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POLICY ISSUES DOCUMENT

ON THE QUALITY AND EFFICIENCY OF VOCATIONAL-TECHNICAL EDUCATION

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Departemen Pendidikan Dan Kebudayaan

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Vocational-Technical Education Study

Policy Issues Document on the

QUALITY AND EFFICIENCY OF VOCATIONAL-TECHNICAL EDUCATION

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A. INTRODUCTION

1. Purpose and Focus of Document

This paper focuses on policy issues posed by efforts to improve the quality and efficiency of senior vocational-technical education in Indonesia. It represents the culmination of the first phase of a study on that topic presently being carried out by Balitbang Dikbud in collaboration with the Division of Vocational-Technical Education (Dikmenjur) and staff of other interested agencies and Ministries.

2. Definition of "Policy Issues"

"Policy issues" arise when there is a choice among alternative courses of action or among alternative means for accomplishing given goals. Overarching goals for the development of vocational-technical education during the next five years are defined in Repelita V. The purpose of this paper, and of the study of vocational-technical education as a whole, is to contribute to the development of strategies for accomplishing those goals.

3. Research Methodology.

The first phase of the vocational-technical education study has focused on collection and analysis of existing data concerning the situation of vocational-technical education (hereafter "Votech") in Indonesia. During the second phase of the study, primary data will be collected in three pilot provinces (NTT, Jawa Timur, and Sumatera Barat) through such means as a tracer study, a school survey and a set of interviews with employers. The particular objectives of the first phase of the research have thus been to get an overview of the status of the Votech system, to begin identifying key policy issues for Repelita V and VI, and to specify the additional kinds of information that it would be most important to collect during the primary data phase.

To this end, "mapping reports" have been established by regional study teams in each of the three provinces concerned following a common analytic scheme, and a national mapping report was drawn up by the

Balitbang Dikbud research team covering the entire country. By analyzing this body of data plus additional documentation available at the national level, the study team has identified a series of critical issues concerning Votech policy and has outlined remaining data needs. Insofar as possible, data refer to the situation during the last year of Repelita IV (1988-89) and trends are analyzed over the five-year period covered by Repelita IV (end 1983-84 through end 1988-89). The principal source of data, unless otherwise specified, is constituted by the yearly statistical reports of Pusat Informatika, the data base from which they are drawn, and analysis of that information by the national research team.

4. Characteristics and Limitations of the Data

Several limitations of the data used in the establishment of this working paper should be noted at the outset.

4.1. First, most of the quantitative data concern only STMs, SMEAs, and SMKKs (plus a comparison with the situation of SMAs), as these are the only types of vocational-technical education on which detailed information pertaining to both the public and private sectors was readily available. Four types of vocational-technical training institutions are thus largely absent from the analysis:

(a) SGOs and specialized SMTs (theatre, arts, handicrafts), which exist throughout the country in much smaller numbers.

(b) Vocational-technical training organized in and by private industry.

(c) The numerous small private SMKTAs that have (and often take care to have) less than the equivalent of three full-time teachers -- the cut-off level above which schools are required to register with the government.

(d) All vocational-technical schools and training activities supervised by other Ministries (Ministry of Agriculture, Ministry of Industry, etc.) In 1984-85, the last year for which there is presently official data, there were 1808 secondary schools supervised by other Ministries, and they enrolled 289,962 students. On the basis of ratios derived from 1980 data (also the most recent of its kind), it can be estimated that 20% of these enrollments were in Votech schools, accounting for approximately 59,000 students, compared to the 300,000 enrolled in Dikmenjur-supervised institutions in 1984-85. As a rough approximation, therefore, the numbers of Votech students in non-MOEC schools can be estimated to represent an additional 20% beyond the enrollment figures for MOEC-supervised schools.

4.2. A second general limitation of the data is that they are not disaggregated by technical program within these schools.

4.3. Third, the contrast -- and sometimes conflict -- between information gathered from different data sources serves as a reminder that all such information is characterized by a certain margin of error. Given the magnitude of discrepancies observed on several offasions during the course of this study between estimates of the same figures by regional and national offices concerned with Votech, analysis must restrict itself to the major dimensions of the data and avoid attaching much importance to small differences.

4.4. Finally, the research team found that there was a general absence of good qualitative data from observational studies of school processes and outcomes.

As a consequence, this policy issues document should be seen as presenting a partial picture of the situation of vocational-technical education, one accurate in its orders of magnitude but not necessarily in its detail. Our purpose is as much to guide subsequent data collection by the research team as to draw definitive conclusions based on the information available thus far.

5. Technical Terms

A number of terms used in the discussion of vocational-technical education policy ("relevance," "effectiveness," "quality," "efficiency," "unit costs," "rate of return," etc.) may mean different things to different people. In an attempt to provide a common language for debates during the Symposium, a set of definitions is laid out in Appendix A to this document.

6. Section Headings

Policy topics are discussed under five headings: issues of access and equity, issues of effectiveness and quality, issues of relevance and external efficiency, issues of cost and funding, and issues of administration and management. In addition, a brief prefatory section is devoted to consideration of the "policy environment" in which the design and implementation of strategies for vocational-technical education takes place. A final section presents a summary of the key issues developed in the document as well as selected recommendations.

B. THE POLICY ENVIRONMENT

1. Policy issues cannot be formulated without taking account of salient aspects of the current economic, political and administrative environment that necessarily influence choices among alternative courses of action.

2. Several closely-related aspects of the current policy environment seem particularly relevant to the discussion of strategies for vocational-technical education:

2.1. The year 1989 marks the inauguration of Repelita V. The orientations specified in Repelita V for the medium-term development of the educational system, and the vocational-technical training network in particular, furnish a critical framework for policy discussions.

2.2. On the economic front, after several years of slow growth and budgetary difficulties due in large part to the collapse of oil prices, the Indonesian economy began a recovery in 1986 and has currently reached a 5.4% growth rate. A priority concern of economic planning in the medium-term future is to diversify the economy and wean the Government budget away from structural dependence on oil revenues, so that the country's progress toward industrial take-off is not impaired.

2.3. The recovery has had two other concomitant characteristics of significance for the policy environment of vocational-technical education:

- First, the Government has begun to apply systematic policies of budgetary austerity, cost recovery, and transfer of social service functions to the private sector in an effort to improve the balance of payments, reduce the national debt, and free additional funds for investment. The operating expenditures of Government ministries grew during Repelita IV at less than half the rate of their growth over the previous decade, and development expenditures shrank in real terms. The outlook over Repelita V is for slow growth at best. At the same time, increasing emphasis is being put on efficiency in the delivery of administrative services.

- Second, the Government is also applying a policy of deregulating industry, commerce and banking in an attempt to stimulate additional growth in the private sector and to stem capital flight.

3. The next five sections are devoted to examination of five categories of policy issues related to vocational-technical education. Under each category, basic Government <u>objectives</u> will be defined, <u>data limitations</u> considered, <u>major findings</u> presented, <u>policy implications</u> discussed, and a few <u>recommendations</u> for the second phase of the study formulated.

C. ISSUES OF ACCESS AND EQUITY

1. OBJECTIVE

To increase the availability of good quality vocational-technical education throughout Indonesia and TO ensure equal access to all citizens. (Repelita IV, Book II, p. 511) In quantitative terms, Repelita IV called for a 100% increase in Votech enrollments over the 1984/85 to 1988/89 period.

"Access" denotes degree of availability of training to the Indonesian population. "Equity" refers to a condition in which all citizens have equal chances of benefiting from vocational-technical trairing, regardless of their individual or group characteristics. These characteristics may be defined by region, gender, urban versus rural residence, socio-economic status, or other forms of social differentiation having objective importance in Indonesia.

2. CHARACTERISTICS AND LIMITATIONS OF THE AVAILABLE DATA

Our data on the availability of Votech training is based on enrollments in different types of vocational-technical schools, rather than on the actual carrying capacity of these schools or the numbers of "places." We are currently able to disaggregate this data only by region (province) and, to a limited extent, by gender.

3. MAJOR FINDINGS

3.1. Scale and Access

3.1.1. Increased access to reduced facilities.

Senior vocational-technical education enrollments have expanded greatly in recent years, increasing by approximately 93% in the course of Repelita IV. (Summary statistics on the scale and growth of the system are presented in Table 1 below.) Numbers of schools increased by only 59%, however, indicating that the growth resulted in good part from adding more students to existing infrastructure.

3.1.2. The growing predominance of the private sector.

The private sector accounts for the major portion of this expansion. Private schools furnished almost two-thirds of the increase in enrollments, and 93% of the new schools, during Repelita IV.

Table 7 : Social Rates of Return for Vocational-Technical Education

TABLE 1.

Growth of the Vocational-Technical Education System from 1983-84 to 1988-89

	1983/84						1988/89						Growth Rates in Percent					
	SMA	STM	SMEA	SMKK	All VoTec	All Second	SMA	STM	SMEA	SMKK	All VoTec	All Second	SMA	STM	SMEA	SMKK	All VoTec	All Second
PUBLIC																		
Schools	996	149	278	82	509	1,505	1,555	149	307	83	539	2,094	56.12	0.00	10.43	1.22	5.89	39.14
Teachers	35,463	8,038	7,651	1,980	17,669	53,132	62,933	10,202	10,739	2,755	23,696	86,629	77.46	26.92	40.36	39.14	34.11	63.04
Students	732,911	101,548	149,400	16,382	267,330	1,000,241	1,052,882	133,848	234,918	35,943	404,709	1,457,591	43.66	31.81	57.24	119.41	51.39	45.72
Students/schl	736	682	537	200	525	665	677	898	765	433	751	696	-7.99	31.81	42.39	116.76	42.96	4.73
PRIVATE																		
Schools	3,462	529	493	63	1,085	4,547	5,849	726	1,242	60	2,028	7,877	68.95	37.24	151.93	-4.76	86.91	73.24
Teachers	81,105	15,069	12,180	873	28,122	109,227	137,576	19,423	26,666	933	47,022	184,598	69.63	28.89	118.93	6.87	67.21	69.00
Students	1,037,980	144,425	148,275	4,843	297,543	1,335,523	1,547,171	266,087	409,110	9,630	684,827	2,231,998	49.06	84.24	175.91	98.84	130.16	67.13
Students/schl	300	273	301	77	274	294	265	367	329	161	338	283	-11.77	34.25	9.52	108.79	23.14	-3.53
TOTAL																		
Schools	4,458	678	771	145	1,594	6,052	7,404	875	1,549	143	2,567	9,971	66.08	29.06	100.91	-1.38	61.04	64.76
Teachers	116,568	23,107	19,831	2,853	45,791	162,359	200,509	29,625	37,405	3,688	70,718	271,227	72.01	28.21	88.62	29.27	54.44	67.05
Students	1,770,891	245,973	297,675	21,225	564,873	2,335,764	2,600,053	399,935	644,028	45,573	********	3,689,589	46.82	62.59	116.35	114.71	92.88	57.96
Students/schl	397	363	386	146	354	386	351	457	416	319	424	370	-11.60	25.99	7.69	117.72	19.77	-4.12

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3.1.3. The expansion pattern of the private sector.

The private sector tends to concentrate on forms of vocational-technical education -- particularly SMEAs -- that do not require much infrastructure or overhead expense. In the five-year period between 1983/84 and 1988/89, numbers of private SMEAs in Indonesia increased by 252%, while the number of private STMs grew by just 37%. (In the public sector, the comparable figures were 10% and 0%).

3.2. Regional Equity

3.2.1. Preference to urban areas and central regions

Overall, vocational-technical schools tend to be most highly concentrated in urban areas and relatively urbanized provinces, even when allowances are made for differences in population from one region to another. (See Appendix B for tabular presentation of access data by province.) In 1987-88, the average number of vocational-technical education "places" per 1000 population was 6.1 in both Jawa and Sumatera (reaching a high of approximately 12 in Djakarta and Yogyakarta, 9.1 in Sumatera Utara). For Kalminantan as a whole the figure was 5.1. For the eastern islands, it was only 4.5, reaching a low of 2.5 in Nusa Tenggara Barat.

3.2.2. Private schools follow market demand

The private sector also exhibits a particular geographical expansion pattern. Private schools tend to be concentrated in regions of high market demand and to neglect those where parents cannot pay or where current labor market conditions are less favorable. As the table below illustrates, private enrollments markedly exceed public enrollments in urban or industrial areas, whereas the reverse is true in less prosperous or less urbanized provinces

Table 2 : Ratio of public to private STM enrollments in selected provinces

Province	Public STM enrollments 1988-89	Private STM enrollments 1988-89	Ratio of Public to Private
DKI Jakarta	8,529	26,333	1 : 3.1
Island of Jawa	64,816	199,222	1 : 3.0
Sumatera Utara	10,092	28,540	1 : 2.8
Sulawesi Tenggara	2,370	238	10 : 1.0
Island of Kalimantan	7,834	3,865	2 : 1.0
Nusa Tenggara Timur	2,077	1,287	1.6 : 1.0

3.3. Gender Equity

3.3.1. More girls in certain kinds of schools.

As is evident in Table 3 below, female enrollments gradually increased over Repelita IV but remained distinctly segregated by type of school. Girls constitute the near totality of SMKK students, the clear majority of those in SMEAs, and a tiny minority (4%) of those in STMs. This disequilibrium seems even more pronounced in the private sector than among public schools.

Table 3: Trend in percentage of female enrollments in SMTKAs over Repelita V

Type of School	Public		Private	
	1983-84	1988-89	1983-84	1988-89
SMA	38%	42%	41%	44%
STM	4%	4%	3%	3%
SMEA	59%	62%	61%	68%
SMKK	98%	97%	99%	98%

4. POLICY IMPLICATIONS

Reliance on the private sector for much of the expansion of vocational-technical education seems to have had certain impacts on the shape and distribution of the training system. The growth of the private sector has had a tendency both to increase overall access and to accentuate inequality among provinces, as well as to incline the supply of training somewhat toward low-cost commercial high schools. Some judgment must be made about whether these growth patterns are desirable, and, if not, what mechanisms might be instituted to better balance the supply of vocational-technical education and ensure appropriate access to all. (This issue is further discussed in the concluding section of the document.)

D. ISSUES OF EFFECTIVENESS AND QUALITY

1. OBJECTIVE

To offer Indonesian citizens quality training in vocational-technical education that enables them to acquire significant levels of new skills and knowledge as well as to form attitudes toward work and adult roles in society that will facilitate their productive integration into the community. (Repelita IV, Book II, p. 559; Repelita V, Book II, p. 609)

"Effectiveness" signifies the degree to which internal program objectives are realized -- that is, the degree to which students in fact acquire the skills, knowledge and attitudes that the program is designed to give them. "Quality" refers to the level of excellence of the materials, staff and curriculum used in the teaching process. A "high quality" school has resources and employs methods that have demonstrated their ability to produce positive instructional results. (For further discussion of these terms, see Appendix A.)

2. CHARACTERISTICS AND LIMITATIONS OF THE AVAILABLE DATA

The national research team was able to find virtually no aggregate data on the actual learning outcomes of vocational-technical education. (EBTA results are reported strictly in pass-fail format, and more than 90% of tested students pass.) One must therefore resort to proxy measures of effectiveness like students flows (available only for the public sector) or to indicators of school quality, a few of which can be derived from existing data.

3. MAJOR FINDINGS

3.1. Internal Effectiveness

3.1.1. Partial improvement in student flows

Student flow data comparing the efficiency of student retention and promotion in 1987-88 with the situation in 1983-84 are summarized below in Table 3. (The first set of data is from the EHR Sector Review; the second is calculated from Pusat Informatika data.) They suggest that internal effectiveness has improved markedly in STMs, improved somewhat in SMAs, and remained much the same in SMEAs and SMKKs.

Table 4 :

Summary of Student Flow Data
for Senior Vocational-Technical Education

Type of School	1983 - 1984		1987-1988	
	Average Promotion Rate	Instruct Years per Graduate	Average Promotion Rate	Instruct. Years per Graduate
SMA	0.92	3.4	0.95	3.2
STM	0.82	4.6	0.91	3.6
SMEA	0.93	3.3*	0.95	3.3
SMKK	0.93	3.3*	0.91	3.5

* Sector Review calculations combined SMEAs and SMKKs

3.2. Quality of Instruction

The indicators of school quality reviewed and compared are student/school and student/teacher ratios; classes per "owned" classroom (belonging to the school); teacher qualifications and status (full- or part-time); workshops and libraries per school; guidance counselors per school; and ratio of student applications to student acceptances.

3.2.1. More students per resource

Data on this subject are presented in Appendix C. Student-school ratios also appear in Table 1 above. Two of the three indicators depicting the ratio of students to instructional resources went up during Repelita IV, with the exception of the student-teacher ratio in public STMs, which stayed virtually stable at 14 students per full-time teacher. (Student-teacher ratios are adjusted for part-time teachers and therefore signify number of students per full-time teacher equivalent).

The increase in student-school ratios illustrates the stretching of resources in the public sector. The number of students per school in public STMs -- buildings originally designed for 567 students, according to information from Dikmenjur -- increased over the Repelita V period from 601 to 898. Addition of more students to the same space seems to have occurred as well in the private sector.

The ratio of classes to owned classrooms stayed roughly the same, except for an increase in public SMEAs and private STMs. Student-teacher ratios increased in nearly all cases, by as much as 30% in private STMs, but do not seem excessively high.

3.2.2. Better teacher qualifications and commitment

Teacher qualifications and the proportion of full-time teachers to total faculty improved markedly over the Repelita V period (see Appendix D). The proportion of Votech teachers with full Master's qualification increased from 13% to 40%, while the proportion of those with minimal D1 and D2 certification decreased from 28% to 18%. The situation was comparable in public and private schools. The proportion of full-time teachers remained much higher in public schools than in private schools, but increased in both sectors, passing from 86% to 92% in public SMKTAs and from 20% to 31% in the private sector.

3.2.3. Public-private differences in support facilities

Information on numbers of workshops (e.g., laboratories, machine shops), libraries and guidance counselors per school has been collected very irregularly and it is therefore difficult to analyze a trend. Data for 1987-88, however, are presented in Appendix E, and they illustrate the somewhat better-equipped nature of public schools. Public STMs average 2.1 workshops per school compared to an 0.7 average in private STMs. In SMEAs, the situation is deplorable on both sides, but a little better in public schools than in private ones: Approximately two-thirds of public SMEAs have libraries compared with half of private schools. Guidance counselors are uniformly rare, though the situation is marginally better in the public sector: taking all varieties of Votech together, 15% of public schools have guidance counselors compared to 5% of private ones.

3.2.4. Public Votech schools somewhat more selective

The school-age population seems to prefer the public schools to the private ones: Overall, public SMKTAs accept 50% of their applicants, whereas the private schools accept on the average 75% of theirs. In the absence of any reliable test data, these figures suggest at least that the student body in public schools is more highly selected and may have a somewhat higher level of aptitude than students in private schools.

3.3. Curriculum

The number of programs actually taught in vocational-technical schools is considerably less than the number theoretically offered country-wide (144). Preliminary indications in the last trimester of

1988 suggested that less than 100 programs are endowed with a curriculum and only about 75 are actually offered in schools. Average schools offer 3 to 4 programs. The greatest number offered by any one school is 10.

3.4. Regional Variation in School Quality Indicators

Many of the indicators of instructional quality and school effectiveness just examined vary considerably by province or region. In Jakarta, Yogyakarta and Jawa Timur, the average number of students per SMEA in 1988-89 was under 400, whereas in Maluku, NTT and NTB the average was over 600. The same year in STMs, the average number of classes per "owned" classroom was 1.19 in Yogyakarta and 7.15 in Timor Timur. The Education and Human Resource Sector Review found as well some significant variations in student flows and "instructional years per graduate" by region at the secondary school level. In their 1983-84 data, the figure was 3.21 for Java and Bali, and 3.71 for the rest of the country.

4. POLICY IMPLICATIONS

The record of quality improvement over Repelita IV appears mixed. On the one hand, teacher qualifications and commitment seem to have increased and enrollment wastage to have decreased somewhat; on the other hand, already insufficient resources have been distributed over a greater number of students with some apparent crowding; and needed equipment and materials have not been renewed. One dimension not captured in our data but critical to the operation of Votech schools is the supply of workshop materials: wood, metal, cement, paper and other items for processing during training. Anecdotal evidence is nearly unanimous in indicating that most Votech schools are extremely short of such resources and that workshop classes can often do little more than go through the motions or reassemble the same worn prototype time and again for lack of needed materials.

The experience of the last five years thus suggests that there is a definite trade-off between quantity and quality of vocational-technical education. The system has been greatly expanded, but in some cases at the price of diluting scarce resources and failing to provide or renew essential equipment and staff. Below some line (which varies by type of training involved), schools may be too ill-equipped to teach a valid vocational-technical program and risk becoming instead second-class general secondary schools, like the technical training institutes disparagingly referred to as "STM sastra."

E. ISSUES OF RELEVANCE AND EXTERNAL EFFICIENCY

1. OBJECTIVE

To ensure that vocational-technical students are able to enter productive and remunerative employment and to contribute to national economic development. Repelita IV places particular emphasis on the training of mid-level technical manpower and on the development of entrepreneurial skills for productive self-employment (Book II, pp. 529-30 and 558-59).

2. CHARACTERISTICS AND LIMITATIONS OF AVAILABLE DATA

We have examined available secondary data on several aspects of the external impact of vocational-technical education programs. The first four categories of the data concern the "external effectiveness" of Votech programs in meeting the current needs of the Indonesian economy for trained manpower, and their relevance to the labor market and to the occupational futures of graduates. They include (1) data on the employment and earnings of graduates; (2) projections of manpower supply and demand; (3) information on the match between the varieties of Votech training available in each region and regional development strategies; and (4) information on partnerships between schools and local industry. The fifth category of data -- internal rate of return estimates -- combines some of these effectiveness indicators with information on the costs of vocational-technical education in an attempt to assess the external efficiency of the programs.

These secondary data give at best an approximate sense of the situation. It is difficult to know exactly how Votech students are using their training and succeeding in the labor market without more first-hand information on just what they are doing after graduation. In order to help fill this gap, the national research team will shortly be undertaking a tracer study. Such a study documents and analyzes the post-training career "itineraries" of a large sample Votech students and records their subsequent earnings and career advancement, their degree of satisfaction with these outcomes and their employers' ratings.

3. MAJOR FINDINGS

3.1. External Effectiveness

3.1.1. Employment and earnings of Votech graduates

Data on the employment of Votech graduates are available in the 1985 Inter-Censal Population Survey carried out by BPS. (See the table in Appendix F.) The data suggest that Votech graduates who do not pursue higher education are employed somewhat earlier and more regularly

than graduates of academic secondary education who go no further. In 1985, 79% of SMKTA graduates no longer in school had employment, compared to 66% of SMA graduates. Labor force participation rates among female SMKTA graduates no longer in school were nearly twice as high as those for female SMA grads not pursuing further studies; those for males were 5% higher.

As many observers note, however, employment data are not a very good indicator of the effectiveness of education in Indonesia (e.g., Godfrey, 1987; Ananta, 1988). Since most of the population cannot afford to be unemployed but must take any available work in order to survive, open and declared unemployment tends to be highly correlated with family income and socio-economic status: that is, the more prosperous a person's family, the more he or she can afford unemployment while looking for better job opportunities. The fact that the unemployment and job search time are higher among SMA graduates may simply mean that they come, on the average, from more prosperous families than do SMKTA grads.

For this reason, manpower economists suggest that income is a better indicator of the labor market success of recent graduates than employment/unemployment statistics. Available data covering the last fifteen years suggest that earnings of Votech graduates remain slightly above those of SMA graduates in urban areas, but are lower in rural areas.

Table 5 : Average monthly earnings of SMA and SMKTA graduates (in current Rupiah)

Source and date	Vintage of data	Subject population	Region				
			All Indo	Jak	Non-Jawa	All Urban	All Rural
Clark (1983)	1976	SMA		22,000	19,000		
		SMEA		---	17,000		
		STM		28,000	13,000		
McMahon et al (1986)	1982	SMA	99,250				
		SMKTA	100,000				
BPS (1988)	1986	SMA male				121,157	88,681
		SMA female				83,504	74,618
		SMKTA m				129,147	81,234
		SMKTA f				83,342	52,801

Two other aspects of employment and earnings data are very

significant to consider. First, according to the Inter-Censal data displayed in Appendix G, SMKTA graduates are somewhat disproportionately employed in "public service" occupations (which include civil service functions, government-funded social service jobs, entertainment professions, and a variety of private tertiary sector jobs): 68% fell in this category in 1985 as opposed to 46% of SMA graduates. Moreover, 35% of the SMA group were employed in manufacturing and trade, as opposed to only 15% of the former SMKTA students. Second, relatively few Votech grads were in self-employment or family business: approximately 8% as opposed to 12% of SMA grads and 24% of the entire workforce. Overall, 81.4% of the Votech graduates were classed as "employees" (BPS, 1986, Table 53.9).

3.1.2. Manpower supply and demand projections

Manpower supply and demand projections for the future nearly uniformly indicate oversupply of senior secondary school graduates relative to jobs requiring senior secondary school qualifications over the course of Repelita V and consequent unemployment and "job bumping." This is true both for SMA and for SMKTA graduates. The most recent BAPPENAS estimates portrayed below (which assume a sustained 5% real growth rate for the economy) project a surplus of 490,000 SMKTA graduates over available jobs during the course of Repelita V, meaning that one out of every four SMKTA graduates would not find a job compatible with his or her training. (The same would be true for one out of every three SMA graduates, in the Bappenas projections.) In most cases, these senior high school graduates will find work by replacing people with lower qualifications on lower-paying and less technically demanding jobs. But at the very least the consequences will be a large degree of underemployment.

Table 6 : Supply and demand projections for trained manpower by level of education over Repelita V

Level of education	Demand	Supply	Deficit or Surplus
SMP	2,164,100	2,104,000	- 60,100
SMKTP	382,700	153,400	- 229,300
SMA	1,411,900	2,191,000	779,100
SMKTA	1,551,000	2,041,800	490,800

Source: BAPPENAS (1989) p. 63

This situation stands in stark contrast with the conventional rationale for vocational-technical education: namely, a critical lack of middle-level technical manpower. There seem instead to be too many graduates for too few jobs. It should be noted, however, that the available projections do not differentiate the results by type of training program or profession, nor do they distinguish between vocational graduates and technical graduates. In particular, they do not separate out the large category of commercial high school (SMEA) graduates included in the figures.

3.1.3. Match between Votech programs and regional development needs

Very little data is available to compare the "profile" of Votech training province by province (or SWP by SWP) with the economic development strategies adopted for these areas in Repelita V, and the investigations of this topic included in the provincial mapping reports remain very approximate. It can be noted, however, that in all 27 provinces without exception, SMEA schools and students outnumber STMs, though in many of these areas government development priorities lie in the primary and secondary sectors (e.g. agriculture, mining, manufacture) rather than in the service and commercial occupations for which SMEAs prepare their students.

3.1.4. Partnerships.

In both Repelita IV and Repelita V, partnerships between Votech schools and local industry are recommended as one means of reinforcing the job market relevance of Votech training and facilitating better placement of graduates. In 1988, forty-four STMs in Indonesia, or 5% of the total number, had structured partnerships with the BLK workshops and training centers established by the Ministry of Manpower. These partnerships offered approximately 5000 students the opportunity to gain practical experience in one of six different technical specialties.

There is little information, however, about partnerships between Votech schools and industry or private enterprises. In one of the three pilot provinces covered by the Votech study -- Jawa Timur -- there appears to be a certain number of linkages between schools and private firms in industries like shipbuilding, construction and furniture manufacture. We have no details on the operations of these partnerships, however, nor was any further information on such structured relationships with industry found at the national level.

3.2. Efficiency

To evaluate the overall efficiency of Votech as a form of manpower training, costs as well as benefits must be taken into consideration.

Though there are a variety of techniques and approaches for benefit-cost evaluation, the one that has been most widely used in recent years is rate of return analysis, in which educational costs are treated as an investment and the future earnings of graduates as a return on that investment. (See Appendix A for further explanations.) Data from an array of rate of return studies conducted in the 1980s are displayed in Table 7. Note that the figures cited are all social rates of return. Private rates are not given but would in all cases be at least slightly above the social ones. In general, studies on data gathered through the early 1980s found overall rates to Votech education to be consistently below those for academic secondary education. Since earnings were roughly comparable for graduates of the two branches, as we have seen, this difference came essentially from the higher unit and cycle costs of vocational-technical training. In recent years, however, some changes seem to be occurring.

First, in the results of the Education and Human Resource Sector Review, SMEAs are clearly distinguished from STMs. SMEAs have lower unit costs and turn out to have appreciably higher returns in urban areas, even above those for SMAs. This suggests one reason why enrollments in commercial high schools of this type have increased so sharply over recent years. The data also suggest why STM graduates have been going into government-financed (though non-civil service) jobs: Their returns in this form of employment (20% for men and 7% for women) appear to have been appreciably above what they could get elsewhere.

Second, in recent and still tentative calculations (McMahon, 1989), the rate of return to STMs seems to be approaching and even overtaking those to SMAs in urban areas. A second remarkable aspect of this data is the suggestive evidence that returns to technical education for women have increased markedly, surpassing those for men in all illustrated cases of urban employment. It is also instructive to note that there appears to be considerable variation in rates of return from province to province as well as between rural and urban areas. Reanalysis of 1982 data by McMahon and Boediano (1988) suggests that while average rates of return to Votech were 11%, province by province rates varied from 6% to 15%.

4. POLICY IMPLICATIONS

The entire set of data on social rates of return to vocational-technical education just examined suggests that the profitability of this form of training for individuals and for society has been slightly below that of academic secondary education, but may be increasing in absolute and relative terms. Rate of return data need to be interpreted with some circumspection, however, For one thing, as we shall see in the next section, measurement of costs for Votech is still very approximate and subject to a considerable margin of error. In addition, rate of return analysis as generally practiced poses some significant problems of reliability and validity. (See Appendix A for a discussion of this point.)

Table 7 : Social Rates of Return for Vocational-Technical Education

TABLE 7.

Results of Studies of Rates of Return to Senior Secondary Education in Indonesia

Source and Date	Vintage of Data	Subject Population	Social Rates of Return							
			All Indonesia							
Clark (1983)	1976	SMA	32*							
		SMKTA	18**							
McMahon, Millot & Eng (1986)	1982		Occupational Categories							
			All occup	Self employ	Small busins	Indust	Civil service	Mili-tary	Govt non civil serv	
		SMA Male	0.23	0.19	0.36	0.49	0.10	0.17	0.14	
		SMA Female	0.11	0.08	-0.01	--	0.07	--	0.23	
		STM Male	0.19	0.14	0.80	0.01	0.05	0.04	0.20	
		STM Female	0.04	-0.02	--	--	0.03	--	0.07	
		SMEA Male	0.24	0.20	0.37	0.51	0.10	0.17	0.16	
		SMEA Female	0.17	0.08	0.24	--	0.07	--	0.24	
McMahon & Boediono (1988)	1982 (primary job only)		Regions of Indonesia							
			All Indo	Jak	W. Jawa	E. Jawa	Sum	Urban Kal	Urban Sul	Other Islands
		SMA Male	0.17	0.21	0.14	0.20	0.14	0.15	0.07	0.22
		SMA Female	0.23	0.35	0.27	0.38	0.07	0.18	0.22	0.23
		SMKTA Male	0.11	0.09	0.15	0.06	0.12	0.08	0.06	0.12
		SMKTA Female	0.11	0.06	0.15	0.14	0.07	0.10	0.10	0.21
McMahon (1989)	1986		Jakarta	East Java Urban		Central Java Urban		Sumatera Urban		
		SMA Male	0.14	0.11		0.12		0.11		
		SMA Female	0.24	0.15		0.22		0.17		
		SMKTA Male	0.14	0.08		0.14		0.10		
		SMKTA Female	0.25	0.10		0.18		0.18		

* Rates go down to 22% if two year job search is necessary

** Rates go down to 12% if two-year job search is necessary

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Rate of return figures should therefore be used with many of the same precautions that we have tried to exercise with respect to the other data of this study. First, we should avoid attaching great policy significance to small differences. Second, rates of return should not be interpreted in isolation, but in relationship with other types of evidence on the relevance and external impact of vocational-technical education.

Overall, the available microeconomic data on earnings, returns and employment for SMKTA graduates suggests that they have been doing fairly well in the labor market, with some indication of significant recent improvements in urban areas and among recent graduates.

From a macro-economic point of view, however, some severe problems seem to be developing. Probably the most critical issue in the area of relevance and external efficiency is the large projected oversupply of senior secondary school graduates, including graduates of senior vocational-technical education, on the job market. In a sense, this situation appears to contradict one of the fundamental tenets of vocational-technical training -- namely, that economic development creates critical shortages of middle-level technical manpower that must be alleviated.

Aggregate manpower surpluses are not, of course, inconsistent with shortages in particular technical specialties, or in certain geographical regions. Current data are not sufficiently differentiated and disaggregated to pick up these variations -- an unfortunate situation, for such distinctions are of great importance to manpower planning. It seems quite likely that within the aggregate manpower figures for SMKTAs there are both surpluses of some types of graduates (e.g., those from SMEAS) and shortages of specific technical skills.

Even this picture may vary from region to region, however. In zones with a rapidly developing tourist industry, for example, good quality commercial training may still be in short supply. These considerations reveal once again how important it is to develop a capacity for disaggregated labor market analysis.

Whatever such detailed balances may be, however, there is obviously in the aggregate a rapidly growing problem of surplus supply of secondary education graduates relative to available job opportunities of a commensurate level. To maximize the potential of Votech graduates for productive employment and self-employment, it is clearly important to upgrade instructional quality and to improve labor market analysis and liaison functions at the regional level and below. There are, however, several indications that the Votech system may not yet be very well equipped to meet this challenge.

First, Ministerial infrastructure has not developed a great deal of capacity to shift its repertoire of training programs in order to to meet region-specific economics needs. The private school system may have greater flexibility to satisfy market

demand, though the evidence of its growth over the last five years suggests that some quality control and structuring of incentives may be necessary to channel this response.

Second, most Votech graduates now go into wage employment for government or into other occupations in the service sector, rather than into industrial processing or manufacture. Few Votech grads, moreover, are self-employed at present. New employment paths for Votech students may therefore need to be pioneered.

Third, liaison with business and industry seems at best embryonic. Partnerships with private enterprise appear to be few and far between.

The underlying challenge for the next five to ten years seems to lie in employment creation. Such an undertaking obviously concerns many other sectors of society besides education and many other Ministries besides MOEC; but it is one with which educators -- and Votech educators in particular -- must become increasingly familiar.

F. ISSUES OF COSTS AND FUNDING

1. OBJECTIVE

To ensure adequate resources for the design and delivery of good quality vocational-technical education programs while monitoring and controlling costs.

2. CHARACTERISTICS AND LIMITATIONS OF THE AVAILABLE DATA

Balitbang Dikbud staff with the assistance of Dr. Walter McMahon are presently in the process of updating the study of educational costs in the Education and Human Resources Sector Review on the basis of 1988 data. The most recent estimates that we have date therefore from 1986 and are not based on very thorough first-hand data on family and school-level expenditures. The school surveys and collection of primary data to be carried out during the 1989-90 school year as part of phase two of the vocational-technical education study will afford an opportunity to gather data on local-level costs and local sources of funding.

3. MAJOR FINDINGS

3.1. Costs for Vocational-Technical Education

3.1.1. Growth in the system and shrinkage in the budget

Numbers of vocational-technical students increased by 93% over the course of Repelita IV (51% in the public sector and 130% in the private sector). The routine (operating) budget for vocational-technical education did not keep pace with this expansion, increasing in real terms over the same period by only 44%. At the same time, the development budget was drastically cut. DVTE only received 60% of the resources originally budgeted, including project funds from international sources (NMK, p. 98).

3.1.2. Lack of accurate unit cost data

Data on the unit costs of vocational-technical education are very deficient. Because of the multiple types of Votech schools, the wide variation of costs among schools and the numerous local factors which impinge on the calculation, cost analysis has to be done in large part on the basis of data collected at the local level. The most recent detailed cost study, performed for the EHR Sector Review in 1986, dealt strictly with public SMEAs and STMs (undifferentiated by program). It also only covered operating costs, omitting annualized capital expenditures (for equipment and facilities) which tend to be larger and more important in genuine vocational-technical education than they are in the other branches of the education system. Even within the realm of

operating costs, the authors admitted that their calculations were necessarily approximations, based on insufficient first-hand data.

The spread in unit costs between STMs, SMEAs and SMAs in the Sector Review analysis derives entirely from the lower student-teacher ratios observed in STMS and used in calculating the "salary bill" per student. Cycle costs of STMs are further raised relative to those for SMAs and SMEAs in the sector review analysis by the higher drop-out/repetition ratios and greater numbers of student years per graduate that the sector review authors found to characterize them. In fact, as of 1988-89, these differences between STMS and SMAS seem to have attenuated. Student-teacher ratios in public STMs and SMAs are nearly identical and drop-out/repetition rates in STMs appear to have fallen. If these newer data proved reliable and were used in calculations, unit and cycle costs between the two would would tend to converge.

In most studies of educational costs around the world, good quality vocational-technical education proves in fact to be more expensive than academic education of an equivalent level because of some combination of four factors that can increase expenditures: (1) costs of specialized tools and equipment needed in training; (2) costs of materials consumed in workshops; (3) higher salaries that must be paid to technically-skilled instructors who have other good opportunities on the labor market; and (4) the lower student-teacher ratios needed in laboratory, machine shop and apprenticeship work.

We have little information on two of these four variables (equipment and material) for public SMKTAs and on three of the four (including salaries) for private SMKTAs. In the EHR Sector Review, estimates of unit costs were made for public STMs and SMEAs without counting capital costs and by adopting the same materials cost as for SMAs. Technical schools were nonetheless found to be more expensive strictly on the basis of their lower student-teacher ratios. SMEAS turned out to have costs similar to SMAs because their student teacher ratios were nearer the norm for academic high schools. Such partial calculation does not seem like a very firm basis, however, for projecting other updated cost estimates.

The most we can say, therefore, is that unit costs in all likelihood continue to be higher for Votech than for general high school, and that there are significant variations among types of vocational-technical training. Differences between STMs and SMAs may have shrunk over the last five years due to the low level of investment in facilities, equipment and material that has already been noted. But there is clearly a lower limit on these expenditures below which the school no longer has the resources to offer genuine vocational or technical training.

As for cycle costs in vocational-technical schools, the Sector Review found STMs to have relatively high cycle costs because of the relative inefficiency of their student flows -- in short, because per student charges had to be multiplied by a relatively high figure for

"instructional years per graduate" (4.68). This figure is considerably lower in the 1988-89 data on student flows (see Table 4 above); and, if the two sets of figures are given credence, the level of cycle costs would come down accordingly.

3.2. Fiscal Capacity and Funding Sources

3.2.1. Limits on the growth of the government budget.

Though we have no new projections of rutin and development allocations for Votech education over Repelita V, government policy statements have emphasized the need for careful limits on public expenditures, for institution of cost recovery schemes, and for transfer of a number of social service functions to the private sector. Under such conditions, it seems unlikely that there will be a major increase in public per student expenditures for vocational-technical education in the short or medium term.

3.2.2. Alternate sources of funding.

Development of production units within vocational-technical schools as means of cost recovery as well as to give more practical content to the teaching program was advocated in Repelita IV and is emphasized anew in Repelita V. However, the national and provincial research teams found little evidence of functioning production units in schools at present. The only examples of which we are aware are scattered SMKKs that run in-school bakeries. No details on their mode of operation were obtained, however.

4. Policy Implications

Both Repelita IV and Repelita V stress the importance of raising the quality of vocational-technical education. As discussed in a foregoing section of this document, some progress has been made in the direction of quality improvement over the last five years, but operating funds have not kept up with system expansion, and very few resources have been put into renewing the physical plant and equipment of the system in order to meet the challenges of growth and new technology. Repelita IV mandated a 100% extension of the Votech system over a period during which budgetary resources for Votech did not grow appreciably. Repelita V calls for an additional expansion of 34.8% with little prospect that the shortfall in plant and equipment can be made up from public funds. Can goals of quality improvement be achieved without additional support from other sources of funding (local, regional or international)?

To clarify these issues, two initiatives seem imperative: (1) institute more effective mechanisms for tracking and analyzing costs; (2) undertake careful study and experimentation of a variety of cost recovery or revenue generation procedures at the local level.

G. ISSUES OF ADMINISTRATION AND MANAGEMENT

1. OBJECTIVE

To ensure optimum efficiency and productivity of the administrative agencies responsible for supervising vocational-technical education and to deliver to schools the services and material they require in a cost-effective manner.

2. CHARACTERISTICS AND LIMITATIONS OF THE AVAILABLE DATA

Though issues of administration and management are evidently critical to the success of vocational-technical education and particularly relevant in a period when government is emphasizing increased efficiency, they have not been an explicit focus of the study, and little systematic data has been assembled on the administrative operations of supervisory agencies. The only exceptions concern the operation of the research teams themselves and certain aspects of Votech administration thrown into relief by investigation of the other dimensions of the system presented in the four preceding sections of this document.

3. MAJOR FINDINGS

3.1. Lack of an Organized System of Trade Tests and Certification

The lack of an organized system of standardized examinations for Votech school leaders and of trade tests or skill certification makes it much more difficult for the government to exercise quality control in the private sector. Recommendations for the development of such a system have been included both in Repelita IV and in Repelita V.

3.2. Lack of Coordination Structures and/or a National Board for Vocational-Technical Education

There are also at present no official structures for coordinating the various forms of public and private Votech training placed under the supervision of the MOEC with those placed under the supervision of other Ministries, or for ensuring policy coherence between these educational programs and the various other economic development initiatives of the Government that affect or depend upon manpower training.

3.3. Lack of Optimal Coordination in Information Management

There is some redundancy and lack of coordination in the area of system monitoring and feedback of management information, as evidenced

by discrepancies between the data gathered by Pusat Informatika and that generated for monitoring purposes by Dikmenjur and Kanwil.

3.4. Lack of Effective Coordination of Research at the National Level

An exemplary amount of inter-agency collaboration seems to have nonetheless been achieved in the execution of the present Votech study at the provincial level (NTT, Jawa Timur, Sumatera Barat), where BAPPEDA coordinated closely-knit research teams made up of representatives from Kanwil, Dikmenjur, Manpower and other concerned agencies. At the national level, however, it has proved much more difficult to ensure this kind of functional and on going collaboration, a fact that has made the gathering of information and the exchange of insights a good deal more problematic.

4. POLICY IMPLICATIONS

At some point, the administrative mechanisms for defining VoTech strategy, for allocating resources, for delivering services and materials to schools and for monitoring and evaluating progress in the field need to be studied in greater detail. The quality of instruction and administration in schools cannot be divorced from the quality (and quantity) of supervision and guidance that Dikmenjur is able to provide. These topics lie outside of the scope of work of the current research team and should in any case be investigated with and by personnel from Dikmenjur and the Ministry's planning service.

A scheme ensuring better coordination and full complementarity between the data collection efforts undertaken by Dikmenjur for monitoring purposes and the storage, retrieval and analysis by Pusat Informatika of the more selective set of information needed for ministry planning purposes would be most useful.

In the medium-term, structures for trade tests and skill certification, and institutional means for coordinating the diverse agencies involved in vocational-technical education at the national level, appear imperative. A more immediate and no less essential task is to design and implement better means for effective coordination and shared execution of policy research at the national level

H. SUMMARY ISSUES AND RECOMMENDATIONS

1. Preliminary Stage of Inquiry

In this final section, we propose to discuss a limited number of summary issues and to make some tentative recommendations. Since the study of vocational-technical education is less than half complete and has focused heretofore largely on collection and analysis of available secondary data, we have too limited an understanding of the situation in the field to risk definitive conclusions or recommendations. In examining summary issues and critical dilemmas framed by the data of the study, we will use the same five topic areas adopted in the outline of this document, but discuss them in reverse order: issues of management and administration first and those of access and equity last. Recommendations will be prioritized according to their time horizon: short-term (in the course of Repelita V), medium-term (in preparation for and during Repelita VI), and long-term (over the period of the next 25-year plan).

2. Administration and Management: Needs for Coordination

Vocational-technical education is located at the critical intersection between the educational system and the economy, and its operations and concerns therefore overlap both domains. Many if not most of its problems cannot be worked out without joint effort by educators, business leaders, industrial planners and the agencies of government that deal with them. A strong institutional framework needs to be created for fostering that cooperation. Within the government, BAPPENAS seems the unit best placed to guarantee the necessary coordination. In the short and medium term, cooperation can probably best be built around the resolution of a series of pressing practical issues, like promotion of business partnerships, design of a trade certification and testing system and development of alternate sources of funding.

Short Term Recommendations:

(1) Institute means for ensuring full interagency participation in the implementation of the vocational-technical education study.

2) Develop and experiment methods for standardized testing of Votech graduates and certification of trade and professional skills.

(3) Establish a National Vocational-Technical Training Board under jurisdiction of BAPPENAS to coordinate the various agencies and Ministries concerned with Votech and to prepare elements for Repelita VI and the 25-year plan.

Medium-Term Recommendations

(1) Establish linkage between planning and coordination functions of the National Training Board under BAPPENAS jurisdiction with similar functions in each province under BAPPEDA leadership.

(2) Promote detailed regional planning of vocational-technical education.

Long-Term Recommendations

(1) Envisage promotion of sub-regional and local planning of vocational-technical education and linkages with industrial development and labor market needs.

Particular Data Needs

(1) A study of the administrative operations of vocational-technical education from the national to the local level and of mechanisms and patterns of fund allocation, to be carried out in close collaboration with Dikmenjur staff.

3. Costs and Funding: the Budget Dilemma

Budgetary resources for vocational-technical education have not been keeping pace with the expansion of the system, and additional means of funding need to be generated. It is crucial in the next five years to investigate -- and experiment with -- a series of funding options, from income generating activities in schools, through diverse local contributions or new tuition schemes, to cost-sharing with industry and possible institution of selective salary taxes for training as is currently the case in a number of European and Latin American countries. Project funding might be made available for efforts of this sort that promised to develop new ways for vocational-technical education to generate the resources it needs.

Short-Term Recommendations

(1) Experimentation with alternative funding schemes, as detailed above.

(2) Evaluation of the exact material and equipment situation and needs of each type of Votech program.

Medium-Term Recommendations

(1) Institution of the funding alternatives found most practical and promising in the course of the prior phase.

Long-Term Recommendations

(1) Possible institution of a salary tax on industry to help fund continuing development of vocational-technical training system.

Data Needs

(1) Integrate a fully-developed local cost study into the research design of the second phase of the Votech quality and efficiency study. One objective would be to answer the question, "What are the costs of good quality vocational-technical education?"

(2) Perform case studies of selected examples of business partnership.

4. External Efficiency: the Crisis of Oversupply on the Labor Market

This issue has been sufficiently outlined in the text of the foregoing document. What to do about it is less clear. Rhetorical solutions are many and cheap. Several things can nonetheless be noted. First, labor oversupply is not always a bad thing for everyone. It generally contributes to keeping wages down, which helps to make local products competitive in international markets and/or to ensure more attractive profits from business activity. Some, if not all, sectors of society may therefore benefit from such a situation. Moreover, even if there are not sufficient jobs to employ graduates, sending young people to vocational-technical school at least keeps them off the labor market a little longer and so eases social strains in the short run.

Second, from a macroeconomic point of view, oversupply is less of a problem for private sector vocational education than for public schools, because private schools and private students are supposed either to adjust to the market and discover what is saleable or to go out of business. Private schools do not therefore give the same sense of "entitlement" to a job that public schools tend to.

Short-Term Recommendations

(1) Develop a series of pilot efforts to establish exemplary business partnership with selected Votech schools.

(2) Reinforce labor market analysis and guidance capacities from the provincial level to the school level.

(3) Examine with other interested Ministries strategies of employment creation that seem adapted or adaptable to Indonesian conditions.

Medium-Term Recommendations

(1) Experiment and evaluate employment creation strategies.

(2) Generalize the most successful models of business partnership tested via the efforts suggested above in "short-term recommendations".

Long-Term Recommendations

(1) Apply new employment creation strategies on a larger scale in tandem with industrial and economic planning.

Data Needs

(1) Carry to completion the tracer study of 3000 Votech graduates in pilot provinces.

(2) Conduct a survey of employers to determine their assessment of the performance of Votech graduates and the strong and weak elements in their training.

5. Effectiveness and Quality: the Quantity/Quality Dilemma

This problem has also been sufficiently invoked in the foregoing pages. The only evident solution in the short run seems to be to adopt more systematically the strategy that was followed by default during Repelita IV: that is, let the private sector handle the quantity side of the issue while the public sector concentrates on the quality side. Most of the system expansion observed in the last four years was provided by the private sector. The government, for example, did not create one new STM over the entire Repelita IV period.

However, the evidence of the recent past suggests that, left entirely to its own devices, the private sector produces suboptimal patterns of expansion: over-concentration in certain forms of training and among certain clienteles, a least common denominator approach to instructional quality, and so forth. There is a critical role for government institutions in at least three important areas: (1) assuring quality control in the system via testing and certification mechanisms;

(2) providing resources that the private sector will not furnish; and (3) structuring incentives for private schools to go into areas critical to national development where market inducements are insufficiently strong at present.

Short-Term Recommendations

(1) Investigate and test strategies for giving the private sector the leading role in system expansion while enabling the public sector to exercise critical responsibility for quality control and up-to-date technical support.

2) Develop and field test instruments for assessing the skill and knowledge acquired by Votech students in the course of their studies.

(3) Evaluate the state of vocational-technical education curricula in pubic schools.

Medium-Term Recommendations

(1) In the medium term, the public sector should be able to exercise quality control and system monitoring functions for vocational-technical education throughout the country.

(2) Begin implementation of the modified curricula.

Long-Term Recommendations

(1) Devolve an increasing proportion of quality control and technical support functions to regional administration, and promote active involvement of regional universities and teacher training colleges in this work.

Data Needs

(1) As soon as possible, administer standardized skill tests in a sample of schools to begin measuring learning outcomes of Votech training.

(2) Undertake observational studies of the teaching and apprenticeship process in a sample of vocational-technical schools in order to develop data on instructional quality variables.

(3) With data from the field research phase of the vocational-technical education study, analyze the returns to quality of teaching staff, equipment and instruction. Do

better quality resources pay for themselves in the sense of measurably increasing student productivity after graduation?

6. Access and Equity: Who Benefits from Votech?

Certain patterns of inequity in the distribution of vocational-technical education were discovered in the section of this document on access and equity issues, particularly regional disparities and gender imbalance. Other undiscovered patterns may exist with respect to the socio-economic background of students. The logic of private sector or market-responsive development of vocational-technical education would suggest that one cannot simply forge upstream against existing patterns of labor market demand and, for example, bring every province to parity in industrial training schools when industry itself is regionally concentrated. Still it is within educators' power to discover and examine these patterns of inequity, while asking to what degree they stem from real economic conditions, and by what means those conditions might change.

Short-Term Recommendations

(1) Develop and implement means for encouraging more female enrollments in technical schools.

(2) Identify in under-served regions the sectors with the highest economic potential and their particular training needs.

Medium-Term Recommendations

(1) Develop and implement incentives for the private sector to provide training in under-served regions in the high-potential technical areas that have been identified.

Long-Term Recommendations

(1) In concert with other Ministries, seek to identify and promote regionalization and deconcentration of development to provide a lasting basis for regional equity.

Data Needs

(1) Investigate the breakdown of SMKTA participation and graduation along other lines of differentiation relevant to equity considerations: socio-economic status, rural-urban location, etc.

Appendix A

DEFINITION OF CONCEPTUAL TERMS

1. INTRODUCTION

A number of terms used in the text of the working paper or commonly invoked in discussions of planning vocational-technical education may in fact have different meanings for different people. These include concepts such as "effectiveness," "access," "educational quality," "unit costs," "rate of return," and "external efficiency," among others. In an attempt to build up a shared technical vocabulary for the vocational-technical education study, this appendix provides a brief exposition of the way in which the terms most frequently employed in the study have been defined.

The meaning and appropriate use of each term and the relations between them are made clearer by reference to the general systems model of vocational-technical education adopted by the study and detailed in the research design document. The systems model specifies five interlinking realms of activity:

(a) the Context, or the economic, social and political environment within which vocational-technical education programs take place;

(b) Input, or the various personnel, material and services which the program requires in order to function properly;

(c) Process, or the diverse instructional and institutional activities through which these resources are brought to play in an attempt to accomplish the program's goals;

(d) Output, or the immediate results of the activity, such as new levels of knowledge or skills acquired by the participants; and

(e) Outcome, or the longer-term impact of the training activity on productivity, labor market performance or success in subsequent education.

Using this conceptual framework as a basis, we can propose a set of definitions for the terms most frequently used in the study. We examine first concepts related to assessment of the benefits of educational programs, then those that include analysis of its resource costs.

2. ASSESSING THE BENEFITS OF AN EDUCATIONAL PROGRAM

Several concepts related to the benefits and value of an educational program will be examined first: specifically, access, equity, effectiveness, quality, and relevance.

2.1. Access

As defined in the text of the working paper, "access" to an educational program refers to its degree of availability and is generally measured by the ratio of available places to the eligible population.

2.2. Equity

In general, "equity" refers to a condition in which all members of a population receive equal treatment and equal benefits, regardless of their particular subgroup characteristics. "Equity of access" thus requires that all those eligible for a given program have in fact equal chances of participating in it and benefiting from it. The notion of equity can equally well be applied to the processes, outputs or outcomes of education, however. At the "process" level, equity requires that all students receive equal treatment in classroom work, whereas in the realm of outputs or outcomes it would signify equal results for all participants. Since the results of instruction are generally (if sometimes wrongly) believed to depend on individual characteristics more than subgroup membership, however, equity discussions typically focus on "equal opportunity" on the input side of educational programs.

2.3. Educational Effectiveness

In dictionary terms, "effectiveness" means quite simply the ability to produce an effect of whatever nature, whether initially intended or not. In the design and assessment of educational programs, the intended effects of the intervention are generally specified in the program's objectives, and its results are then evaluted against this criterion. From the evaluative point of view, therefore, the term "effectiveness" most often refers to the degree to which a program actually accomplishes its objectives or goals.

A program typically has several kinds of objectives, each one concerning a different domain of the systems model sketched above:

- Intermediate or logistic objectives focus on the production or supply of certain critical inputs (like new curricular materials) or the implementation of particular processes (like a set of innovative teaching methods).

- Internal or learning objectives specify the immediate outputs of the instructional process, such as the acquisition of certain skills and knowledge by vocational-technical students.

- External or impact objectives concern the longer-term outcomes of vocational-technical education, like equiping students to find productive employment after graduation or, more generally, contributing to the development of an industrial base in a given province.

As a consequence, one can talk of the "internal effectiveness" or the "external effectiveness" of an educational program. It is also possible to speak of particular measures of "intermediate" (or "logistic") effectiveness in reference to the supply of given inputs or processes necessary to the operation of vocational-technical education programs. When used without other specifications as to its meaning, however, the "effectiveness" of an educational program usually refers to its efficacy in producing internal results -- that is, in achieving a specified set of learning objectives. To what degree and in what proportions do students who enter the educational program in question in fact acquire the new skills, knowledge and/or attitudes that it is designed to help them develop?

As the terms "degree" and "proportion" in the above sentence suggest, the notion of effectiveness lends itself to quantification. What percentage of students actually finish the course? How many of the learning objectives do they master? What are the drop-out and repetition rates?

2.4. Educational Quality

Quantification does not and cannot capture all the nature and results of an educational program, however. In fact, in order to quantify, one often has to arbitrarily limit the number of factors taken into account and greatly simplify their representation. The notion of "quality" appeals to our more general sense of what constitutes good education or training. By dictionary definition, "quality" means the "degree of excellence or superiority" of some thing. We may speak of the high or low quality of textbooks and school facilities (inputs), of teaching methods and counseling procedures (processes), of academic results (outputs) or of a person's overall training seen from the point of view of their subsequent social status or job success (outcomes).

There is obviously an important link between quality and effectiveness. A good quality school -- that is, one characterized by "excellent" facilities, staff, and teaching methods -- should also be effective at accomplishing its learning objectives and promoting the careers of its students.

But there is more to the notion of quality than simply proven linkage to specific and immediate curricular or career results. First, "quality" judgments most often constitute composite assessments made on the basis of a variety of characteristics, and they therefore depend as much on the perceived balance and harmony of the factors in question as on their aggregate sum. "Quality" is thus a broader concept than effectiveness in accomplishment of singular objectives. (Think, for

example, of the various characteristics you would refer to as defining a "well-educated" person.) Second, there is in the term "quality" a notion of durability, of superiority "in the long run." Just as a good quality suit will bear more wear and tear than a cheaper model, so it is felt that a good quality education will stand its beneficiaries in good stead throughout their lifetime.

Paradoxically, measures of the quality of educational inputs and processes are often given importance in evaluations precisely because valid quantitative measures of educational effectiveness or adequate indicators of the quality of outputs and outcomes are difficult to obtain. Results of norm-referenced tests and official examinations, for example, often say little about what students have actually learned. Measures of broader and longer-term outcomes like civic participation or professional status of former students are rarely obtained. This is one reason why educational evaluations frequently revert to the concept of quality. In situations where it is difficult to measure all relevant outcomes, it is helpful to use the quality of inputs and processes as a proxy indicator of educational results. In other words, if we cannot determine exactly what students have learned in the course of a training program or what impact it will have on their later lives, we can at least make some progress in assessment by evaluating the quality of the educational experience that they have undergone.

Conflict arises, however, over how the notion of quality is to be operationally defined. Two main tendencies can be observed. On the one hand, quality is defined as embodiment or approximation of characteristics that are socially accepted as proof of excellence. Thus, if all teachers in an academic secondary school have Master's degrees from reputable universities, the group will be considered a high quality staff. On the other hand, quality is defined as proven ability to produce results -- in short, the argument that "a tree is known by its fruits." This approach assumes that previous experience has demonstrated which educational inputs and processes lead to the most positive learning outcomes -- or, in any case, it puts a premium on the effort to identify inputs and processes that do typically produce the best results.

The two approaches to quality converge in many cases, of course. Given characteristics may be socially accepted as proof of excellence because they have demonstrated over time their ability to induce superior learning outcomes. But this is not necessarily or always the case. Teachers may be judged excellent because they ape high status characteristics of the environment that in fact have little to do with -- or are actually detrimental to -- the acquisition of new knowledge by students.

Lately in the educational research literature, the second approach to the notion of quality has gained the upper hand, and it is the one that will be principally used in the vocational-technical education study. We should not forget, however, some of the broader connotations of the term.

2.5. Educational Relevance

The notion of educational "relevance" is allied to that of quality. "Relevance" is, in fact, one qualitative dimension of external effectiveness. It concerns the degree to which the material taught in a given educational program (or the skills, knowledge and attitudes acquired there) can in fact be applied to students' post-graduation experience and enables them both to deal more effectively with that experience and to derive more enjoyment and satisfaction from it. It therefore focuses on much the same domain as measures of external effectiveness like job placement and productivity. Just as the notion of school quality is broader than the calibration of a few specific learning outcomes, so "relevance" embraces more of the variety of post-graduation experiences and satisfactions than those typically catalogued among job market outcomes.

3. TAKING ACCOUNT OF RESOURCE COSTS

All the above concepts directly or indirectly concern the results of educational experience or its benefits. But policy issues cannot be resolved and planning decisions cannot be made without reference as well to the costs of educational programs. However great the demonstrable benefits of a program, if its costs are prohibitively high or cannot be offset by realizable benefits or cost-recovery mechanisms, it is simply not feasible. There would doubtless be some real benefits to implementing interactive computer instruction in every primary school in Indonesia, but the expenses involved presently render this idea impracticable.

If the notions of effectiveness, quality and relevance are to render service in evaluations and studies, they must at some point therefore be combined with those of cost. And to do that, costs themselves must be carefully determined and measured: operating costs and investment costs to each of the parties concerned by a given educational program. Once data on expenditures are assembled and aligned with effectiveness measures, ways must be found to compare the two types of information and to draw conclusions. The rest of this appendix is devoted to those kind of joint benefit-cost measures.

3.1. Benefit-Cost Analysis

This topic of comparing benefits and costs, which is obviously a constant preoccupation in business, has become a focus of social service programs as well in the last forty years. There has grown up a whole methodology of "benefit-cost analysis" devoted to determining the advisability of investing public funds in alternate projects or programs. Most of the related methods in education trace their lineage back to this area of applied economics and public administration.

Before considering some of the terms and (primarily quantitative) techniques used for combining cost and benefit data, it should be noted that both costs and benefits have qualitative components which are difficult to boil down into simple sets of numbers. A program may have social or personal costs which go undetermined in quantitative exercises. Any numerical computation must therefore be placed squarely in a larger context of qualitative judgment about the balance of costs and benefits.

3.2. The Concept of "Efficiency"

If there is one core notion in the economic analysis of education, it is probably the concept of "efficiency." The term has some specific meanings in economics, plus some more general connotations in popular usage. Webster's New World Dictionary defines efficiency as "the ability to produce a desired effect, product, etc., with a minimum of effort, expense or waste" or as "ouput divided by input." Economists generally distinguish "technical efficiency" from "allocative" or "price" efficiency. The former describes a production process that yields the greatest quantity of outputs for a given set of inputs (or uses the least quantity of inputs to produce a given set of outputs). The latter term includes monetary valuation of inputs and outputs. The most "allocatively efficient" production process is therefore the one that produces the greatest market value of output relative to input, or that achieves the greatest "value added."

In the planning literature on education, a distinction is also frequently made between internal efficiency and external efficiency. The two differ in much the same way as the notions of internal and external effectiveness discussed above, only now the cost of the program (in kind or in monetary terms) is directly taken into consideration. "Internal efficiency" can be defined as the ratio of learning outputs to resource inputs and therefore concerns both the economy and the effectiveness with which an educational program produces its immediate (internal) results -- gains in skill and knowledge and development of new attitudes. "External efficiency," on the other hand, refers to the ratio between the after-graduation or ultimate outcomes of the educational process and its resource costs and thus deals with the domain of job performance, personal satisfactions, and the economic or social impacts of the program.

Two principle technical concepts are most frequently used to operationalize internal and external efficiency in vocational-technical education: "cost-effectiveness" and "rates of return."

3. Cost-Effectiveness

One way to jointly analyze the costs and benefits of an educational program is to attempt to calculate the cost per unit of "output," much as a manufacturing firm determines the cost of producing each of its final products and compares this with prevailing prices to see if it is worthwhile continuing to produce the items in question. The problem in

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the case of a social service product like education is that there are several kinds of output and they are generally rather poorly measured. The true immediate output of training is the knowledge or skill acquired, but there is little agreement about how to divide knowledge acquisition into units, or about how to measure and cost the units. Generally evaluators fall back on proxy measures like cost per student-year or cost per graduate. The text of the working paper presents briefly methods for translating unit costs into costs per graduate. The problem is that these calculations give no value to what may have been learned by drop outs and consider graduation as a standard unit of output. How much of this cost is assignable to math learning, how much to attitude acquisition, etc.?

Such cost effectiveness measures are therefore rather schematic and bear a rather indirect relationship to the learning variables which are of prime interest. As a consequence, to make them useful for decision-making, something more must generally be said about the quality of outputs costed in this manner. Such is the strategy adopted, for example, in consumer reports, which typically talk about the "quality-price ratio" of different products and seek to inform judgment about where one gets the most for one's money, taking plural criteria into consideration. Inexact as these calculations may be, it is certainly a step forward to bring cost considerations into the evaluation of education programs and to align them with assessments of benefit.

3.4. Internal Rates of Return (IROR)

To the degree that both the costs and the benefits of a given cycle of education or educational program can be expressed in monetary terms, it is possible to push the economic analogy even further and to consider the form of education in question as an investment which yields financial returns over time, much like what happens when one purchases an annuity or invests funds in a business venture.

This means, of course, that the only advantages and drawbacks of an educational program taken into consideration are those to which a price tag can be attached. Theoretically speaking, economists and planners have ways of "pricing" almost any input or outcome associated with education. For those inputs our outcomes (like leisure foregone or cultural awareness gained) not normally bought and sold in markets, techniques exist for determining and measuring "willingness to pay" -- that is, the amount that people would be ready to spend in order to obtain (or keep) the advantage in question, or in order to avoid the disadvantage in question. Practically speaking, however, these sorts of calculations are rarely performed. Expenditures are habitually restricted to financial outlays plus "opportunity costs", or the income foregone by virtue of participating in education. Benefits focus on measureable increments in lifetime income associated with the level and type of education in question.

The monetary (or "monetizable") costs and benefits of an education program generally occur at different points in time. Typically, one

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incurs costs during participation in the educational program, whereas the pecuniary benefits only begin to show up in the form of improved job prospects and increased income several years later. How can these data be converted to a rate of return estimate? Two methods are most frequently cited and used.

The first and by far the more frequently used approach involves computing the "net present value" (NPV) of the stream of costs incurred and the NPV of the stream of benefits anticipated. Calculating the net present value of a sum of money (cost or benefit) expected in the future is just the reverse of calculating the future yield of a sum invested today. Both operations involve using an interest rate that represents the current "price" of investment funds to the borrower or, equivalently, the rate at which a sum of money invested today is expected to grow in the future. In determining the future yield of a sum of money invested today at a given interest rate, the sum is multiplied by one plus the interest rate, this latter expression raised to a power equivalent to the number of years for which the money will be allowed to grow. The reason for the exponential operation is, of course, that the investment is compounding: the earnings in the first year become part of the principal in the second, and so forth. In mathematical notation,

Future Yield =

where t = time period
n = number of years during which investment will grow

= symbol denoting summation of the following expression from the subscripted time period to the superscripted one (i.e., in this case, from the time period "0" to the last year in the growth period, or the "nth" year.
B = amount of benefits in any period of time "t"
r = interest rate

To determine a net present value, one does just the reverse: that is, the future yield (or stream of benefits) is deflated by the interest rate to discover what sum of money would have to be invested now in order to generate such a return. This is the "net present value" of the future sum of money. The formula is as follows:

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To determine the effective rate of return to an educational program, the problem is changed only slightly. In each of the examples above, one sum of money and the interest rate are known and these two variable values are then used to compute the other sum of money. In ROR calculations, we have an estimate of both sums of money: the costs to be incurred and the future benefits to be realized. The problem is to use these two variable values to compute the effective interest rate. By definition, the interest rate that would make a stream of costs (C_1, C_2, C_3 ...) with a net present value of

grow into a stream of subsequent benefits (B_1, B_2, B_3 ...) with net present value of

is precisely the one that would cause the two net present value figures to be equal to each other. The rate of return is therefore determined by solving the following equation for "r":

In practice, the problem is solved by repeated hit-or-miss calculation (or computer iteration) until one lands on the rate that causes the two sums to be equal.

The advantages of this approach are that it is relatively simple and straightforward and that it provides a convenient means for handling costs and benefits occuring over a period of several years at different points in time. The NPV approach also has somes disadvantages, however, of which three are worth mentioning here. First, the method does not work well when benefits and costs are not segregated in discrete periods of time -- that is, when, for example, the person realizes some benefits for a number of years, then incurs again some educational costs. Second, nothing in the procedure allows one to estimate to what degree the "benefits" realized are really attributable to the education received. It is just assumed that increased income acquried by persons with a higher degree is a return to the longer period of education undergone. Third, the data used to estimate rates of return by this procedure are almost unavoidably cross-sectional -- that is, they represent with greater or lesser degrees of accuracy what people possessing the degrees in question are presently earning on the labor market, not what they will earn during the working life of students presently contemplating continued education.

The resulting statistic is designed to be interpreted in much the same manner as an interest rate on savings or a level of financial yield on business investment. In other words, if the figure is above current

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rates of return on capital elsewhere in the economy, then the type of education in question would appear to be a good investment; if it is below, then the investment looks less attractive.

But a good or bad investment for whom? In response to this question, economists and educational planners differentiate between the private rate of return to education expenditures (PROR) and the social rate of return (SROR). In calculating the former, one counts only the costs of education actually incurred by individual students (including nonetheless the worth of their forfeited time), and income benefits are restricted to after-tax earnings. The PROR thus expresses how profitable a given cycle or program of education appears to the prospective student him- or herself. In calculating the social rate of return, on the other hand, all costs are included, since they represent social resources that can no longer be put to alternative use, and the income measure corresponds to before-tax earnings, since the entire value of the individual's work accrues to society, even if a part of it is taxed away and is no longer in the worker's possession.

Though private rates of return provide a means of analyzing and predicting the level of popular demand for different kinds of education, it is evident that the social rate of return has greater potential policy relevance. A technique that allows one to compute the social worth of educational programs from available data and to compare their investment potential to that of alternate targets of government funding like infrastructure projects or farm price support policies has inherent attractions for decision-makers. Unfortunately, the SROR is also the more tenuous of the two measures. The principal problem arises from the built-in assumption that income is an accurate reflection of the social worth of the associated work. In neoclassical economic theory, this assumption holds under conditions of perfect competition when all markets are in equilibrium. Such conditions are never realized, however, and market "imperfections" introduce varying levels of distortion in the relationship of income to productivity. The link becomes even weaker when data on current levels of income are used -- as they must be -- to project future productivity. As a consequence, social rate of return figures must be interpreted with some circumspection.

The second major technique for determining rates of return -- the "earnings function" approach -- permits one to differentiate returns to schooling from returns to professional experience, but it has a number of other disadvantages and is not very frequently used in actual policy research. Data on the level of schooling and years of professional experience of a sample of workers are regressed on the natural logarithm of their earnings. In this formulation, the coefficient of the schooling variable represents the average marginal productivity of education (i.e., the relative change in earnings per unit change in education) and is therefore equivalent to a rate of return to education net of the effects of professional experience. However, it is not easy to incorporate information on the cost of education in this model and it

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therefore is of little help in estimating social rates of return. It is thus very infrequently used for policy purposes.

5. Economic Metaphor and Educational Process

Most of the concepts discussed in the foregoing pages spring from the application of a "production model" to education. The operation of educational programs is compared to a sort of industrial process in which inputs derived from the environment are transformed into outputs that are subsequently returned to the environment and produce a variety of impacts upon it. This metaphor lends itself to quantification and to some useful kinds of analysis, but it has definite limits.

To borrow systems terminology, the production model does not handle plural outputs or multiple criteria very well. It works best and yields quantitative results most reliably when the factors taken into consideration are greatly simplified -- as in "student-years per graduate," or "income increments associated with further training." Quantitative models tend to bog down or become uninterpretable when too many variables are entered into the equation. As a consequence, they typically leave out a number of the subtler processes of education -- like transmission of cultural values and formation of attitudes -- that determine its quality and play a major role in producing its results. Use of any of the derivatives of the production model needs to be supplemented by qualitative analysis and tempered with an awareness that these concepts are largely metaphor and that most of the indicators are only proxy measures of the topics that really interest us.

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APPENDIX B.

Growth in Number of Places in STMs and SMEAs per One Thousand Population in Selected Regions of Indonesia Between 1983-84 and 1988-89

	Places per 1000 Population in 1983 - 1984		Places per 1000 Population in 1988 - 1989		Rates of Increase in Access	
	STM	SMEA	STM	SMEA	STM	SMEA
Jawa Barat	12.4	13.6	15.4	22.3	24.2%	64.0%
DI Yogyakarta	33.4	20.5	62.6	75.7	87.4%	269.3%
Sumatera Utara	19.3	17.4	38.6	68.0	100.0%	290.0%
Kalimantan Selatan	2.0	5.1	2.4	4.5	20.0%	-11.8%
Sulawesi Tengah	1.6	2.6	2.9	7.9	81.3%	203.8%
NTB	1.0	2.7	2.1	4.9	110.0%	81.5%

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APPENDIX C.

Indicators of Level of Resource Endowment in Vocational-Technical Schools in 1983/84 and 1988/89

Type of School	1983-1984						1988-1989					
	Public			Private			Public			Private		
	Stdts/ School	Stdts/ Tchr	Class/ Clssrm	Stdts/ School	Stdts/ Tchr	Class/ Clssrm	Stdts/ School	Stdts/ Tchr	Class/ Clssrm	Stdts/ School	Stdts/ Tchr	Class/ Clssrm
SMA		23	1.32		20	1.40		18	1.25		17	1.28
STM		14	1.55		16	1.36		13	1.50		21	1.5
SMEA		21	1.27		21	1.50		23	1.41		23	1.34
SMKK		9	1.29		8	1.01		14	1.27		12	1.19

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APPENDIX D

Trends in Indicators of Teacher Quality: Percentages of Secondary School Teachers with Varying Levels of Formal Education in 1983/84 and 1988/89

1983 - 1984

Level and Type of School	D1102	Bachelor	Master	Total
Public				
Senior Secondary School	14.02	72.57	13.41	100.00
a. General S.S.S	6.47	80.07	13.46	100.00
b. Vocational S.S.S	27.32	59.37	13.31	100.00
- Economics S.S.S	10.45	73.83	15.71	100.00
- Home Economics S.S.S	43.77	48.07	8.16	100.00
- Technical S.S.S	39.13	48.56	12.31	100.00
Private				
Senior Secondary School	18.42	63.49	18.09	100.00
a. General S.S.S	14.86	65.48	19.65	100.00
b. Vocational S.S.S	31.26	56.31	12.44	100.00
- Economics S.S.S	16.48	68.99	14.53	100.00
- Home Economics S.S.S	45.70	45.31	8.98	100.00
- Technical S.S.S	40.43	48.29	11.29	100.00
Total				
Senior Secondary School	15.52	69.49	15.00	100.00
a. General S.S.S	9.72	74.42	15.86	100.00
b. Vocational S.S.S	28.25	58.65	13.10	100.00
- Economics S.S.S	11.78	72.77	15.45	100.00
- Home Economics S.S.S	44.03	47.70	8.27	100.00
- Technical S.S.S	39.48	48.49	12.03	100.00

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APPENDIX E.

Distribution of Selected Instructional Resources Among Vocational-Technical Schools in 1987/88

Type of School	Guidance Counselors (Average nb. per school)	Garages (Average nb. per school)	Workshops (Average nb. per school)	Libraries (Average nb. per school)
Public STM	0.16	1.60	2.13	0.68
Private STM	0.06	0.78	0.66	0.58
Public SMEA	0.15	---	1.10	0.65
Private SMEA	0.05	---	0.21	0.51
Public SMKK	0.14	---	2.34	0.56
Private SMKK	0.05	---	0.96	0.55

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APPENDIX F.

Labor Force Participation Rates Among Graduates of Different Types of Senior Secondary Schools
From a 1986 Survey of the Population 10 Years of Age and Over Not in School

Sex	Type of School	Working		Looking for Work		Housekeeping and others		Total
		No.	%	No.	%	No.	%	
Male	Senior High School-General	2,101,627	81.1	339,593	13.1	150,285	5.8	2,591,505
	Senior High School-Technical and Vocational	1,915,441	86.3	191,037	8.6	112,504	5.1	2,218,982
Female	Senior High School-General	515,002	38.1	204,616	15.1	632,540	46.8	1,352,158
	Senior High School-Technical and Vocational	914,620	66.3	106,669	7.7	357,816	25.9	1,379,105
Total	Senior High School-General	2,616,629	66.4	544,209	13.8	782,825	19.9	3,943,663
	Senior High School-Technical and Vocational	2,830,061	78.7	297,706	8.3	470,320	13.1	3,598,087

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APPENDIX C.

Employment of Graduates of Senior Secondary School by Sector in 1985

Sector	Type of Senior Secondary School					
	General		Technical and Vocational		Total	
	No.	%	No.	%	No.	%
Agriculture	204,061	9.3	192,220	6.9	396,281	8.0
Mining	34,062	1.6	27,085	1.0	61,147	1.2
Manufacturing	263,590	12.0	235,922	8.5	499,512	10.0
Elec. Gas & Water	10,279	0.5	20,138	0.7	30,417	0.6
Construction	90,528	4.1	88,197	3.2	178,725	3.6
Wholesales & Retail Trade, Hotels & Restaurants	407,107	18.6	213,901	7.7	621,008	12.5
Transport, Storage & Communication	105,492	4.8	79,888	2.9	185,380	3.7
Finance Real Estate & Bussiness Services	73,924	3.4	44,282	1.6	118,206	2.4
Public Services	1,002,669	45.7	1,878,350	67.5	2,881,019	57.9
Other and Not-stated	2,449	0.1	1,587	0.1	4,036	0.1
Total	2,194,161	100.1	2,781,570	100.1	4,975,731	100.0

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