

ASIAN DEVELOPMENT BANK

RES: INO 97036

**REEVALUATION
OF THE
SECOND SENIOR TECHNICAL SCHOOLS PROJECT
(Loan No. 488-INO)**

**IN
MALAYSIA**

December 1997

CURRENCY EQUIVALENTS

Currency Unit - Rupiah (Rp)

| | At Appraisal | At Project Completion | At Postevaluation | At Reevaluation |
|----------|---------------------|------------------------------|--------------------------|------------------------|
| \$1.00 = | Rp415 | Rp1,742 | Rp1,935 | Rp2,980 |
| Rp1.00= | \$0.0024 | \$0.00057 | \$0.00051 | \$0.00034 |

ABBREVIATIONS

| | | |
|----------|---|---|
| DTVE | - | Directorate of Technical and Vocational Education |
| GDP | - | Gross Domestic Product |
| MOEC | - | Ministry of Education and Culture |
| MOM | - | Ministry of Manpower |
| O&M | - | Operation and Maintenance |
| OJT | - | On-the-Job Training |
| PCR | - | Project Completion Report |
| PMS | - | Politeknik Mekanik Swiss |
| PPAR | - | Project Performance Audit Report |
| REM | - | Reevaluation Mission |
| REPELITA | - | Five-Year Development Plan |
| SMEA | - | Economic Senior High School |
| SMK | - | Vocational High School |
| TEDC | - | Technical Education Development Center |
| TTC | - | Technical Training Center |
| TTTU | - | Technical Teacher Training Unit |
| TTUC | - | Technical Teacher Upgrading Center |
| VEDC | - | Vocational Education Development Center |

NOTES

- (i) The fiscal year (FY) of the Government ends on 31 March.
- (ii) The school year (SY) for secondary schools is from 15 July to 15 June.
- (iii) In this Report, "\$" refers to US dollars.

EXECUTIVE SUMMARY

The Project was the second of a series of four Bank-financed senior technical high schools (STM) projects in support of the Indonesia strategy for economic growth, i.e., improve access to education, increase employment opportunities, and develop balanced regional growth. The upgrading of STMs in the provincial areas was considered one of the means by which these objectives could be achieved. The Project was designed to improve the quality and increase the number of graduates for employment in industry as skilled workers and lower level technicians. The Project upgraded 16 STMs, strengthened the technical teacher upgrading center in Bandung, and established a new center in Malang. Four technical training centers in Bandung, Medan, Surabaya, and Ujung Pandang, as well as the Politeknik Mekanik Swiss in Bandung, were provided with additional equipment and facilities for technical teacher training units.

The Project was appraised in August/September 1980, approved in November 1980, and completed in December 1988 with a delay of 4.5 years. The actual cost at Project completion was \$46.88 million, 9 percent lower than the estimates at appraisal. The loan amount (\$26 million) was almost completely disbursed (99.8 percent). The project completion report was circulated in May 1990 and the project performance audit report (PPAR) was circulated in November 1991. The PPAR concludes that despite a substantial delay in the completion of the Project due to circumstances beyond its control (drop in government oil revenues in the early 1980s), the Project was generally successful and satisfactorily achieved its objectives

The reevaluation study of the Project is being undertaken nine years after completion of the Project in order to reassess the Project's operational impact and sustainability. The reevaluation report provides an indication of the relevance and impact of technical education on the country's overall development. A tracer study was conducted as part of the reevaluation study to examine the employment and career trends of a sample of graduates of the STMs assisted in the Project, and to assess the socioeconomic impact on the graduates and their families. The findings confirm that there is a high employment rate for STM graduates, with 94 percent of those seeking jobs getting employed within one year. Favorable employment prospects for STM graduates will continue to grow in the medium and long term. STM graduates earned between Rp150,000 (\$50) and Rp650,000 (\$218) per month. The majority of STM students (95.3 percent) come from low-income families with earnings between Rp200,000 (\$67) and Rp500,000 (\$168) per month. Studying in an STM clearly enhances the likelihood of landing jobs. Sixty-nine percent of employed graduates contribute financially to family expenses.

The reevaluation confirmed many aspects of the general findings and assessment made at postevaluation. Further, the quality of technical education and vocational training system has continued to progress. To make the system more effective and relevant, the Government adopted the policy of *link and match* in its Sixth Five-Year Development Plan (1994-1999). While policy dialogue or reform considerations were not specifically included in the design of the Project, unintended reforms did eventuate from the Project. Because of increasing social demand for STM courses, student selection is getting more restrictive, thus resulting in better quality inputs from the junior secondary level. Enrollment at the Project STMs increased to 16,147 in school year 1996/97 compared with the envisaged 14,400 during appraisal. Teachers are better qualified. Improvement in the internal efficiency and in the qualitative aspects of technical education is pronounced. Academic facilities and workshops of the STMs were generally fully utilized. Significantly, the use of the workshops was maximized as they were made available for the use of other STMs and

private schools. Activities in the production units provided the means for teachers and STM management not only to interact with industry, but also to provide relevant training in the STMs.

The largely good performance of STM graduates in industry, the growing demand for STM graduates, and the modern and well-equipped facilities provided under Bank and other donors assistance have helped improve the image and status of technical education. Systemic deficiencies are being addressed by the Government's policy of *link and match* through the implementation of *Pendidikan Sistem Ganda* (dual [school and industry] education system). STMs are fully integrated into their community, providing service and receiving support from the community. The annual recurrent budget allocation has more than doubled in real terms over the last ten years, and recurrent cost allocation per student has increased 1.55 times in real terms since 1986. In light of the recent cuts in Government budgets due to the regional currency crisis, recurrent budgetary allocations across all sectors are being reduced. However, alternative sources of funding and cost recovery are continually being sought and the Government is developing new proposals and initiatives to enhance future budgetary provisions, such as production units, contributions from industry, and operations of private schools with increased tuition fee revenues.

The Government is undertaking to put into action the Bank's advice concerning institutional development, sustainability, and relevance to the end users through institutional and policy reforms. Further Bank support to Government efforts in preparing quality technical personnel for the country's industrialization program is justified, keeping in mind the long gestation period needed in this subsector. There is scope for further improvement of the quality of technical education. The upgrading of school management personnel, especially principals, vice principals, and heads of departments is of utmost importance.

Project objectives and targets set out at the time of appraisal have been achieved. The quality of technical education has improved through closer cooperation of industry, and aid agencies. There is a pronounced improvement in internal and external efficiencies in the STMs. The Project has assisted the Government in achieving a more balanced regional growth by providing equitable access to quality technical education in six provinces previously unassisted by technical education projects. The Project has continued to perform well following the PPAR and has achieved long-term impact by promoting development of technical education. Benefits have been sustained. The Reevaluation Study confirms the conclusion of PPAR that the Project is generally successful. The success of the quality upgrading of STMs in Indonesia highlights the importance of providing assistance and policy guidance over the long term in the education sector.

I. BACKGROUND

A. Technical Education Subsector Framework

1. Senior secondary education (Grades 10-12) is provided in two streams: (i) general secondary school, which is the academic stream; and (ii) the technical/vocational stream, which is delivered through institutions collectively known as vocational secondary schools (SMK). In school year (SY)1997/1998 there were 751 Government and more than 3,000 private SMKs. The two largest groups of SMKs are focused on business studies/economics. These are known as economic

senior secondary schools (SMEAs) and senior technical high schools (STMs¹). There are 339 SMEAs and 186 STMs² run by the Government. STMs offer formal technical education at the

¹ Sekolah Teknologi Menengah, Bahasa Indonesia for senior technical high schools.

² There are 167 STMs which offer the five standard engineering programs, 2 STMs specializing in Avionics, 4 STMs in Graphic Arts, 4 STMs in Industrial Chemistry, 2 STMs in Shipbuilding, and 7 advance STMs offering 4-year programs.

senior secondary level (ages 16-19 years) through three-year courses intended to develop broad-based technical skills in preparation for employment as skilled workers or lower level technicians in industry. SMEAs comprise 50 percent of total SMK enrollment of 1.46 million, STMs 38 percent (around 555,000 students), and other institutions (agriculture, textiles, crafts, arts) 12 percent. Sixty-five percent of students are enrolled in private institutions.

2. Senior secondary education is the responsibility of the Ministry of Education and Culture (MOEC) which provides funding and policy direction to Government schools, as well as the registration, examination, and other coordinating functions for private institutions. The MOEC organizational structure is comprised of four Directorates General, each headed by a Director General who reports to the Minister of Education and Culture. Under the Directorate General of Primary and Secondary Education is the Directorate of Technical and Vocational Education (DTVE), responsible for the management of public SMKs. While the Directorate of Private Schools is responsible for private SMKs in matters of administration,³ DTVE plays an important role by providing policy guidance, direction and support to the technical and academic aspects of private schools (e.g., curriculum, teacher qualifications, facilities). In general private STMs are not at par with Government STMs because of inadequate workshop and laboratory facilities.

3. Under MOEC's *link and match* policy, the vocational and technical education and training system is to *link* directly with the labor market, and *match* its training programs with the present and future skill requirements of Indonesian industry. The resulting education system, currently under development and being progressively introduced, is called the *Pendidikan Sistem Ganda*.⁴ The system, modeled after the German dual education system, has been modified to match Indonesian conditions. System development is supported by the Governments of Australia, Germany, and Switzerland, and undertaken in close cooperation with Indonesia's Chamber of Commerce and Industries. The aim is to contribute to the establishment of a demand-driven system. The amount of external assistance in education to Indonesia over the last 22 years is about \$5.5 billion, of which the main contributors are the World Bank (41 percent) and the Bank (30 percent). Among the bilateral aid agencies, the Government of Japan was the single biggest source (13 percent), followed by Australia (5 percent). Of the total amount, about 25 percent was provided for technical education and vocational training. External assistance to STMs was provided mainly by the Bank (\$233.3 million). Other contributors were the World Bank (\$18.6 million), Australia (\$16.9 million), France (\$7.2 million), the Netherlands (\$13.9 million), and others. The total of this assistance to technical education is about 5.3 percent of total investment in education over the period.

4. While the majority of technical education and vocational training comes under the responsibility of MOEC, a number of other Government departments are involved in training. The Ministry of Manpower (MOM) operates over 150 skills training centers for unemployed and out-of-school youth, and is developing apprenticeship training programs with industry. MOM is responsible for the regulation of trades and occupations, as well as for overall labor market analyses. Other ministries, such as the Ministry of Agriculture and the Ministry of Industry and Trade, also provide vocational training related to their specific needs.

³ About 10 percent of private STMs are subsidized by the Government (i.e., teachers' salaries are reimbursed), or public school teachers are provided. Another 12 percent are partly subsidized.

⁴ Literally translated as Dual Education System, a technical education and vocational training model combining an educational program in school with a skills acquisition program in industry or other employment-related institution in a monitored, sustainable, and systematic manner. The system was established with reference to Law No. 2/1989 on the National Education System, Government Regulation No. 29/1990 on secondary education, and the Decree of the Minister of Education and Culture No. 0490/U/1992.

B. The Project

5. The Second Senior Technical Schools Project (the Project) was prepared in 1979⁵ to 1980 in support of the Indonesia strategy for economic growth. This strategy was articulated in the broad

⁵ TA No. 323-INO: *Second Senior Technical Schools*, for \$92,000, approved on 10 December 1979.

objectives of REPELITA⁶ III (1979-1984): to improve access to education, increase employment opportunities, and develop balanced regional growth. The Government considered the upgrading

⁶ Rencana Pembangunan Lima Tahun (Five-Year Development Plan).

of provincial STMs one of the means by which these objectives could be achieved. The Project was designed to improve the quality and increase the number of graduates for employment in industry as skilled workers and lower level technicians. The main objectives of the Project were to assist the Government to: (i) improve the quality and supply of skilled workers through better formal training, (ii) provide equitable distribution of technical training opportunities throughout the country, and (iii) improve the quality of training and increase the supply of qualified technical teachers.

6. The Project was appraised in August/September 1980 at a total Project cost estimated at \$51.5 million. The Loan was approved on 27 November 1980 in the amount of \$26 million from the Bank's ordinary capital resources to finance the entire foreign exchange cost of the Project. The Loan became effective on 22 January 1981 and the Project was implemented over a period of 8 years. The Project upgraded 16 STMs, strengthened the technical teacher upgrading center (TTUC) in Bandung, and established a new TTUC in Malang. Four technical training centers (TTCs) in Bandung, Medan, Surabaya, and Ujung Pandang were provided additional equipment and facilities for technical teacher training units (TTUs), as was the Politeknik Mekanik Swiss (PMS) in Bandung. The executing agency was DTVE. The expected closing date of 31 December 1984 was extended four times and the Loan was closed on 31 December 1988, a delay of 4.5 years. At Loan closing an amount of \$25.948 million had been disbursed and \$0.052 million was cancelled. The actual cost at Project completion was \$46.88 million, 9 percent lower than the estimates at appraisal.

7. The Project was the second of a series of four Bank-financed STM projects covering the period 1979 to 1998.⁷ The project completion report (PCR) was circulated in May 1990. PCRs of the first three projects expressed satisfaction in the achievement of objectives and targets. The project performance audit reports (PPARs) for both the first STM project (Loan No. 356, PE-341, October 1991) and the Project (PE-345, November 1991) rate the projects generally successful. No performance audit has been undertaken for the third project (Loan No. 715). The fourth STM project (Loan No. 1100) is scheduled for completion in 1998.

C. Major Findings of the Project Completion Report

8. The Project improved the quality and supply of skilled workers through better formal technical education, and in providing equitable distribution of training opportunities in 13 of the country's 26 provinces. Also, it increased the supply of qualified technical teachers and improved the quality of existing stock (808 upgraded teachers [94 percent of total number] by the end of the Project) and updated the STM curriculum. All 16 STMs were fully operational as of May 1990. Total enrollment for SY1988/89, the last year of Project implementation, was 12,997 (90 percent of appraisal- envisaged enrollment). The shortfall was due to a Government policy of reducing class size from 40 to 36 (and some from 36 to 32), and the late completion of school improvements due to lack of Government counterpart funds. However, enrollment increased to 14,671 students in the following SY1989/90, surpassing the appraisal target. While the entire local currency requirement of \$25.5 million was to be provided by the Government, it financed the equivalent of only \$14.724 million in local cost (58 percent of agreed contribution). Project implementation was delayed by 4.5 years, more than twice the original estimate, due to the Government's rephasing of its public investment program in 1983 to cope with the sharp drop in revenue caused by the decline of world

⁷ The other projects were (i) Loan No. 356-INO(SF): *Senior Technical Schools Project*, for \$24 million, approved on 28 September 1978 and closed on 31 December 1988; (ii) Loan No. 715-INO: *Third Senior Technical Schools Project*, for \$83 million, approved on 11 December 1984 and closed on 30 September 1993; and (iii) Loan No. 1100-INO: *Technical Education Development Project*, for \$100 million, approved on 26 September 1991. The Bank has provided a total of 11 technical/vocational education projects in Indonesia (including agricultural education).

oil prices.⁸ This led to a disruption in the civil works program and a subsequent delay in other related components. Civil works started only in March 1985, and buildings were not ready for commissioning until early 1988. Equipment were commissioned only in 1989. Consultants were fielded more than three years behind schedule. The fellowship program contributed significantly to the preparation of master teacher trainers, addressing a major deficiency in the first project.

D. Postevaluation Findings

9. A postevaluation mission was fielded in May/June 1991 and the PPAR (PE-345) was circulated in November 1991, 18 months after the PCR. The PPAR noted that student enrollment had expanded gradually since 1986 and had surpassed the appraisal target of 14,400. Curricula were improved to better match the emerging industrial needs. The quality of teaching was improved because teachers skills were enhanced. A review of internal efficiency indicators (class size, teacher/student ratio, teaching load, dropout and graduation rates) showed a reasonably high level of internal efficiency. On the other hand, the assessment of external efficiency was constrained by limited data. In general, the PPAR estimated the employment rate of graduates during the first two years after graduation at between 50 and 75 percent, depending on the rural/urban character of the school. About 10 percent continued with further education, 10-15 percent were self-employed, and the rest were either unemployed or underemployed. The major limitations observed were in the areas of industry linkages, recurrent funding support for operation and maintenance (O&M), and utilization of teacher training institutions. Overall, the Project improved the quality and supply of skilled workers through better formal technical education, and provided equitable distribution of training opportunities. In addition, it increased the supply of qualified technical teachers, improved the quality of existing stock, and updated the STM curriculum. The PPAR concludes that despite a substantial delay in the completion of the Project due to circumstances beyond its control, the Project was generally successful and satisfactorily achieved its objective of providing support to the Government's efforts to improve technical education in the context of increased and better qualified skilled human resources for the growing requirements of industry.

⁸ The Government made use of the facility provided by the Bank in 1986 under the *Special Project Implementation Assistance Loan* (Loan No. 822-INO, for \$30.6 million, approved on 16 December 1986) to help pay for local currency cost requirements for the procurement of equipment for six education projects. An amount equivalent to \$6.207 million was used for the second STM project.

10. The PPAR recommended that the Government execute a number of follow-up actions: (i) provide adequate recurrent funding resources to improve the quality of maintenance of buildings and equipment; (ii) develop institutional linkages with industries on a regional basis to improve curricula and adjust syllabuses in line with regional needs and priorities; (iii) establish a structured and sustainable system for monitoring and evaluation by strengthening staff capabilities within DTVE⁹; and (iv) examine the extent to which additional support can be provided to improve the scope, functions, and output of TTUCs to ensure more effective utilization of existing facilities, including staff. Findings of this Reevaluation Study (the Study) show that the Government has taken concrete steps to address these issues.

E. Need for Reevaluation

11. A Reevaluation Mission (REM) visited Indonesia in September 1997 to (i) validate the PPAR's findings on long-term impact and sustainability in light of the long gestation period, (ii) examine whether the concerns on the major limitations would affect Project performance and sustainability, and (iii) gather more actual operational data for the assessment of external efficiency. This Study was undertaken nine years after Project completion. REM coordinated and discussed its work with Project staff in relation to the review and formulation of Bank's education sector strategy in Indonesia, especially as it affects prioritization of the technical education and vocational training subsector within the education sector. The Study provides an indication of the relevance and impact of technical education on the country's overall development, and will provide inputs to the Bank's operations departments in formulating Indonesia's education strategy.

12. As part of the Study, a tracer study, including an industry survey, was undertaken from July to September 1997. The objectives of the tracer study were to examine (i) the employment and careers of a sample of Project-assisted STM students who graduated between 1992 and 1996, and to assess the socioeconomic impact on the graduates and their families, and (ii) the educational development in Project STMs (enrollments, teacher supply and quality, internal efficiency, industry linkages, which impact on the quality of graduates. The Study focused on three groups of respondents: (i) students, principals, department heads, and instructors, (ii) small, medium, and large industrial companies/firms that require and employ STM graduates, and (iii) STM graduates employed in these companies. The study covered a sampling of students, teachers, and management staff in 5 Project-assisted STMs, 1 each from 5 selected provinces (North Sulawesi, Riau, East Java, Central Java, and Greater Jakarta); 6 industrial firms in each of these provinces; and a sampling of 30 employees (Project STM graduates) from each company. An STM in West Java that did not receive Bank assistance was chosen as the control group. The Study gathered data related to Project STMs through survey questionnaires and interviews from a sample of 454 graduates (50 percent of the target of 900 graduates), 30 instructors/teachers, 5 principals, 25 heads of departments, 125 third-year students, and 30 industrial firm representatives. The survey sample specified 150 graduates for in-depth interviews. Additionally, the control group included 28 graduates and 23 students from a Government STM. The tracer study's sampling procedure, findings, qualitative analyses, and recommendations are given in Appendix 1.

II. REEVALUATION FINDINGS

⁹ The need for making appropriate structural changes in the existing institutional framework of DIVE in this regard should also be considered.

A. Project Design

13. The Project was designed as a follow-up to the first STM project. In accordance with Government policy to improve educational opportunities, increase employment opportunities, and develop balanced regional growth, REPELITA III (1979-1984) envisaged the upgrading of 105 STMs throughout Indonesia's 26 provinces. The first project assisted the Government in upgrading 17 STMs and establishing a TTUC in support of this goal. The Project was to upgrade an additional 16 STMs and TTUC Bandung, and to establish TTUC Malang, thereby expanding quality technical education to 13 provinces where facilities were either unavailable or inadequate. The Project was necessarily hardware-oriented, with about 83 percent of actual Project cost expended on building construction and instructional equipment. The Project was completed with a time overrun of four and a half years, more than double the envisaged implementation period. With benefit of hindsight, the appraisal design of project implementation in only three years and three months turned out to be too ambitious.

14. While the system could have benefitted through some policy reform, the Government's urgent goal was to upgrade and establish these institutions to ensure the numbers and quality of graduates. The Bank supported the Government's undertaking through the Project. Policy dialogue or reform considerations were not specifically included in the design of the Project. However, the experience of implementing the Project in a sustained manner generated some lasting reforms. Examples were reforms associated with the revised curricula, abolition of the common semester, and standardization of STM programs around five basic technical areas.

B. Operational Performance

15. Progress in the development of the technical education and vocational training system, including the Project STMs and teacher training institutions, has been steady since the time of the Project's postevaluation in 1991. Various aspects of this development are discussed in the following paragraphs.

1. Educational Development

a. Enrollment

16. Enrollment in Project STMs increased to 1 6,147 students in SY1996/97 compared with the envisaged 14,400 during appraisal and 14,671 during postevaluation (SY1989/90). The total enrollment in SY1996/97 in 173¹⁰ Government-run STMs was 165,512 students, comprising 157,530 males (95 percent) and 7,982 females (5 percent). Female enrollment in SY1996/97 was increased over the 2.95 percent enrollment in SY1994/95. An increasing number of courses are now offered in the STMs where girls have greater opportunities to participate due mainly to industry demand. For example, 23 percent of the enrollment in STM Grafika (printing trades) is female. Appendix 2 shows the increase in student enrollment from SY1986/87 to SY1996/97. There is an increasing social demand for STM courses with applications for enrollment increasing

¹⁰ In SY1997/98, 13 more STMs were established of which 12 were financed from Loan No. 1319-INC): *Vocational and Technical Education*, for \$85 million, approved on 27 September 1994.

more than four times in this ten-year period (Appendix 3).¹¹ Thus, student selection is more restrictive resulting in better quality inputs from the junior secondary level.

b. Teacher Profile

17. In SY1996/97 there were 1,537 teachers working in Project STMs, and 14,019 in the 154 Government STMs offering the standard five engineering programs (automotive, civil works/building, electrical, electronics, and mechanical). Teachers are predominantly male (82.7 percent). The majority of teachers (95 percent) have permanent employment status (Appendix 4). More than 80 percent are married. The numbers of teachers with Bachelor's and Master's degrees have also been increasing over the years. Between 1986 and 1997, the number of teachers with Bachelor's degrees increased more than fourfold, and teachers holding Master Teacher Certificates increased more than eightfold (Appendix 5). Eight percent of teachers have had opportunities to study overseas. The main obstacle for overseas training is the lack of proficiency in foreign languages. However, in-country training opportunities through the TTUCs provide a comparatively high level, efficient, and cost-effective alternative. The largest percentage of STM teachers is in the highly productive 31-40 age group (56 percent). This indicates the potential for upgrading and career improvement. The percentage of teachers 41 years and above is 36 percent, a large enough pool from which to draw middle management material such as department heads and vice principals (Appendix 6). The majority of department heads had attended refresher courses on enhancement of performance effectiveness in classroom instruction and workshop management, and about half this number had attended career improvement courses (upgrading of qualifications, skills, teaching capacities, and work experience in industries).

c. Internal Efficiency

18. Improvement in the internal efficiency and qualitative aspects of technical education is pronounced. MOEC has been implementing a monitoring and evaluation system that provides important information in two aspects: (i) efficiency of the principal as a manager and a leader; and (ii) success of the school shown through internal efficiency indicators (class size, teacher/student ratio, teaching load, productivity [percentage of graduates to total enrollment], dropout rates, and graduation rates). Attitudes and discipline are also examined. Further, school follow-up on its graduates is evaluated.

19. **Class Size, Teacher/Student Ratio, and Teaching Load.** Class size in Project STMs averaged 40.37 students in classroom lectures, and 13-16 students per workshop class. This compares to the Government recommendations of 32 for theory classes and 16 for practical classes. The teacher/student ratio in Project STMs in SY1996/97 averaged 1:11, the same as the national average for all 154 public STMs. This was down from an estimated 1:12 in 1991 during Project postevaluation. Instructors had a classroom load of 15-20 hours per week, as well as workshop and production unit activities, amounting to the required load of 24 periods per week.¹²

20. **Productivity, Dropout and Graduation Rates.** Improvement in productivity as a measure of increased internal efficiency is significant. Productivity in Project STMs increased from 20.6 percent in SY1986/87 to 31.4 percent in SY1996/97 (Appendix 2). In Project STMs the dropout rate was only 3-4 percent annually for the first two years, due mainly to better inputs from the junior

¹¹ The desirability of STM courses is expressed as the ratio of applications for enrollment to the numbers admitted (actual enrollment). Thus, the higher the ratio, the greater the social demand.

¹² A period refers to a lecture, tutorial, or practical work lasting 40-45 minutes.

secondary field. Students dropped out mainly because of low aptitude, financial constraints, and disciplinary problems. The graduation rate (percentage of successful candidates in the final examinations in the third year) in Project STMs is about 99 percent. Overall, there is a high graduation rate in the STM final examinations, about 98 percent over the last few years. For example, in SY1995/96 46,257 of 47,203 examinees (98 percent) passed. Total dropout rate is lower than the allowance of 10 percent over three years projected during appraisal, and substantially less than the pre-Project attrition level of 25 percent. The high pass rate in STMs compares favorably with that of other secondary schools in Indonesia.

d. Instructional Methodology

21. The impact of the Project in modernizing instructional methodology is minimal. Instructional methods remain conventional, consisting of a combination of traditional classroom lectures, demonstrations, practical (workshop and laboratory) teaching, and student assignments. Despite the training the teachers get in the TTUCs in the use of overhead projectors and other audio-visual equipment, and despite the materials provided (transparencies, slides, charts), use is very limited. The limited use of modernized instructional methodology however, does not appear to have affected the internal efficiency of Project STMs. The TTUCs are developing and producing instructional materials, including workshop and laboratory manuals, which are gradually introduced into the STMs as part of the school integrated development program of DTVE. While computer-based learning is not expected of projects designed prior to 1980, basic computer operation is now offered in a number of STMs, some in cooperation with certain computer suppliers. Computer numerically controlled machines are not uncommon in the machine and production shops. Mainly because of feedback from industry, STMs are starting to implement new methods and introducing new subjects (e.g., group problem solvinn, entrepreneurial training).

e. Production Units

22. Activities in the production units¹³ provided one of the most effective means for teachers and STM management not only to provide relevant training in the STMs, but also to interact with industry. Production units are operated by instructors and students, supervised by department heads, and work on orders from companies or provide repair services to the local communities. Ninety-five percent of students surveyed stated that they have participated in production activities and that they found the experience useful. The frequency of demand for production-related work, and thus of the involvement of staff and students in the production units, was highest in mechanical technology (machine shop), followed by civil works (mainly carpentry), automotive, electrical, and lastly electronics.

f. Teacher Training

23. To address the severe shortage of technical and vocational teachers (up to 7,200 at the time of appraisal) and the need for teacher upgrading (2,300 STM technical teachers, 14,000 from junior secondary schools, 7,000 from private STMs), the Government embarked in 1980 on an accelerated program to train a sufficient number of technical teachers involving the maximum use of available resources with the minimum financial outlay for facilities. The major investment of the

¹³ Article 29 of Regulation No. 29 (1990) on Secondary Education provides for production units or incomegenerating units to be established in all public STMs to foster an entrepreneurial spirit and to develop skills for self-employment, while simultaneously producing articles for sale to meet the O&M costs of STMs.

Project focused on the establishment of TTUC Malang and the upgrading of TTUC Bandung to provide three-year teacher diploma (D3) in-service programs. In addition, four TTCs and the PMS in Bandung were provided with instructional equipment for teacher training. The total enrollment capacity of these institutions was planned as 2,784 teacher trainees per year distributed as follows: TTUC Bandung 768, TTUC Malang 816, PMS Bandung 240, and four TTCs with 240 each (first year only). Other training institutions, such as TTUC Medan and the Teacher Training Colleges (for pre-service training programs) also train technical teachers. Measures taken by the Government to address limitations on the utilization of teacher training institutions, as observed in the PPAR, are now in place.

24. TTUC Malang, now known as Vocational Education Development Center (VEDC) Malang, has gained a reputation as a center of excellence. Established mainly as a teacher training center, it has taken on an expanded role and functions, including the development and implementation of STM teacher upgrading courses in 13 trades, production and services, integrated development of STM schools, and environmental education. It has 206 permanent staff (of which 128 are instructors) and 58 contractual staff. In-service training of teachers comprises the main activity, with an annual output of around 1,500 STM teachers (3,000 personmonths of training). As part of its production and services function, around 900 person-months of training were provided to industry personnel, mainly in electronics, mechanical, and automotive courses in 1996. While still a limited offering, computer training is envisaged to be provided to all STM teacher and industry trainees during SY1997/98. The school integrated development program is assisting in the development of 38 STMs in ten provinces in eastern Java to improve the quality of training and strengthen cooperation with industry. Finally, VEDC Malang has been assigned as the national center for environment education, and is tasked with designing and implementing environmental programs as an integrated part of the national curriculum. Long-term bilateral Swiss assistance (since 1983) has contributed to this success.

25. TTUC Bandung, now known as Technical Education Development Center (TEDC) Bandung, was established by the Government in 1975. The center implements three-year in-service training programs, as well as specialized upgrading courses, for technical teachers. Between 1975 and 1980, a total of 3,296 teachers were trained. Currently, it has an annual output of around 1,200 STM teachers. TEDC Bandung has developed and now implements a nine-step teacher training program integrating work-related predeparture preparations, in-country and overseas training, monitoring and evaluation, and action plans for application of training results. This program encompasses training inputs, processes, and outcomes, and is very effective in realizing the full potential of teacher trainees.¹⁴ The Bank is providing assistance to TEDC Bandung through Loan No. 1100 for the development and strengthening of training programs in education management. It has also been assisted by Australian bilateral aid.

26. TTCs provide centralized workshop facilities to a number of satellite STMs (usually 2-4 STMs within commuting distance in large urban areas) where such workshops are unavailable. During the period 1970-1980, two World Bank projects provided centralized workshops to nine TTCs to serve a total of 25 satellite STMs.¹⁵ Four of these nine TTCs (in Bandung, Medan, Surabaya, and Ujung Pandang) were identified to be provided with TTTUs in the Project. A TTTU at the PMS Bandung, established in 1974 with Swiss assistance, has been in operation since 1977 and served as the model for the TTCs. Three-year diploma programs are conducted for teachers specializing in the mechanical trades (maintenance mechanics, toolmakers, and draftspersons). In the TTCs, however, due to staff and facility constraints, only the first year program was envisaged to be

¹⁴ Special Study on the Effectiveness and Impact of Training in Education Projects in Indonesia, undertaken by the Postevaluation Office under RETA No. 5734: *Impact Evaluation and Special Studies on Issues of Operational Importance*, for \$600,000, approved on 15 April 1997.

¹⁵ Credit 219-IND: *First Education Project*, \$4.6 million, 1970-1976; and Loan '237-IND: *Fourth Education Project*, \$14 million, 1976-1980.

implemented, with TTUCs taking over for the second and third year programs. The TTCs had a total capacity of 960 teacher trainees, comprising an input of 120 trainees per TTC per semester (22 weeks), while PMS Bandung had another 240 trainees. Starting in 1990, about 5,200 teachers were trained. These teachers were supplied to the three TTUCs (including TTUC Medan, established under Loan No.356). With the acute short-term shortage of STM teachers largely addressed by the early 1990s, teacher in-service training activities in the TTCs were gradually phased out, and these are now assumed fully by the TTUCs. PMS Bandung continues to offer diploma programs for technical teachers, as well as for industry personnel in the mechanical trades.

g. Utilization and Maintenance of Facilities

27. Academic facilities and workshops of the STMs were generally fully utilized. The use of the workshops and laboratories was especially maximized because they were made available for use by other STMs and private schools in second shifts in the afternoons/evenings. Government policy is to encourage private sector use to: (i) respond to social demand for technical education, (ii) provide workshop facilities to private schools to ensure quality of training, (iii) supplement public STM resources for maintenance of equipment and buildings, and (iv) augment incomes of teachers. The tracer study shows that only 36 percent of Government STMs have libraries. REM found that in the selected STMs where libraries existed, the volumes and reference materials were outdated and students did not see the value of using them. TTUCs, on the other hand have a better stock of books and materials.

28. While the concept of TTCs providing workshop and laboratory facilities, mainly to private STMs within its catchment area, is sound, the functional lines of responsibility are difficult to delineate. While the TTCs have their own core staff, teachers of visiting STMs are usually given complete run of the shops. This has a detrimental effect on maintenance and housekeeping. The level of performance was mixed, depending largely on school management. For example, TTC Medan, which serves three STMs, is poorly managed. In contrast, TTC Surabaya, which serves four private STMs, has 180 full-time instructors and accommodates 3,800 students per week despite outdated equipment. DTVE is in the process of restructuring the TTC concept to make it more effective.

2. Curriculum Development

29. The present curriculum, which was reviewed by consultants in the first STM project, comprised the five standard engineering programs. This curriculum was finalized in 1984 and replaced the 1976 curriculum. However, the curriculum was designed with central control in mind and lacked sufficient flexibility to be implemented effectively throughout 27 provinces with varying industry requirements for technical personnel. The curriculum was therefore improved under the Project to introduce flexibility. In the early 1990s the curriculum, after further review in consultation with representatives from industry, was finalized and adopted in 1994. While the STM system is geared mainly to provide basic skills in the five standard engineering programs, modern technological advancements make it necessary to allow the flexibility of diversifying into other program offerings, and to link a competency-based multi-entry/exit system with emerging regional industrial priorities. Competency-based short courses are also planned for delivery through the STMs as part of a fee-based continuing education program. The Government has recognized this exigency and has established some specialized STMs. For example, STM Grafika, Malang (assisted under Loan No.1100) offers a three-year course in the printing trade. Other examples are shipbuilding (STM Sidoarjo, Surabaya) and oil/industrial chemistry. On the other hand, care must be exercised not to

make the specialization too narrow because this would require more advanced and sophisticated equipment and more specialized instructors.

3. External Efficiency

30. The findings of the tracer study, combined with REM's field investigations, confirmed a high employment rate for Project STM graduates, with 94 percent employed within one year. In contrast, the bulk of graduates in the control group (93 percent) took up to two years to land a job.¹⁶ The findings show that Project STM graduates are in high demand, are sufficiently qualified for immediate employment, and that the Project has clearly improved the quality of education and training in Project STMs. A sampling of small, medium, and large industrial firms confirmed the high regard of employers for the technical expertise of STM graduates. It also showed that firms generally prefer technical school graduates over general secondary school graduates. Graduates of Project STMs landed jobs in relatively short periods: 43.8 percent immediately after graduation, 26.0 percent within three months of graduating, 11.6 percent within six months, and 13 percent within a year.

31. Of the Project STM graduates who are employed, 37.7 percent found jobs on their own, 29.5 percent through their schools, 24.0 percent through friends or relatives, and 4.8 percent through newspaper advertisements. Project schools provided three times more assistance to graduates in job placements than the control school. While very few engaged in entrepreneurial work prior to their present jobs, 96.6 percent of the Project STM graduates landed full-time jobs (79 percent in the control group). This is to be expected as graduates are from low-income families and simply do not have the financial resources to start their own businesses. STM graduates earned between Rp150,000 (\$50) and Rp650,000 (\$218) per month, a significant contribution to the family income (pare. 39). They report general satisfaction with their work conditions, salaries, and other benefits. The tracer study shows that employment prospects for STM graduates are favorable in the medium term. There is a continuing need for STM graduates to fill mid-level positions (skilled and lower level technician) in industry. For example, in a pulp and paper mill in Riau, no less than 20 nationalities have been employed by the company due to lack of Indonesian personnel.

32. While the exact numbers are not known, the conclusion derived from the results of the tracer study is that the majority of STM graduates will not continue on to higher education. The main constraint is the generally low income of their families. Eighty-two percent of these families earned less than Rp400,000 (\$134) per month supporting a family of 4-5 members (less than \$1 per day per member). Given these economic conditions, it is apparent that (i) the main reason for enrolling in STM is the prospect of employment after graduation; (ii) the graduate will seek employment rather than aspire to higher education; and (iii) once employed, the graduate will help with family expenses. Nonetheless, while very few STM graduates had the opportunity to further their studies, a need exists to provide sufficient flexibility to enable graduates of the technical/vocational schools to have access to higher education.

¹⁶ The control group chosen is a Government-owned STM in Bandung, West Java which did not receive Bank assistance through the Project or equivalent donor assistance. The conditions surrounding this STM are similar to those of the Project STMs.

4. Industry Linkages

33. To make technical education and vocational training more effective and relevant, the Government adopted the policy of *link and match* in its sixth five-year development plan (REPELITA VI, 1994-1999). Now being introduced progressively through the implementation of *Pendidikan Sistem Ganda*, it links schools and employers at the local level. DTVE has formulated strategies and is now implementing a number of measures to provide better school-industry linkages, specifically, (i) closer involvement of industry in the training of students through *Sistem Ganda*; (ii) establishment, or acceleration of activities, of production units in schools as a way of increasing cost recovery, providing industry experience to students and additional income for teachers; and (iii) gradual shift to training programs in new technologies with greater value-added components in which Indonesia has a comparative advantage, such as telecommunications, information technology, agro-industry (oil palm, rubber, cacao), petrochemicals, and mining. STM Mataram, for example, is the venue for the training of skilled personnel of a copper and gold mining firm in Nusa Tenggara Barat. The project will employ 5,500 people during construction (over the next two years) and 2,200 mainly technical personnel during full operation (starting in December 1999). Flexibility has been exercised in allowing demand to dictate supply of technical personnel. Another example is the shipbuilding STM in Sidoarjo (assisted under Loan No. 715) that provides skilled workers to the country's largest and most modern shipyard, where 4,500 skilled workers are employed.

34. Interaction between instructors and the industrial community is growing, especially in situations where students undergoing on-the-job training (OJT) are supervised, and where the marketing of items and services is related to production units. Industry personnel are encouraged to participate in school councils, and the tracer study shows that 67 percent of industries are involved. Further, 42 percent of companies surveyed took part in student counseling, 36 percent took part in curriculum revision and updating, 16 percent provided equipment, and 10 percent provided some financial contribution to STMs. Feedback from industry is encouraging and useful, and the impact on industry is positive. Measures taken by the Government to address the limitations of industry's linkages during Project implementation are now taking root rapidly. The trend of cooperation is on the increase, especially with the further implementation of *Pendidikan Sistem Ganda*.

5. Financial Performance

35. As a share of gross domestic product (GDP), total MOEC budget has increased from less than 1 percent annually in the late 1980s and has stabilized at around 1.4 percent annually in the last few years (Appendix 7). However, MOEC budgets represent only around half of total Government funds going to education. Total Government education expenditure in 1995/96 amounted to Rp11,963 billion (around 2.7 percent of GDP). This represents 2.8 percent of gross national product, lower than the figure in neighboring countries such as Malaysia (5.5 percent) and Thailand (3.8 percent).¹⁷ MOEC expenditure as a percentage of total government expenditure has been growing steadily from 4.87 percent in 1990/91 to 6.92 percent in 1996/97 (Appendix 8). In nominal terms, education expenditure increased three times from 1990/91 to 1996/97. Although the share of national budget for education development has increased, Indonesia allocates less than other Asian countries. Vocational training and technical education expenditure, as a proportion of MOEC budget, has increased as well over the last ten years from 2.64 percent in 1987/88 to 3.14 percent in 1996/97 (Appendix 9).

¹⁷ TA No. 2548-INO: *Education Finance Study*, for \$500,000, approved on 25 March 1996 and completed in May 1997.

36. The Government's commitment to quality technical education is demonstrated by its support of budgetary allocation for recurrent expenditure. The annual recurrent budget allocation has more than doubled in real terms over the last ten years, and recurrent cost allocation per student has increased 1.55 times in real terms since 1986 (Appendix 10). However, recurrent budgetary allocations across all sectors are being reduced in light of the recent cuts in Government budgets due to the regional currency crisis. While budgetary cuts are seen as a temporary problem, alternative sources of funding and other forms of cost recovery measures are continually being sought and the Government is developing new proposals and initiatives to enhance future budgetary provisions. Revenues from production units increasingly complement the regular allocations and contribute substantially to O&M-of the workshops. Contributions in cash and in kind from industry have also grown as the savings from foregoing unnecessary additional training materialize. Cost recovery was typified by STM 12, Pluit, Jakarta, in its private school enrollment of 900 students in a second (afternoon) shift. Private students pay Rp40,000 per month compared with the Rp3,000 per student-month paid by the school's 980 public students. Tuition and other fees and parents' contributions are generally about 10 percent of unit cost. The percentage is lower in less developed provinces. The Government encourages the practice and a growing number of STMs are promoting private schools to augment their incomes.

6. Institutional Development

37. The major inputs provided under the Project to enhance institutional capability comprised (i) the modern and well-equipped facilities for the upgrading of the STMs and the establishment of TTUC Malang; (ii) fellowships for teacher and staff training; and (iii) consultant services for curricula upgrading, instructional resource development, teacher training, and school administration. STM upgrading was provided in six new provinces (13 were covered under the Project) not covered by earlier projects. Fellowships for master teachers were provided to 35 technical teachers, mainly for TTUC Malang, and management and administration training was provided to four DTVE staff. The fellowship program compensated for the limited program provided in the first project and was in line with the needs of DTVE and STMs. The majority of technical teachers in the Project STMs (808 of 863, 94 percent) had been upgraded by the completion of the Project, with 303 teachers completing the three-year teaching diploma course. The Project improved the teaching, supervisory, and managerial skills of staff (RETA No. 5734). Consultant services helped in teacher training, updating of STM curricula to address emerging industrial needs, and in the production of teaching aids and materials. Because consultants recruited under the Swiss aid were concentrating on TTUC Malang, the Project extended assistance to TTUC Medan to strengthen its capacity to run upgrading programs for technical teachers, as well as its capacity for curriculum and learning materials development.

38. Demonstrations that these institutional development contributions have been sustained are evident in the operations of DTVE. Systemic deficiencies are being addressed by the *link and match* policy through the implementation of *Pendidikan Sistem Ganda*. The Project helped in improving the management system of technical education, especially as it concerns school-industry linkages. Production units in STMs and TTUCs provide one of the most effective means of providing relevant training, interacting with industry, generating revenue for O&M, and providing extra income for students and teachers. Ground work has been started to consider such future policy directions as a shift from a supply-driven system to a demand-driven system based on labor market requirements, adoption of a flexible school system with multiple entry and exit points, decentralization of management, and generation of alternative sources of funding for self-sufficiency. Another result is the analytical approach with which DTVE now addresses the key issues confronting the subsector. A good example is its "talent scouting" for principals, vice principals, and heads of departments that identifies prospective candidates based not on seniority alone, but on competency, qualifications, and good work attitudes.

C. Socioeconomic Impact

1. General

39. Results of the tracer study indicate that the majority of Project STM students (65 percent) come from low-income families with incomes of less than Rp300,000 (\$101) per month. A large percentage (38 percent) earned less than Rp200,000 (\$67) per month. Studying in an STM clearly enhances the opportunity of landing jobs (98.5 percent), while 68 percent stated that family's poor economic condition was the reason for choosing to study in an STM. Cognizant of the financial needs of their families, 69 percent of employed graduates contributed financially to defray family expenses. Of these, 2 percent surrendered all their wages, 36 percent gave a portion of their wages, 14 percent helped defray daily expenses, 13 percent helped underwrite the education of younger siblings, and another 3 percent contributed in other forms. The Project contributed to poverty reduction by augmenting the income of the graduates' families through the contribution from the new income of the graduates. Most of the graduates came from families with relatively low levels of education: 39 percent of fathers in these families had completed primary education, 3.4 percent did not finish primary education, 16.4 percent completed junior high school, 34.9 percent completed senior high school, and 6.2 percent completed a diploma program. Mothers had comparable educational attainment: 47.9 percent finished primary education, 7.5 percent did not finish primary education, 21.9 percent completed junior high school, 21.2 percent senior high school, and 1.4 percent diploma program.

2. Women in Development

40. Due to the nature of STM engineering programs, females in STMs comprise only 5 percent of the enrollment. This is due to the public perception that STM programs are male-oriented. On the other hand, female teachers in STMs now comprise 17.3 percent of the total, almost doubling since 1990. Female participation in STM programs has shown an increasing trend, particularly in electronics and electrical courses. An increasing number of technologies are now offered in the STMs, due mainly to industry demand where females have more opportunities to participate. For example, 23 percent of the enrollment in STM Grafika (printing trade) is female. The trend in the increase of female participation is seen to continue. The status of women in Indonesia, especially in rural areas, is heavily influenced by the sociocultural setting, notably the norms regarding family, marriage, and inheritance, all of which put women at a disadvantage. Nonetheless, the tracer study shows that among the mothers of STM graduates, levels of education attained were comparable to those attained by their husbands. In fact, more women had completed primary and junior secondary school than men. This demonstrates that while females had fewer opportunities of obtaining formal schooling in the past, they are now catching up. Improvement of women's education, postponement of marriage, implementation of family planning, and the Government's promotion of nonoil products for export have all contributed to an increase in the number of women entering industry and service sectors.

3. Environmental Impact

41. There were no adverse environmental effects in any of the Project sites. Of much greater impact, with very significant long-term implications, is the opportunity to educate the youth and

other community members in the importance of sustainability and environmental awareness. This is quite relevant in light of the recent massive environmental pollution and its adverse effect on health and economic activity. While not part of the Project, it is noteworthy that VEDC Malang has been designated as the national center for environment education and tasked with designing and implementing environmental programs as an integrated part of the national curriculum.

D. Sustainability

42. The largely good performance of STM graduates in industry, the growing demand for STM graduates, and the modern and well-equipped facilities provided under Bank and other assistance have helped improve the image and status of technical education. STMs are fully integrated into their community, providing service and receiving support from the community. Recurrent budgetary allocations have been partly compensated by alternative sources of funding such as the operation of production units, contributions from industry, and fees from private schools. The operation of the production units, which contribute substantially to school O&M, as well as staff and student morale, is viewed positively by industrial and commercial firms. Internal efficiency indicators indicate considerable improvement in academic productivity (para. 20). The key contributing factor is the substantially strengthened academic capability of teachers and management skills of DTVE and STM staff. The high quality of training and efficient running of the TTUCs will ensure the continuing improvement of STM teachers.

43. Assurance of sustainability is also helped by some key policy shifts in technical education:¹⁸ (i) from a supply-driven system based on a large social demand to a demand-driven system guided by labor market exigencies, (ii) from a centralized system to a decentralized system of management, (iii) from a school-based diploma-awarding system to a competency-based system in accordance with nationally recognized standards, (iv) from a rigid school-based system to one with multiple entry and exit points, and (v) from Government fully-subsidized institutions to more self-supporting organizations.

III. KEY ISSUES

44. The Project has substantially achieved its objectives. The Study confirms earlier findings that Indonesia's policies and strategies in technical human resource development are progressing in the right direction as evidenced by the achievement of a high level of external efficiency and the improvement in the quality of and access to technical education. Following up the recommendations of the Project's PCR and PPAR, and given the conditions in subsequent Bank operations in the sector, a number of important issues has been raised and needs to be resolved

¹⁸ Based on the directives of the State Guideline of 1993, the regulation stipulated in Law No. 2/1989 on the National Education System, Government Regulation No. 29/1990 on secondary education, and the Decrees of the Minister of Education and Culture Nos. 0490/U/1992 and 080/U/1993.

in order to make technical education even more effective and efficient, and to increase labor force productivity through efficient and cost-effective strategies.

A. Enabling Framework

45. Projects for the improvement of technical education have to be designed and realized within a framework of institutional development, sustainability, and relevance to the end users. The Government is implementing the Bank's advice in this regard (i.e., follow-up actions prescribed in the PPAR, through reforms in light of the institutional and policy framework in which technical and vocational education is now viewed and implemented). The Government needs to provide flexibility to enable multiple entry and exit points in the system. This flexibility includes coordination and cooperation with other ministries and Government agencies, as well as with industry organizations, in their specific and specialized training programs. The imminent reduction in budgetary allocation for recurrent cost is a matter of concern. While other sources of financing are being tapped and expanded, the system needs the sustained assurance of a safety net in the form of a steady and adequate yearly allocation for recurrent expenditure to ensure continuing improvement in quality. The monitoring and evaluation system for internal efficiency, as well as for the employment of STM graduates, needs improvement and fine tuning. In addition, attention needs to be given to monitoring and controlling the cost of Government-provided training in relation to its social and individual rates of return.

B. Technical Education or General Education

46. The National Labor Force Survey (Sakernas) and Census data for the period 1986-1992 show an average unemployment rate of 15.4 percent annually for senior general high school graduates, higher than the rate of 8.8 percent for STM graduates (Appendix 11). It seems that the bulk of unemployed STM graduates come from the lower quality private schools. The percentage distribution of unemployment by level of education in 1996 is almost double for senior general high school graduates at 30.9 percent, compared with that of STM graduates at 15.9 percent. Research findings in Japan, Korea, Singapore, and Taipei, China show that the level of emphasis on technical/vocational education is linked to the level/pattern of economic growth. These countries invested heavily in technical/vocational education during their early stages of economic development, and tended to move towards more general education at the secondary level as they attained higher levels of economic development.

47. A 1996 study on technical personnel supply and demand by the Japan International Cooperation Agency shows that among the three levels of engineering personnel (engineers, technicians, and skilled workers), the highest demand is for skilled workers, especially as establishment size gets smaller.¹⁹ There is an oversupply of university graduates and an undersupply of technicians and skilled workers, a situation resulting from the large numbers of students going on to universities. Those numbers are considerably higher than the demand level, and industry cannot cope with the present volume of engineering graduates who seek employment in high technology jobs.

C. Quality of Education

¹⁹ *Study of Engineering Manpower Development Planning in Indonesia*, financed by Japan International Cooperation Agency in cooperation with the National Development Planning Agency and the Ministry of Manpower, March 1996.

48. Notwithstanding the impressive advancement achieved so far in terms of internal and external efficiencies, scope exists for further improvement of the quality of technical education. The upgrading of school management personnel, especially principals, vice principals, and heads of departments, in terms of selecting the most qualified, and in the provision of appropriate management skills, is of utmost importance. DTVE's policy of "talent scouting" is timely and has already generated a higher morale among staff. While the pedagogic aspects of teacher training are satisfactorily provided for by the in-service training programs in the TTUCs, improvement in the upgrading training programs of teachers in industry is needed.

D. Private Schools

49. Most of privately owned STMs were established without adequate financial resources, are supply-driven by nature, have very little workshop and laboratory facilities, and thus are not at the qualitative level of public STMs. Thus, the Government's policy of providing assistance to private STMs, such as subsidy of teachers' salaries, sharing of teachers, teacher training, use of workshops and laboratories, procurement of textbooks and teaching materials. However, because of the large role of private sector training (two thirds of total enrollments), the Government needs to examine what form its own investment program should subsequently take, especially as plans are being drawn up for the next five-year plan. While the participation of the private sector in technical education is encouraged, policies must be put in place that will protect the good reputation of the STM system in general and of outstanding schools in particular. Policies also need to be implemented to regulate the practice of allowing public school teachers to teach in private schools (with corresponding income) during official working hours.

IV. CONCLUSIONS

A. Overall Assessment

50. Project objectives and targets designated at the time of appraisal have been achieved. The quality of technical education has improved through closer cooperation of industry and aid agencies. Pronounced improvement in internal and external efficiencies in the STMs is observable. Graduates readily find jobs and provide financial assistance to their families. The quality and numbers of teachers have increased. The Project has assisted Government in providing equitable access to quality technical education for a more balanced regional growth with assistance to STMs in six new provinces previously unassisted. The establishment of TTUC Malang proved to be a strategic success as it now provides high quality teacher training for provinces in the eastern half of the country. STMs and TTUCs are also servicing private schools. Sustainability is assured in light of the institutional and policy framework in which technical and vocational education is viewed and implemented. The Project continued to perform well after the PPAR and achieved the long-term impact of promoting development of technical education. The benefits have been sustained. The Study confirms the conclusion of the PPAR that the Project is generally successful.

B. Lessons Learned

51. The success of the quality upgrading of STMs in Indonesia underlines the importance of providing assistance and policy guidance over the long term in the education sector. For example,

TTUCs have had assistance from Bank projects (Medan in Loan No. 356, and Malang and Bandung in Loan No. 488), as well as continuing bilateral aid from the Australian, German, and Swiss Governments. There are also examples of long-term assistance in other developing member countries, such as the long-term assistance provided by the Swiss Government to technical education in Nepal. In contrast, technical teacher training institutions established by the Bank in other developing member countries have performed poorly because of the short-term nature of assistance.

52. There is a need for greater coordination (among agencies) and decentralization (to provincial levels) of human resource planning to ensure the relevance of training provided in technical schools to industry and the local community needs. For example, the requirements for mining personnel in Nusa Tenggara Barat, shipbuilders in Surabaya, sugar refiners in Gorontalo, pulp and paper and related forestry personnel in Riau, and chemical industry workers in Medan need to be met through training offered by STMs located in these provinces. Human resource planning strategies need to adopt labor market analyses, including market-based assessment of skill demand and supply.

53. Feedback from the Project highlighted the need for a more rigorous selection process for school management personnel (principals, vice principals, department heads) and the need for providing them with courses in school management. Care must be observed that while senior ascendancy be respected, only qualified and competent personnel are selected. The lack of industrial experience and orientation of teachers remains a major limitation in the task of preparing students for the world of work. Efforts by TTUCs to provide intensive upgrading courses and regular refresher courses that would keep teachers apprised of modern industrial technology and practices must be accelerated. Individual STMs initiatives in turn, need to complement TTUC efforts.

54. Alternative financial resources need to be institutionalized so as to lessen the dependence of STM operation on the regular budgetary allocations of the Government. Alternative resource mobilization now includes production units, industry contributions, establishment of private schools, and contributions from the community. While it seems that room exists for increasing tuition fees, care must be exercised not to penalize the poor. Scholarship funds have been established in this regard. The enabling framework should take into account these and other alternative resource mobilization concepts and put into place policies and directives to encourage their adoption.

C. Follow-up Actions

55. Further Bank support of Government efforts in preparing quality technical personnel for the country's industrialization program is justified, keeping in mind the long gestation period needed in this subsector. There is scope for further improvement of the quality of technical education. While the Government has made great strides in the subsector, it requires further assistance to ensure the realization of the full potential of past investments. For the Borrower, the following remedial measures to improve the efficiency and effectiveness of operational performance are suggested.

- (i) Expedite the decentralization of the management of technical education, particularly in terms of program offerings catering to the demands of industry.
- (ii) Provide flexibility to link a competency-based multi-entry/exit system with emerging industrial priorities, and diversify into other program offerings, including short

courses delivered through the STMs and VEDC/TEDC as part of a fee-based continuing education program.

- (iii) Upgrade the monitoring and evaluation database with data disaggregated by gender in each STM, in provincial/regional offices, and in DTVE.
- (iv) Mitigate the effects on O&M of budgetary cuts in the short term by increasing revenues from alternative sources, and ensure adequate recurrent budgetary funding in the long term.
- (v) Accelerate institutional linkages with industries on a regional basis through the *Pendidikan Sistem Ganda* to improve competency-based curricula, provide for OJT for both students and teachers, and facilitate employment marketing in line with regional needs and priorities.
- (vi) Intensify efforts in the selection of qualified and competent school management, provide upgrading management courses to the candidates, and institutionalize the talent scouting process after fine tuning.