

APPENDIX 10: Technical Notes to Economic Analysis of the Project

1. Age-Earning Profile Approximation

Aged-earning profile was approximated from Average Monthly Salary data by educational attainment and by age group both of which is available in BPS (2000). Salary difference indexes were calculated by averaging indexes during 1997-99, and merge into one index for JSE, SSE and Higher Education by taking mean figures.

Table 1. Average Monthly Salary by Educational Attainment, Indonesia

Education	Index 1988	1997 index (Primary: 1.00)	1998 index (Primary: 1.00)	1999 index (Primary: 1.00)	Index Ave. 97-98	Index for Estimation			
No Education	0.69	101,674	0.58	120,650	0.61	162,105	0.68	0.62	
Some of Primary	0.73	136,659	0.78	150,883	0.76	191,721	0.80	0.78	0.8
Primary (SD)	1	174,618	1.00	199,395	1.00	239,708	1.00	1.00	1
JSE (SLP Umum)	1.42	210,866	1.21	247,680	1.24	298,708	1.25	1.23	1.33
JSE (SLP Kejuruan)		242,293	1.39	275,458	1.38	358,469	1.50	1.42	
SSE (SMA Umum)	2.21	300,950	1.72	345,360	1.73	426,735	1.78	1.75	1.79
SSE (SMA Kejuruan)		310,351	1.78	358,358	1.80	455,437	1.90	1.82	
Diploma I/II	2.68	360,353	2.06	436,738	2.19	551,219	2.30	2.18	2.63
Akademi/Diploma III	3.44	472,345	2.71	528,036	2.65	640,050	2.67	2.67	
University	4.55	543,759	3.11	610,807	3.06	701,651	2.93	3.03	

Source:

Indicator Tingkat Hidup Pekerja 1998-2000 Table 2.4

McMahon (1992) for 1988 Index,

Average monthly salary by age group has been indexed in a similar way. Salary for under 15 group was approximated as 0.8 (primary graduate salary: 1.0), then they were transformed to another stream of index (Index ave.2).

Table 2. Average Monthly Salary by Age Group, Indonesia

Age Group	1997 index	1998 index	1999 index	index Ave.	index Ave. 2
under 15				0.80	1.00
15-19	131,772	1.00	156,257	1.00	1.28
20-24	195,814	1.49	207,378	1.33	1.78
25-29	228,741	1.74	261,162	1.67	2.17
30-34	255,564	1.94	289,065	1.85	2.44
35-39	275,854	2.09	325,754	2.08	2.72
40-44	290,153	2.20	344,165	2.20	2.86
45-49	301,314	2.29	368,844	2.36	3.00
50-54	312,538	2.37	353,505	2.26	2.97
55-59	250,886	1.90	342,564	2.19	2.64
60-64	203,609	1.55	194,898	1.25	1.76

Source: Indicator Tingkat Hidup Pekerja 1998-2000 Table 2.3

These two streams of indexes have been employed to manipulate the index of age-earning profile by different educational attainment. As the simple manipulation contains some unrealistic index such as that salary index of 12-15 for university graduates is manipulated, such portion are reallocated to indexes appropriate age period to adjust..

Table 3. Estimated Indexes for Age-Earning Profile, Indonesia

Education	12-15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	Index
Some Primary	0.78	1.00	1.39	1.69	1.91	2.12	2.23	2.34	2.32	2.06	1.37	0.78
Primary (SD)	1.00	1.28	1.78	2.17	2.44	2.72	2.86	3.00	2.97	2.64	1.76	1.00
JSE	1.33	1.70	2.37	2.87	3.24	3.61	3.79	3.98	3.94	3.51	2.34	1.33
SSE	1.79	2.29	3.18	3.86	4.36	4.86	5.10	5.36	5.30	4.72	3.14	1.79
HE (incl. Dip.)	2.63	3.37	4.69	5.70	6.43	7.17	7.52	7.90	7.82	6.95	4.63	2.63
Index	1.00	1.28	1.78	2.17	2.44	2.72	2.86	3.00	2.97	2.64	1.76	

Index Calculation: after adjustment, Indonesia

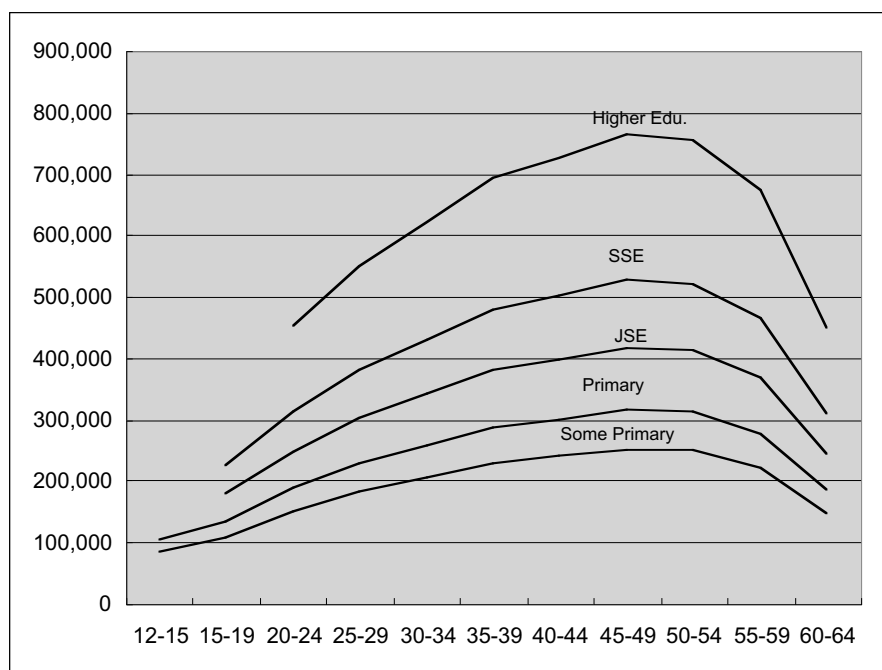
Education	12-15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Some Primary	0.78	1.00	1.39	1.69	1.91	2.12	2.23	2.34	2.32	2.06	1.37
Primary (SD)	1.00	1.28	1.78	2.17	2.44	2.72	2.86	3.00	2.97	2.64	1.76
JSE		1.77	2.47	2.99	3.38	3.77	3.95	4.15	4.11	3.65	2.44
SSE		2.39	3.32	4.03	4.55	5.07	5.32	5.59	5.53	4.92	3.28
HE (incl. Dip.)			5.14	6.25	7.05	7.86	8.24	8.66	8.57	7.63	5.08

Then average wages for different educational attainment (1999) were applied to 25-29 salary, then minor modifications have been done to match the calculated average wages from the profile (before adjustment), with the average same average wages, as shown in the figure.

Table 4. Age-earning Profile: Before Adjustment, Indonesia

Education	12-15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	Average
Some Primary	88,551	113,527	157,899	191,721	216,448	241,274	252,967	265,825	263,006	234,033	155,978	202,435
Primary (SD)	110,715	141,942	197,420	239,708	270,624	301,664	316,283	332,359	328,835	292,610	195,019	253,103
JSE	0	194,572	270,621	328,589	370,967	413,517	433,557	455,594	450,763	401,106	267,329	358,661
SSE	0	261,187	363,272	441,086	497,974	555,091	581,992	611,574	605,089	538,431	358,854	512,186
HE (incl. Dip.)	0	0	519,661	630,973	712,351	794,057	832,539	874,856	865,579	770,225	513,340	723,731

Assumption: a labor receives respective average salary by educational attainment during 25-29.

**Figure 1. Estimated Age-earning Profile: After Adjustment**

2. Direct Cost of Private Education Expenditure

There is no dis-segregated data available in the household survey data in SUSENAS 1999 (Socio Economic Survey). This estimation employs Clark et al (1997) who estimated household expenditure on education by different level and sub-sectors, then adjusted the figures by applying inflation deflators made available in BPS (2000).

Table 5. Employed Inflation Deflator, Indonesia

Inflation Deflator	1996	1997(jan-dec)	1998(jan-dec)	1999(jan-dec)	2000(jan-dec)
Inflation Rate		11.05%	77.63%	2.01%	9.35%
Index (1996=1.00)	1.00	1.11	1.97	2.01	2.20
Index (1997=1.00)		1.00	1.78	1.81	1.98

Source: Buletin Ringkas BPS Januai 2001, Table 3

Table 6. Estimated Household Expenditure on Education, 2000 Price (K Rp. Annual), Indonesia

	# of student (K)	Household Expenditure (Annual Rp.)				
		Total	school expenses	school equipment and supply expenses	Transportation and courses	Others
Primary	29,448	118	31	45	14	28
Public	24,057	105	24	44	12	26
Private	1,892	246	105	61	44	36
MI-public	193	125	38	46	12	30
MI-private	3,306	135	42	42	14	38
Junior Secondary	8,404	330	121	86	73	50
Public	4,684	295	91	85	71	48
Private	2,262	446	198	93	97	57
MT-public	355	262	83	79	55	44
MT-private	1,103	264	103	75	38	48
Senior Secondary	4,225	565	233	114	155	64
Public, general	1,429	472	159	111	141	61
Private, general	500	638	295	115	149	79
Public, vocational	1,148	521	210	111	141	59
Private, vocational	1,148	693	321	119	188	65
MA-public	192	359	131	89	83	55
MA-private	259	359	141	101	69	48
Tertiary	2,650	1,355	804	182	252	117
PTN (public univ.)	853	939	503	157	200	79
PTS (private univ.)	1,450	1,664	1,028	200	291	145
PTAI (Islamic Univ)-public	279	939	503	157	200	79
PTAI (Islamic Univ.)-private	68	1,664	1,028	200	291	145

Source:

Clark et al (1997) Indonesia: Education Finance Study Final Report Volume 1: Main Report, Appendix A Table 1&3, then deflators are applied for approximation in 2000 prices

3. Direct Cost: Unit Cost of Public Finance for JSE

Direct cost of education per students has been estimated from public expenditure for educational program. It is interesting to see that a serious inflation in 1997 does not affect its nominal amount. 2000 Estimated expenditure were assumed from the approximation of the recent trend.

Table 7. Public Expenditure for Educational Program, Indonesia

By Educational Level, National	1995/96	1996/97	1997/98	1998/99	Assumed Amount
Primary					
Routine and Dev. Budget for "Development of Primary School" (Rp. ,000)	1,707,989,233	2,006,307,182	2,333,005,257	2,298,944,542	
# Students (Public SD)	24,056,591	23,872,058	23,804,633	23,841,741	
expenditure per student (Rp. ,000)	71	84	98	96	100
Secondary					
Routine and Dev. Budget for "Development of Secondary School" (Rp. ,000)	1,113,281,714	1,223,218,517	1,327,442,464	1,299,145,519	
# Students (Public SLTP & SM)	6,613,157	7,034,749	7,273,462	7,477,714	
expenditure per student (Rp. ,000)	168	174	183	174	200
Higher					
Routine and Dev. Budget for "Higher Education" (Rp. ,000)	1,132,532,270	1,333,015,308	1,453,203,896	1,653,320,912	
# Students (Public HE)	1,131,912	1,186,757	1,159,529	1,469,454	
expenditure per student (Rp. ,000)	1,001	1,123	1,253	1,125	1,200

Source: MONE (1999) Indonesia Educational Statistics in Brief 1997/98, Table 71, 85

4. Settings in Estimating Cash Flow

Cohort survival rates

Cohort survival rates are available in MOE statistics.

Table 8. Continuation Rate (100%: Primary Grade I of Each Cohort), Indonesia

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Primary Graduate	62.6%	63.4%	64.4%	66.1%	68.1%	70.6%	71.4%	71.8%	73.3%
JSE Graduate	32.1%	30.7%	29.6%	32.3%	33.6%	36.7%	39.2%	41.1%	45.3%
SSE Grade I	25.4%	25.9%	24.7%	24.9%	28.6%	30.9%	30.8%	29.4%	30.8%
SSE Graduate	21.0%	22.5%	21.3%	21.6%	21.9%	22.6%	23.5%	24.3%	24.0%
Continue to Univ.	7.6%	6.7%	7.0%	9.1%	10.0%	9.1%	9.5%	10.1%	11.0%

Source: Ministry of Education (1999) Indonesia Educational Statistics in Brief 1997/98, 1998/99

Regression results in following formulas, and they are applied to approximate cohort continuation over the course of 30 years.

Table 9. Survival Rate Regression

Transition	Formula	R ²	where
Primary Graduate	$y = 0.0144x - 0.6755$	0.9762	y: survival rate at primary education graduate to the Primary 1 st grade cohort x: (year-1900)
JSE Graduate	$y = 0.0152x - 30.057$	0.812	y: survival rate at JSE graduation to the Primary 1 st grade cohort x: (year-1900)
SSE Grade I	$y = 0.0084x - 0.5087$	0.7265	y: survival rate at SSE grade-1 to the Primary 1 st grade cohort x: (year-1900)
SSE Graduate	$y = 0.0038x - 0.132$	0.763	y: survival rate at SSE graduation to the Primary 1 st grade cohort x: (year-1900)
Continue to Univ.	$y = 0.0048x - 0.3622$	0.7837	y: survival rate at University Grade-I to the Primary 1 st grade cohort x: (year minus 1900)

Unemployment

Following unemployment of labor force by different educational attainment are assumed in the estimation. The following table also shows the unemployment rates from the National Labor Force Senses.

Table 10. Assumed Unemployment Rate, Indonesia

	Rates set in the projection	1997	1998	1999
Primary Graduate	3%	2.7%	2.7%	3.4%
JSE Graduate	8%	6.0%	7.0%	8.0%
SSE Graduate	15%	13.0%	14.6%	15.9%
Univ. Graduate	12%	11.8%	12.2%	13.1%

Source: National Labor Force Senses 1997, 1998, and 1999 quoted in BPS (2000b)

Projection Framework

Internal Rate of Return was calculated for a projection period of 30 year (2003-2032). It is estimated by solving Internal Rate of Return (IRR) to the project that equates a flow of costs (the Project investment including management cost, and direct recurrent educational expenditure by government), and benefit from the Project investment. IRR is estimated at 13.0%.

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