of the team at any point in time will be determined by specific implementation requirements. The Bank team will also participate in stakeholder workshops organized by the client, as and when necessary.

Implementation Support Plan

6. The Bank team members are based in Washington, D.C. and New Delhi. While the Task Team Leader is expected to be based in Washington, D.C., knowledge staff will be based in New Delhi to ensure urgent issues are resolved without delay. During the formal and interim reviews, detailed inputs from the Bank team will comprise the following:

(a) **Technical inputs.** These will be provided to the implementing agencies to facilitate project implementation activities. Technical inputs will include any assessment and support that is required so that contractual processes and obligations on the part of the client are duly met. The Bank team will review the ToR and concept notes prepared by the client to implement specific project activities; this is particularly expected to be needed in new areas or areas where international experience is greater than the Indian one (such as on student assessment, institutional governance, or program evaluation). The PIP, which will be a living document, will be reviewed and revised as necessary by the client and discussed with and then approved by the Bank team.

(b) **Fiduciary inputs.** The Bank team will support the client through training and other capacity-building needs with respect to FM and procurement. There will be six-monthly procurement and FM reviews. Any timely support required by the client on fiduciary requirements of the project will also be provided. Additionally, the Bank's FM and procurement specialists will support the client through any technical assistance on the use of the agreed FM and procurement plans.

(c) **Safeguards.** The Association will monitor compliance with the EAP/IPPF and EMF during the joint reviews, and technical guidance will be provided accordingly.

(d) **Operations.** An operations officer will provide guidance on and supervision of all operational aspects.

7. A summary of implementation support is provided in Tables 4.1 and 4.2.

Table 4.1. Staff Resource Estimates for Project Implementation Support

Time	Focus	Skills Needed	Resource Estimate (in SWs)	Partner Role
First 12 months	Technical support	Technical Education Specialist M&E Specialist Operations Officer	8 8 8	n.a.
	Fiduciary training and supervision	FM Specialist Procurement Specialist	8 4	
	Social and environment monitoring and reporting	Social Development Specialist Environment Specialist	2 2	
	Team leadership	Task Team Leaders	24	
12–48 months	Technical support	Technical Education M&E Specialist Operations Specialist	16 16 16	n.a.

Time	Focus	Skills Needed	Resource Estimate (in SWs)	Partner Role
	Fiduciary monitoring and reporting	FM Specialist Procurement Specialist	8 4	
	Social and environment monitoring and reporting	Social Development Specialist Environment Specialist	6 6	
	Team leadership	Task Team Leaders	32	

Note: SW = Staff weeks.

Table 4.2. Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Technical Education Specialists	24	Field trips as required	Country office and HQ based
M&E Specialist	8	Field trips as required	Country office based
Operations Officer	24	Field trips as required	HQ based
FM Specialist	24	Field trips as required	Country office based
Procurement Specialist	24	Field trips as required	Country office based
Social Specialist	8	Field trips as required	Country office based
Environment Specialist	8	Field trips as required	Country office based
Task Team Leaders	48	Four annually	Country office based

Annex 5: Economic and Financial Analysis

INDIA: Technical Education Quality Improvement Project III

Introduction

1. This annex discusses the likely benefits and costs resulting from project objectives and activities. The analysis focuses on the technical education sector as whole, not just engineering education, since reform activities are expected to have a sector-wide impact. It begins by providing an exposition of the benefits of technical education and the need for public intervention in the sector. Where appropriate, for instance, the benefit from an increase in the number of graduates, benefits are restricted to engineering education. Other benefits are assumed to accrue to the entire technical education sector. While twinning arrangements are likely to lead to sectoral and institutional development in focus as well as other states, these benefits are difficult to estimate for the latter. The project cost-benefit analysis, therefore, is based only on benefits accruing to focus states. The cost-benefit yields an EIRR of 41 percent. The note also discusses possible risks to the project and summarizes the results of a risk analysis based on simulated projects' benefits and costs.

Economic Context and Sector Background

2. India is a fast-growing, lower-middle-income country averaging 7.3 percent annual growth of real GDP over the last five years. A persistent feature of India's economic development has been the low share of value added in manufacturing to GDP. In 2014, manufacturing contributed 16 percent to GDP, significantly lower than other fast-growing emerging markets—China at 31 percent, Indonesia at 22 percent, and Thailand at 33 percent.

3. A key determinant of success in expanding high value-added manufacturing is the availability of a highly qualified and skilled technical workforce. Technical education in India has grown rapidly. The intake in UG and PG technical courses grew at 16.5 percent annually between 2006–07 and 2014–15. This growth has led to a shift in enrolment patterns, away from general higher education to technical education. While 20.6 percent of those enrolled in higher education studied technical courses in 2008, 48.3 percent studied technical courses in 2014. Among technical education courses, the majority of students is enrolled in engineering.

4. An important feature of the expansion of technical education is the leading role of the private sector. Of engineering colleges, for instance, 84.6 percent are private[17] and account for 83 percent of UG intake.[18] Private technical colleges are required to operate as not-for-profit. State Admission and Fee Regulatory Councils regulate the fees charged by private colleges based on audited per-student costs.

5. Engineering colleges, both government and private, are affiliated to state government universities, known as ATUs.[19] Fifteen ATUs affiliate a total of 4,171 colleges.[20] The ATUs also

[17] Lok Sabha Un-starred Question No. 2965 for July 30, 2014.
[18] Lok Sabha Un-starred Question No. 3925 for December 12, 2014.
[19] In states without ATUs, engineering colleges are affiliated to a state government university.
[20] AISHE 2013–14.

serve as centers for research in technical disciplines. Most affiliated colleges do not offer PhD programs; 70 percent of students pursuing a PhD do so through an academic department of the ATU. The ATUs, in this role, are particularly significant in the context of the low levels of R&D activity in India. Data from the latest available R&D survey,[21] conducted in 2010, show that India had among the lowest number of researchers in R&D per million, at 160, versus 890 in China and 710 in Brazil.

The Returns to Technical Education

6. The private returns to technical education are substantial and significantly higher than the returns to general education. Based on a simple age-earnings profile of individuals in the age group 18–60 years,[22] the present value of the incremental earning of technical graduates over senior secondary completers, net of direct and opportunity costs, is 280 percent higher (INR 942,000 or US$14,490 versus INR 247,000 or US$3,800) than that of general graduates at 2016 prices. Private returns to technical education are nearly as high in focus states, where the incremental earning of technical graduates over senior secondary completers is nearly 250 percent higher than that of general graduates.

7. A possible consequence of this high incremental return is the high rate of LFP among technical graduates. While the LFP rate of graduates with a general degree is higher than that of the LFP rate of senior secondary completers, at 70 percent versus 64.2 percent, the LFP of technical graduates is markedly higher at 88 percent (table 5.1). The increased LFP from technical education, over general education, is particularly significant for women and SC.

Table 5.1. LFP by Level of Education Completed (in percent)

Level of Education Completed	Higher Secondary	UG Degree (General)	UG Degree (Technical)
All Individuals	64.2	70.0	88.0
Male	92.2	89.5	91.8
Female	20.8	31.9	72.8
SC	70.0	74.7	91.4
ST	72.8	84.6	87.2

Source: NSS 68th Round (2012).

8. The private benefits to technical education include better jobs, both with regard to the type of job (white-collar versus agricultural and factory labor and crafts) and contractual conditions (table 5.2). Table 5.3 summarizes the priced and unpriced benefits from investing in technical education.

Table 5.2. Occupations and Employment Conditions by Level of Education Completed (percent)

Occupation	Level of Education Completed		
	Higher Secondary	UG Degree (General)	UG Degree (Technical)

[21] UNESCO Institute of Statistics Data Centre: Science, Technology and Innovation

[22] NSS 68th (2011-12) round data was smoothed to generate the age-earnings profiles using the equation: $Y=a + b_1age + b_2age^2$. Where Y is annual income.

Occupation	Level of Education Completed		
	Higher Secondary	**UG Degree (General)**	**UG Degree (Technical)**
Legislators/senior officials	13.0	15.2	12.1
Professionals	5.7	20.9	60.7
Technicians and associated profiles	13.1	22.1	13.2
Clerks	7.2	10.8	1.8
Service, shops, and market sales	17.6	11.9	3.8
Skilled agriculture and fisheries	22.2	10.7	2.9
Craft and related trades	9.1	4.0	2.8
Plant and machine operators	5.5	2.4	2.1
Elementary occupations	6.7	2.0	0.5
Total white-collar occupations	**38.9**	**69.0**	**87.9**
Employment Conditions			
Long-term, written job contract	41.6	53.5	54.0
Availability of social security benefits	52.7	70.4	80.3
Eligible for paid leave	60.1	78.9	87.3
Enterprise with > 20 workers	17.5	27.4	49.1

Source: NSS 68th Round (2012).

Table 5.3. The Priced and Unpriced Benefits from Investing in Technical Education

Benefits	
Priced	**Unpriced**
Increase in graduate earnings due to: (a) Increased LFP (b) Increase in graduates employed (c) Better pay	Improved job satisfaction and quality of life from better jobs and employment conditions
Increase in tax revenue as incomes rise	General improvement in skill level of labor market entrants and corresponding productivity gains Improvement in areas of social development due to a higher-caliber workforce Greater economic and social equity as education levels improve. Project interventions will target LIS and underserved groups. Social indicators improve as education levels rise.
Revenue from faculty consultancies and joint projects with industry.	
Revenue from self- financing courses	
Returns on investment in R&D activities	Knowledge spillovers and technology diffusion from R&D activities

Benefits	
Priced	**Unpriced**
Reduced fees from affiliation as colleges become autonomous or permanently affiliated	Improved responsiveness of the technical education sector to the needs of the economy and society Improved teaching and learning at other education levels as aspirations increase due to more and better opportunities
Cost savings and improved efficiencies due to: (a) Consolidation (b) Better data management (MIS) and the use of data to inform policy decisions (c) Better procurement and FM (PMSS) (d) Better information flows	Better management of the technical education sector by the MHRD, ATUs, and state governments
Reduced costs as students complete the program faster	

The Case for Public Intervention

9. There are significant inequalities in access to technical education, particularly across income groups (table 5.4). While the majority of students in higher education in poorer households study general courses, the majority of those in richer households study technical courses.

Table 5.4. Type of Course by Quintiles of Household Consumption Expenditure

Quintiles of Consumption Expenditure	1 (poorest)	2	3	4	5 (richest)
General	62.4	58.9	55.6	46.5	36.6
Professional/Technical	30.7	35	39	47.8	59.4
Vocational/Others	6.9	6.1	5.4	5.7	4

Source: NSS 71st Round (2014).

10. This is because of the high cost of technical education relative to general education (table 5.5). Further, access to financial assistance is low, particularly for those enrolled in private technical colleges (table 5.6).

Table 5.5. Mean Expenditure on Higher Education by Type of Institution (INR)

Type of Institution	Tuition Fee	Books	Private Coaching	Other Expenditure	Total Expenditure
All Higher Education	32,473	5,216	3,897	5,201	46,263
Government Professional/ Technical	34,434	7,227	6,535	7,421	53,142

Type of Institution	Tuition Fee	Books	Private Coaching	Other Expenditure	Total Expenditure
Private Professional/ Technical	67,037	7,850	3,278	8,744	87,093

Source: NSS 71st Round (2014).

Table 5.6. Percentage of Students Who Received Financial Assistance by Type of Institution

Type of Institution	Free	Tuition Fee Waiver (Mean Amount in INR)	Scholarship/Stipend (Mean Amount in INR)
All Higher Education	8	4.3 (19,388)	18.1 (13,699)
Government Professional/Technical	11	6.3 (17,313)	24.5 (21,412)
Private Professional/Technical	1.3	3.8 (33,327)	15.6 (23,097)

Source: NSS 71st Round (2014).

11. The emphasis on focus states is necessitated, in part, by low levels of access to technical education in these states. In focus states, 42 percent of those in higher education study technical courses, against 55 percent in other states. While income levels in these states are low, with 47 percent of the population in the bottom two quintiles of household consumption expenditure, the out-of–pocket expenditure incurred on technical education is higher in the focus states, at INR 78,715 per year, as against INR 73,700 per year in other states. This results in particularly low levels of access for students in households from the bottom two quintiles of household consumption expenditure in focus states at 25 percent and 29 percent, respectively, compared to 37 percent and 40 percent, respectively, in other states. Access to technical education in these states is further restricted by the lower availability of financial assistance when compared to other states (table 5.7).

Table 5.7. Percentage of Students Who Received Financial Assistance in LIS and Other States

	Participating States	Other States
Tuition Fee Waiver (Mean Amount in INR)	3.7 (25,990)	5.7 (32,560)
Scholarship/Stipend (Mean Amount in INR)	16.9 (22,500)	18.3 (22,500)

Source: NSS 71st Round (2014).

12. Despite the need for greater public investment in technical education in focus states, per capita expenditure on technical education in the age group 18–23 years is significantly lower in these states. In 2012–13, plan expenditure on technical education in other states was almost five times higher at INR 299 versus INR 66 per capita per year in the age group 18–23 years,[23] while non-plan expenditure was almost twice as high, at INR 9,102 versus INR 4,627.

13. Alongside equity concerns, there are significant quality challenges in technical education. The absence of market incentives for improving quality necessitates an effective quality monitoring and accreditation system. While data on the overall effectiveness of regulations and accreditation is hard to come by, several indications point to significant gaps in the system. First,

[23] Analysis of Budget Expenditure on Education, MHRD 2014.

while the ATUs are mandated to play an important role in improving quality in their affiliated colleges, only 3 of the 15 ATUs currently have valid accreditation from NAAC,[24] reflecting a lack of participation in the quality assuarance process at the ATU level. Second, despite a strong emphasis on maintaining strict pupil teacher ratios in the AICTE regulations, faculty strength is 30.2 percent and 27.2 percent below requirement in private engineering colleges at the UG and PG levels, respectively.[25] Finally, while there are widespread reports of violations of AICTE norms by technical colleges, sanctions against violations are weakly enforced.

14. An intervention focussed on reforms in the ATUs and national- and state-level institutions such as the AICTE, NBA, and state Admission and Fee Regulatory Councils can broaden the project's impact far beyond project institutions, including to private colleges that make up the majority of technical colleges and account for more than 80 percent of UG capacity. These interventions can serve as a cost-effective means to achieve scale in a large and diverse technical education system.

15. Finally, improving R&D output is another key area that requires public intervention. Data from the latest R&D survey,[26] conducted in 2010, showed that combined gross domestic expenditure on R&D from all sources, as a percentage of GDP, in India is far lower than in other emerging markets at 0.81 percent, against 1.21 percent in Brazil and 1.84 percent in China. The R&D deficit in higher education is particularly significant, with higher education in India employing only 11.5 percent of full-time equivalent researchers in R&D. This is the lowest of all countries for which data is available, and far lower than Brazil at 67.8 percent and China at 19.8 percent. Expanding R&D in technical eduction institutions is also of particular importance because of weak intellectual property rights enforcement, which restricts the expansion of commercial R&D.[27]

Cost-benefit Analysis

16. The cost-benefit analysis quantifies project benefits and costs in rupee terms, where data is available, to compute the project's EIRR. The project benefit streams, for which sufficient data is available to quantify the economic value, accrue from five channels. First, improvements in technical education lead to a phased increase in enrolment. Second, improved teaching and learning increases the completion rate in technical education. Third, an improvement in the skill level and productivity of labour market entrants increases the wage premium earned by technical education graduates. Fourth, improvements in employability and higher wage premiums increase the worker population ratio of technical education graduates.[28] Fifth, greater R&D activity and more industry-funded R&D increases the revenue the ATUs earn through externally funded research.

17. The wage premium for technical education graduates has been defined as the present value of the incremental earnings of technical education graduates over senior secondary

[24] NAAC website as accessed on October 10, 2015.
[25] Lok Sabha Un-starred Question No. 3925 for December 17, 2014.
[26] UNESCO Institute of Statistics Data Centre: Science, Technology and Innovation.
[27] India ranks lowest among 25 counties with regard to its intellectual property rights environment, according to the Global Intellectual Property Center's International Intellectual Property Index, 2014.
[28] The number of persons employed divided by the reference population.

graduates, net of direct and opportunity costs. This is computed using an age-earnings profile generated from the NSS 68th[29] round data using a simple smoothing equation.

18. Project costs are divided into three major components: (a) the cost of increased enrolment in technical education borne by instituitons and the central and state governments; (b) project-related investment costs, assumed to be 30 percent of the total project funding, based on the project design; and (c) project-related incremental recurring costs, assumed to be 70 percent of the total project funding, and projected to continue after the close of the project, based on the project design.

19. Table 5.8 summarises the key variables used in the cost-benefit analysis, their baseline values, the assumed project impact, and the data sources used.

Table 5.8. Key Variables Used in the Cost-benefit Analysis

Variable	Baseline Value	Assumed Project Impact	Data Source
UG enrolment in engineering and technology courses in focus states	1,616,138 (2016–17, projected using 2013–14 data)	Phased increase, starting with approximately 3% in year 1	AISHE 2013–14
Completion as a percentage of enrolment in engineering and technology courses	21%	Increase of 5%, starting in year 2	AISHE 2013–14
Wage premium for technical education completers in focus states	INR 531,769 (2012 prices converted to 2016 prices)	Increase of 5% starting in year 2	NSS 68th Round
Worker population ratio of technical graduates in focus states	74%	Increase of approximately 3%, starting in year 3	NSS 68th Round
Average percentage of externally funded R&D projects and consultancies in the total revenue of ATUs	0.8%	Increase of 2 percentage points per year from year 2 to year 4	AISHE 2013–14

20. Table 5.9 summarises the results of the cost-benefit analysis. The computed EIRR is 41 percent, significantly higher than the assumed socially required rate of return of 12 percent, indicating that the project is highly feasible.

Table 5.9. Summary of Cost-benefit Analysis Results

NPV (INR)	
Estimated Economic Benefits	162,969,217,486
Estimated Economic Costs	120,265,678,570
Free Cash Flow	42,703,538,916
NPV (US$)	
Estimated Economic Benefits	2,449,928,104

[29] The 71st round of the NSS on 'Social Consumption: Education' does not provide data on employment status and wages.

Estimated Economic Costs	1,807,962,696
Free Cash Flow	641,965,408
EIRR (percent)	41 percent

Note: NPV = Net present value. A discount rate of 12 percent is assumed.

Risk Analysis

21. Managing project risks effectively requires identifying potential risk factors and quantifying their impact on project success, as best as possible. The project faces risks from weak government commitment and delayed flow of funds in some states to institutional resistance to autonomy and affiliation reforms, poor administrative capacity in some institutions, faculty and nonteaching staff shortages, and limited technical expertise in implementation agencies.

22. Monte Carlo simulation techniques have been used to estimate project risk, defining project failure as obtaining a negative NPV of free cash flows generated. Project benefits and costs are disaggregated into five principal components:

(a) The economic gain from more engineering and technology degree completers as well as higher employability and labor market premiums for all technical degree holders in focus states (focus)
(b) Increased earnings of ATUs through externally funded research (rnd)
(c) The cost of higher enrolment (grads)
(d) Project-related investment costs (ic)
(e) Project-related incremental recurring costs (irc)

23. This level of disaggregation necessitates careful consideration of the correlations between components. The rank correlation method of Iman and Conover[30] is used to generate the required correlations in the Monte Carlo samples. This method has the advantages of being applicable regardless of the input distribution and maintaining the original marginal distributions, while introducing the target correlations.

24. All five components listed above are assumed to follow triangular distributions.[31] The mode of each component is set to the value obtained in the cost-benefit analysis, and maximum and minimum values are set as given in table 5.10.

Table 5.10. Assumed Distribution of Cost and Benefit Components

Component	Lower Bound % of Mode	Upper Bound % of Mode	Mode

[30] Iman, R., and W. Conover. 1982. "A Distribution-free Approach to Inducing Rank Correlation among Input Variables." *Communications in Statistics-Simulation and Computation* 11 (3): 311–334.
[31] A triangular distribution is defined entirely by its lower bound, mode, and upper bound. It serves as a useful approximation when the marginal distribution of components is unknown. The modal value can be set to the estimate arrived upon in the cost-benefit analysis, with the lower and upper bounds reflecting the degree of uncertainty around that estimate.

focus	65	110	162474566200
rnd	60	130	494651286
grads	90	120	80814078685
ic	100	125	5342085073
irc	90	120	34109514812

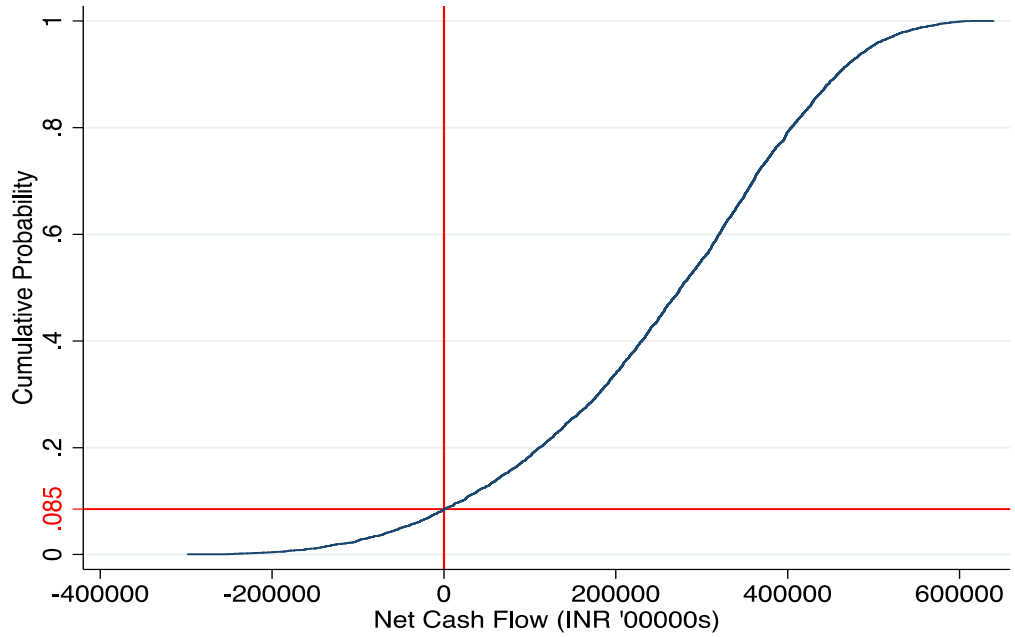
25. Table 5.11 describes the matrix of assumed rank correlations imposed on these distributions.

Table 5.11. Assumed Rank Correlations between Project Benefits and Costs

	focus	**rnd**	**grads**	**ic**	**irc**
focus	1	0.1	0	0	0
rnd	0.1	1	0	0	0
grads	0	0	1	0.1	0.1
ic	0	0	0.1	1	0.15
irc	0	0	0.1	0.15	1

26. Based on 5,000 repetitions, simulations yielded a mean present value of net cash flows of INR 25,684,696,714 and a 95 percent confidence interval of [INR 25,223,638,682, INR 26,145,754,747]. Figure 5.1 plots the empirical cumulative distribution of the simulated present value of net cash flows. The implied probability of project failure (negative net present value of net cash flows) is 8.5 percent.

Figure 5.1. Empirical Cumulative Distribution Function of Net Cash Flows from Project Activities



27. In summary, the computed EIRR for the project is 41 percent, significantly higher than the assumed socially required rate of return of 12 percent, indicating that the project is highly feasible. The case for public intervention is strong, given the highly inequitable distribution of engineering education by region, income and SC/ST as well as the market failures inherent in high-end R&D work. A risk analysis suggests that the implied probability of failure is 8.5 percent.