



# FEASIBILITY STUDY FOR A TECHNICAL EDUCATION FACILITY IN ACEH PROVINCE

**USAID/Chevron Global Development Alliance**

**MAY, 2006**

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# **Feasibility Study for a Technical Education Facility in Aceh Province**

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## **DISCLAIMER**

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## LIST OF ABBREVIATIONS

APK	Approximate Participation Index
ASEAN	Association of South-East Asian Nations
ATMI	Technical Academy of Mechanical Engineering
Bappeda	Regional Planning and Development Agency – Provincial or District level
BHPT	Higher Education Legal Entity
BRR	Rehabilitation and Reconstruction Agency
BPS	Badan Pusat Statistik / Central Bureau of Statistics
D3	Level of professional education offering a minimum of 110 credits and a maximum of 120 credits in a 6-12 semesters after high school education
D4	Level of professional education offering a minimum of 144 credits and a maximum of 160 credits in 8-14 semesters after high school education
Depdiknas	Ministry of National Education (MONE)
Deperindag	Provincial Department of for Trade and Industry
Dikti	Directorate General of Higher Education
Dinas Pendidikan Nasional	National Education Office at Provincial Level
Disnaker	Manpower Office at Provincial Level
GNP	Gross National Product
GOI	Government of Indonesia
GTZ	German Agency for Technical Development Cooperation / Deutsche Gesellschaft für Technische Zusammenarbeit
ICT	Information Communication Technology
ILO	International Labor Organization
ITS	Institute of Technology Surabaya
Kadinda	Provincial Chamber of Commerce and Trade
Kopertis	Coordinator for Private Higher Education
LPTK	Institute of Teacher Training and Education
LSM	Non-Government Organization (NGO)
MONE	Ministry of National Education
NAD	Nanggroe Aceh Darussalam / Aceh Province
PAUD	Early Childhood Education
PCR	Polytechnic Caltex Riau
PMI	Indonesian Red Cross
PNF	Non-Formal Education
S2	Strata 2 - Post Graduate / Masters
S3	Strata 3 – Doctorate
SMA	Senior High School
SME	Small and Medium Enterprise
SMK	Vocational Senior High School
SPMA	Senior High School of Farming/Agriculture
STPP	Academy for Agricultural Extension
SUPM	Senior High School for Fisheries
UI	Universitas Indonesia
UNCEN	Universitas Cenderawasih
UNDANA	Universitas Nusa Cendana

UNHALU	Universitas Haluleo
UNLAM	Universitas Lambung Mangkurat
UNM	Universitas Negeri Makasar
UNP	Universitas Negeri Padang
UNRI	Universitas Riau
Unsyiah	Universitas Syiah Kuala
USU	Universitas Sumatera Utara
VET	Vocational Education and Training

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## I EXECUTIVE SUMMARY

The purpose of this feasibility study was to determine the needs and options for strengthening the relevance, accessibility, and quality of technical education in Aceh Province. The assessment included: 1) Examining labor market needs for long term sustainable development; 2) Assessing long term sustainable economic growth and the skills needed in growth industries; 3) Assessing the status of technical and vocational education institutions; and, 4) Analyzing construction and maintenance costs to build a new polytechnic institution in Aceh.

This assessment was conducted to assist USAID and Chevron decision making about supporting technical education in Aceh. Each organization intends to contribute up to \$5 million to provide a combination of facility construction and technical assistance to strengthen technical education at the post-secondary level in Aceh. The USAID-Chevron public-private alliance is a critical element of the overall USG recovery and reconstruction assistance program for Aceh. In coordination with the Government of Indonesia's Board for Rehabilitation and Reconstruction of Aceh and Nias (BRR), USAID has committed over \$400 million to promote recovery and reconstruction. Activities focus on livelihood restoration, longer-term economic recovery, small infrastructure, community development, and basic local government services.

The assessment team conducted extensive interviews and meetings with provincial and district planning agencies, ministries, vocational high schools and technical institutes, and local industry representatives (Annex II, List of Contacts and Annex III, Survey Questionnaire). Seven sectors were examined as potential areas of skill development: agro-industry product processing, seafood and fisheries food processing, port and ship operations, petrochemicals (oil and gas), tourism and hospitality, waste management, and telecommunications. Skill development needs were assessed within each sector based on: percentage of population employed in the sector; potential for expanded and sustained growth in the sector; investments and priorities for reconstruction by the Indonesian government and donor agencies; private sector commitment (existing and potential) to participate in developing the sector; and existing education providers. Based on these criteria, the assessment team found that a polytechnic was not needed in four of the seven industries (see Table 1 and section IV for more information).

As summarized in Table 1 below, the assessment team did find long-term sustainable growth potential in: value-added processing (of agricultural and fishery products), port operations and related shipping and trade industries. The assessment team recommends developing a polytechnic for process engineering skills that are applicable to and needed by these linked areas of economic activity. The rationale is as follows:

### **1. The Indonesian government and international donors are providing large infrastructure investments in port reconstruction in Aceh.**

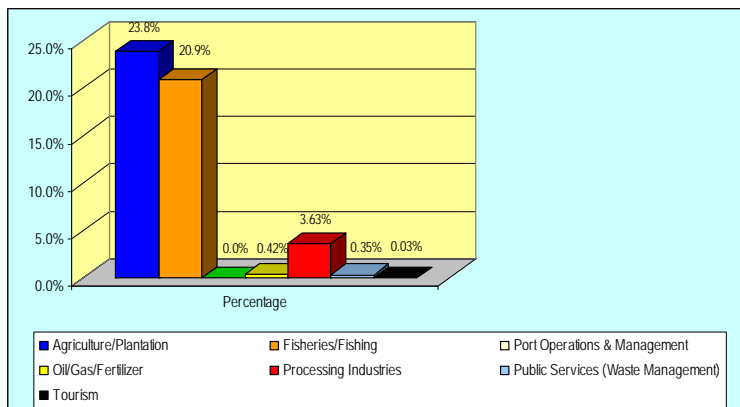
Port and shipping facilities are a high priority for reconstruction in Aceh. The BRR is providing funding for re-structuring the Port of Sabang for international containerized exports and increased trade. Currently the port of Malahayati (35 km east of Banda Aceh) is being developed and upgraded with assistance from The Netherlands Government to increase exports. Bappeda-Aceh also has plans and funding to establish an industrial park adjacent to the Malahayati port area. UNDP, in cooperation with AusAID, is currently rebuilding the port of Ulee Lheu in Banda Aceh to increase passenger services and limited shipping capacity. These key port infrastructure projects are anticipated to be completed between 2006 and 2009. Bappeda-Aceh is also keen to develop and expand deep sea fishing (over 50 mile limit) that also needs a more highly skilled labour force in processing and machinery maintenance. All of these plans will increase the need for a highly skilled workforce, i.e. for qualified crews, port management, administration, and operations personnel in addition to raw product processing.

### **2. There is a well-established base in Aceh of low-technology processing of agro-industry, plantation, aquaculture, and marine raw products. The potential for higher-technology processing is underutilized and is a priority of the Indonesian government for development in Aceh.**

Agriculture, including agro-industry, plantation production, and animal husbandry, has historically been a core part of Aceh's economic development. The land area used for this sector in Aceh accounts for nearly 23% of the total provincial land area (57.4 thousand km<sup>2</sup>) and provides employment for about 572,000 people or 24% of the employed/working population which total ca. 2.4 million post-tsunami. An additional 21% (70% of the coastal area population) of Aceh province is also employed in shallow water and subsistence fishing, and low-technology processing of fish products. Estimates are

that nearly 87,600 people or 4% of the working population was engaged process industries prior to the tsunami (2003). The Aceh BRR Master Plan indicates that altogether 45% of the population are employed in agriculture, plantation, aquaculture and fishing. Employment data, however, do not include all of the population but rather those who are either working or seeking work; thus, there is a discrepancy between data sources regarding people engaged in agriculture, aquaculture, and fishing and the number of people employed as laborers or earning their livelihood from these economic activities. This may also be an indication of the number of women and children who may be dependent and engaged but not counted as members of the labor force for employment reporting purposes.

**Figure 1: Employment Trends in Aceh from Estimates in Seven Sectors Examined**



The majority of Aceh's raw products are currently shipped out of the province to other cities such as Medan for value added processing and shipping. An opportunity exists in Aceh, therefore, to expand both the processing of raw products and shipping them. The priority sectors for economic development by the BRR are agro-industry and fisheries, both to restore livelihood to those previously dependent on low-skill fishing and agriculture, and also to tap the potential economic benefits of adding value to Aceh's raw materials before they leave the province.

The BRR Rehabilitation and Reconstruction Master Plan allocates nearly Rp. 2.4 billion (US\$ \$267,000) for repairing public service facilities over a four-year implementation period (2005 – 2009). This includes: port and dock development and restoration, pond and fishing fleet & gear reconstruction, fisheries rehabilitation, coastal & small island eco-system rehabilitation, monitoring fisheries and maritime resources, and developing fisheries education and training centers. The Aceh Master Plan also allocates: Rp. 492 B for food and agriculture rehabilitation--the construction of waterways and irrigation systems, production roadways, seed production, marketing facilities, and an animal health center; Rp. 20.6 B for industry facilities; 20.5 B for trade, 17 B for manpower—training and monitoring; 73.2 B for SME & cooperative support; and 4.75 B for Tourism. In addition to BRR funding, the Ministry of Agriculture is also investing Rp 1.9 billion in land amelioration, donating an agricultural facility to re-initiate production of food crops, horticulture, plantation and animal production as well as a processing and marketing facility. The Ministry of Trade plans to invest Rp. 108 billion from 2006 – 2009 for wholesale markets, Rp. 47 billion for constructing 19 units of warehouse capacity plus establish a trade sector coordination post according to BRR Master Plan details. The electrical sub-sector anticipates investing Rp. 312 billion to repair 6 substations, medium and low voltage electric and airwave networks.

Potential exists for 259,308 hectares in aqua culture production throughout the 20 regencies in Aceh which will require 2,593 people with aqua culture skills at D3 level (1/each 100 hectares). This does not include personnel required for processing to value added production. The best data available indicate that 3.89% of the population (pre-tsunami) was involved in processing trades with a 3.4% annual growth rate in the GDP. Given the amount of infrastructure investments planned, it is reasonable to expect an increase in the growth rate as recovery operations are completed. It is also reasonable to expect there will be an increase in process industries and thus the need for addition skilled labor in related areas such as port facility reconstruction, operations, management and upgrading for export. No reliable data were found by the team that was disaggregated by sector on labor force predictions post tsunami. Data on 2005 Aceh statistics are to be available in August which may provide more complete predictions on manpower needs.

### 3. Process engineering skills will be in demand and are applicable to multiple industrial sectors.

In order to serve the business needs of the sectors identified above, the following skills are needed:

### Core Subject Areas: Process Engineering

- (a) *Electronics and electrical engineering:* Graduates of this program would be able to repair, operate and maintain electrical and electronic components for packaging, and processing plants & machinery within all sectors of food production and transferable to other industries.
- (b) *Mechatronics and pneumatics:* Graduates of this program would be able to repair, operate and maintain specific mechanical components for packaging, and processing plants & machinery within all sectors of food packaging and processing with transferability to other industries.
- (c) *Computer programming:* Graduates of this program would be able to design and troubleshoot computerized machinery that processes food products, as well as develop specific computer programs to effect specific process systems. (Both electrical and mechanical). These skills would also be transferable to other industries.
- (d) *Marketing:* Graduates of this program would be able to understand & follow international food trends and market value added processed foods to the international community.

### Optional Subject Areas: Ports Operations

- (a) *Commercial air conditioning, refrigeration, and ice production:* Graduates of this program would be able to repair, operate and maintain refrigerated chiller and freezing plants, ice making facilities for the storage of processed food items, together with the operation and repair of air conditioning installations which are transferable to other industries and settings.
- (b) *Container movement and management:* Graduates of this program would be able to operate computer controlled container operations and management within a port, together with the transportation & storage of processed foods, for national & international export. Additional three month courses could be offered in skill areas such as crane and forklift operations, dependant of industry demand.
- (c) *Small and medium engine repair and maintenance:* Graduates of this program would be able to repair, and maintain all small engine systems such as fork lifts, outboard engines, etc.
- (d) *Large engine repair and maintenance:* Graduates of this program would be able to repair, operate and maintain large boat diesel engines, truck engines and other forms of transport drive systems.

#### 4. Currently there is no post-secondary education program or institution in Aceh that provides adequate industry-driven skills in process engineering.

Although there are some diploma and university programs in Aceh in related subjects, the assessment team did not find any institutions that adequately provided the industry-driven skills listed above. At the secondary level, there are two nautical and marine fishery vocational high schools in Aceh (SUPM Ladong and SMK Labuhan Haji), with a combined total of only 190 students. At the tertiary level, there are a limited number of vocational training providers under the Ministry of National Education specializing in agro-industries (see Annex VII). The largest public university in Aceh, Syiah Kuala University, has a D3 program in agriculture and animal husbandry. Several private universities and academies have diploma programs in engineering, communications and business subjects, but these programs are more focused on design engineering, and not concerned with the repair, operation and maintenance of equipment or adapting it to meet the need to process and package raw products.

**The emphasis of any proposed Polytechnic should be on providing skills training at the operation and maintenance level, providing personnel with the skills to actually repair and maintain equipment, not to design it.** There is currently only one polytechnic institute in Aceh, Politeknik Negeri Lhokseumawe, which offers a D3 program to serve the needs of the petrochemical industries in North Aceh such as Exxon Mobil. These industries are currently downsizing, however, and administrators of the polytechnic indicated that graduates are finding work in other industries. Table 1 summarizes the above discussion:

Table 1: Summary of Sectors Considered

SECTORS:	% Population employed	Government priorities <sup>1</sup>	Private sector participation	Existing education providers	Summary
1. Port management, and ship operations	~5% population	Extensive investments (871 Billion Rp)	Assumed investments	1 High school 0 Polytechnic	Yes, polytechnic needed
2. Agro-industry food processing and animal husbandry	~27% population employed, but mostly at subsistence level	Extensive Investments (820 Billion Rp)	High-tech processing in Medan	8 High schools 6 Diplomas 0 Polytechnic	Yes, polytechnic needed
3. Aqua-culture & sea food processing	~20% population employed, but mostly at subsistence level	Some Investment (included in agro & aqua-culture/fishing investments + 20 Billion Rp.) <sup>2</sup>	Aqua-culture & sea food processing	2 High school 0 Diplomas 0 Polytechnic	Yes, polytechnic needed
4. Petrochemicals (oil and gas)	<5% population employed	-	Downsizing	0 High schools <u>1 Polytechnic</u>	No additional polytechnic needed. Industry on decline. Already has 1 polytechnic.
5. Telecom	<1% population employed	(31 Billion Rp. for med. Voltage Air Wave )	+	0 High school 0 Polytechnic	Not enough industry demand.
6. Tourism and hospitality	<5% population employed	(4.75 Billion Rp)	Backpacker level	4 High schools 1 Diplomas 0 Polytechnic	Not enough government or private investment.
7. Waste management	<1% population employed	-	-	0 High school 0 Polytechnic	Not enough industry demand.

**Physical site location recommendations** The assessment team identified several options for the proposed new polytechnic that differ by physical location and management: 1) Co-location with Ladong SUPM (Aqua-culture and Maritime High School) on the north coastal edge of Aceh Besar district. Land for expansion is available and there is interest in building a polytechnic, as evidenced by an existing proposal that USAID and Chevron could revise; 2) Yayasan PENA land in inland Aceh Besar district. Land is available through an existing foundation (Yayasan), which has an existing proposal; and 3) Blang Ulam Industrial Park (near Malahayati Port) has good potential, but no sites were specifically identified nor plans identified by this assessment team.

**The team recommends pursuing the first option, to develop a polytechnic co-located with Ladong SUPM**, since there is an existing “feeder high school” and a great deal of planning has already taken place. It is located within minutes of the Malahayati port and industrial park, within an hour by land of the Ulee Lheu port in Banda Aceh, and an hour by sea to the two ports on Sabang Island. There are seven hectares available for development and not having to purchase land would significantly increase the funding available for construction and equipping the polytechnic.

**The team recommends use of a tropical construction design.** In reviewing types and costs of construction, the assessment team analyzed and compared two methods: a tropical design with minimum air conditioning, compared to a large concrete structure that is heavily dependant on air conditioning. The analysis compared costs of construction, opera-

<sup>1</sup> Figures used are from BRR Master Plan identifying budget allocations from the Ministries of: Agriculture, Marine Affairs & Fisheries and Trade in addition to BRR funding. Funding from donors and other sources are not included, only the public service sector funds are mentioned here.

<sup>2</sup> The Ministry of Trade is also investing 108 Billion Rp. In the construction of 18 wholesale / principal market units and the construction of 19 warehouse facilities at a cost of 47 Billion Rp. (Presumably some refrigeration and ice making capacity will be required at all units).

tions, and maintenance (see Table 16, Table 17, Table 19, Table 28 and Table 29) and provides a case study for further analysis (see Annex XIII).

**The recommended number of students at the polytechnic is 144 students per year (432 by year three)** (5 programs with 24 students each). The five recommended core curriculum programs include: 1) Electronics & Electrical Engineering; 2) Mechatronics and Pneumatics; 3) Telecommunications and Computer Networking; 4) Computer Programming and Application; 5) Marketing. The team recommends all of these core curriculum areas be developed to provide students with application to process engineering of raw products with adaptive strategies to other industries as well. The team also identified four additional program areas for expansion and consideration. They are: 6) Commercial Air Conditioning, Refrigeration & Ice Production; 7) Container Movement and Management; 8) Small engine repair and maintenance; and 9) Large engine repair and maintenance. These technical training areas can be used in multiple industries and fill industry demands beyond the adaptations for process engineering of raw agricultural and fish products.

**The recommended size of the proposed polytechnic building is a total of 15,320 m<sup>2</sup>** (see Table 16). This would include a high quality main building with two floors consisting of 2,120 m<sup>2</sup> to be built in the first year of construction. The main building would include: administrative headquarters, classrooms, library, laboratories, and lecture rooms. Other support buildings would total 13,200 m<sup>2</sup> and include: a multi-function room, laboratories, space for security, warehouse, guard house, canteen, additional classrooms, offices, and sport facilities.

**Total cost is estimated to be US\$ 10,258,900 US\$ over seven years.** The estimated timeline for construction is two years with the main building constructed the first year followed by the completion of the building construction phase in the subsequent year. First year construction costs are estimated at ± US\$ 3.4 Million, which includes the main building plus ten laboratory equipment packages, as well as staff recruitment and development. Second year additional building construction and 15 laboratory equipment packages plus staff recruitment and development are estimated at ± US\$ 5 Million. The operating costs are estimated at US\$ 322,000 per year in years three and four. That amount increases to US\$ 402,000 per year in years five through seven which accumulates to a total of US\$ 1,850,000 and is included in the total estimated costs of US\$ 10,258,900. The recommendation is to provide operating costs through year seven.

Figure 1: Proposed Costs per Item

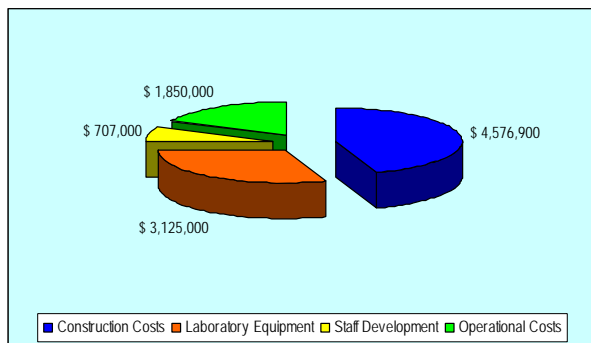
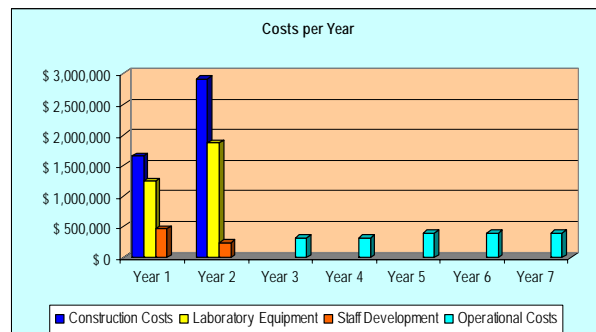


Figure 2: Proposed Estimate of Costs per Year



Note: Refer to Table 17, page 49 below

## II BACKGROUND

### II.1 OVERVIEW

#### II.1.1 General Description of Aceh Province

Aceh Nanggroe Darussalam (NAD) is one of 33 provinces of Indonesia. It has a land area of 57,366 square kilometers and is bordered on the north by the Indian Ocean, the Malacca strait on the east, North Sumatra Province on the south, and the Indian Ocean on the west.

Aceh Province includes 119 small islands, 35 mountains, and 73 rivers. It is administratively organized into 17 regencies/cities (districts), 228 sub-districts, and 5,927 villages. There are four major cities including: Banda Aceh, (239,000 within the city limits and similar numbers in communities just outside the city limits), Langsa (135,000), Lhokseumawe (138,000), and Sabang (28,000). This data is based on the BPS pre-tsunami survey in 2004. At that time the reported total population of Aceh was 4,271,596<sup>3</sup> people (approximately 2,148,887 males and 2,122,709 females) with the population density at about 71 people per km<sup>2</sup>.

The current population of Aceh Province is estimated to be approximately 3.9 million after the tsunami. It is estimated that 221,000 persons (5.2% of the population) were lost in the tsunami and an additional 150,000 have left Aceh as a result of the tsunami. Although the loss of life due to the tsunami was over 5%, this damage was disproportionately concentrated in coastal communities including the provincial capital of Banda Aceh. Destruction of economic infrastructure was similarly concentrated in coastal areas. Approximately 654 (11.4%) of the 5927 villages were destroyed and the source of earning a livelihood was destroyed for about 584,500 (approximately 14%) of the Aceh people. Poverty level estimates range from 33% to 48% of the population. Pre-tsunami conditions estimated 33% of the population was living in poverty and approximately 2% (103,160) were unemployed. The team found this figure questionable; however, more accurate data were not available at the time of this report.

The Master Plan for Aceh states: "Programs for reconstruction of Aceh are meant to simultaneously solve the existing fundamental problems (48% of the people living in poverty with 11.2% unemployed)--not only to restore the Acehese community to conditions before the tsunami." The theme throughout all of the plans and interviews conducted by the team was to "restore better than before."

**Table 2: Aceh Population, Employment, Level of Poverty Pre- and Post-Tsunami**

Indicator	Pre-tsunami (2003)	Post tsunami (2004-2005)
Population	4.3 M	3.9 M
Employed	2.5 M	1.42 M*
Unemployed	103,160 (2%)	1.26 M (31%)
Living in Poverty	1.38 M (33%)	1.9 M (48%)

\*Includes persons who are "semi-employed." - Source: BRR Aceh Master Plan. The BRR Master Plan indicates 284,000 registered unemployed persons.

## II.1.2 Business and Economic Activities

Production agriculture and fisheries constitute the largest sectors for employment in Aceh Province with paddy production engaging the highest number of people. Fruits and vegetables produced by Acehese farmers are of good quality and plantation crops are recognized as high potential for export and value added processing. Current production is at basic raw produce levels with little processing.

According to a BPS Monthly Export Press Release, the value of exports has been decreasing from US\$. 2.6 Billion in 1997 to US\$ 1.7 Billion projected for 2006. This reflects revenues from oil, gas, and fertilizer which were a large revenue source in 1997 and is declining. It also indicates the effect of the lack of infrastructure, good seaports and security in previous years due to the conflict involving the Aceh Freedom Movement (GAM)--all contributing factors that have severely affected the ongoing economic development and progress of Aceh Province.

Oil and mining have historically been a major source of revenue but are declining along with associated industries, such as fertilizer production. Indonesia is currently an importer of crude oil though still producing gas. The assessment team learned that both Exxon and Arun Oil companies are downsizing their workforces, and Exxon has already downsized to the point of closing their residential compound in Lhokseumawe. The Aceh ASEAN fertilizer plant and the Aceh Kraft Paper companies in that area have also closed because the cost of fuel made production prohibitively expensive. Discussions

<sup>3</sup> See: Trend of Labor Markets during the Post-Tsunami Rehabilitation and Reconstruction, Dinas Tenaga Kerja, Provinsi Nanggroe Aceh Darussalam. December, 2005

with oil industry consultant Dr. Andrew Davidoff and Commissioner Mohamad Abduh of Pertamina support findings of the assessment team that the oil industry in Aceh is declining and that the primary need for skills development is in the area of risk management and safety. In addition, PCR and the Lhokseumawe Polytechnic are currently providing graduates to meet the demand for skilled workers in this sector. Even with the downsizing of these industries, administrators at Polytechnic Negeri Lhokseumawe indicated their graduates are finding work in the area which would indicate there is a fair amount of cross over of skills to other industries.

Telecommunications and IT are frequently identified as major growth areas; however, as the assessment team discussed restructuring and economic growth in Aceh, they were never mentioned as a part of the planning for infrastructure improvements nor as industries in which there was a great demand for a more highly skilled workforce. That said, as will be pointed out later in the examination of existing vocational and technical programs we found that there are already nine programs offered in Informatics and Computer Science and Engineering at the D3 and D4 level (

Table 7, page 19). The team found no indications of plans for major investments in the infrastructure that would be required to make this area one of major growth for Aceh.

Hospitality and tourism were mentioned by several planning organizations as a growth industry but the lack of infrastructure, such as passable roads and a major direct flight airport are lacking and therefore make international tourism unlikely even though there may be considerable short term domestic tourism. Government investment is simply not there even though there are several public institutions offering training for approximately 1500 students there were only about 800 jobs reported as part of the labor force statistics.

### II.1.3 Employment and Unemployment

In 2004 there were slightly more than 2.5 million working age people in Aceh with approximately 284,000 registered unemployed (10%). Over 1/3 of the working age population (35%) have attained elementary or lower education levels with 9% of the working age population going on to tertiary education (see Table 3 below). The percentage of each level of education attained was analyzed to identify trends of employment and unemployment at each level of education. Data sources were unclear in defining the levels of education consistent with the current structure of the education system. The assessment team determined that the BRR categories probably intended the categories as listed in Table 3. The original source listed Vocational School D3 and D4 in one category which the team has redefined to mean Vocational School as High School (SMKs) and added D3/D4 to the Diploma/Academy/Polytechnic Post Secondary/Tertiary education level.

**Table 3: Workforce and Unemployment Percentages by Level of Education in 2004 in Aceh**

Level of Education Attained	Working Age Population		Employed Workers		Unemployed (Open Un-employment)*	
	Number	% of Total Working Age Population (2.5 + M) by level of education	Number	% of working age population <u>employed</u> at each education level	Number	% of working age population <u>unemployed</u> at each education level
Elementary or Lower level	896,000	35%	848,000	95%	48,000	5%
Junior High School	603,000	24%	543,000	90%	60,000	10%
Senior High School	660,000	26%	524,000	79%	136,000	21%
Vocational High School (SMK)	150,000	6%	132,000	88%	17,000	11%
Diploma/Academy/Polytechnic (D3/ D4) Graduates	87,000	3%	78,000	90%	9,000	10%
University	143,000	6%	129,000	90%	14,000	10%
<b>Total</b>	<b>2,539,000</b>	<b>100%</b>	<b>2,254,000</b>	<b>NA</b>	<b>284,000</b>	<b>NA</b>

Source: BRR Aceh Master Plan

\*Assumption is that Open Un-employment refers to workers who have registered as unemployed with the Department of Labor.

#### Key Points:

- Only 3% of the workforce aged population has had post-secondary/tertiary vocational/technical training in Aceh.

- Availability of vocational and technical institutions at D3/D4 level (only two in Aceh Province) is limited with only two institutions offering programs in agro-industries and aqua-industries and none in food-processing engineering which relates to the sectors of highest employment and economic activity in Aceh.
- 9% of the working age population has had further education beyond high school, with 90% employed and 10% seeking work or unemployed.
- The education level with the highest percentage of employed was the lowest level--elementary or lower-- with 95% employed and 5% unemployed. The workforce with junior high level education has 90% employed and 10% unemployed. This is reflective of the economic demographics in Aceh where 45% of the population earns their livelihood from agro-industry and fisheries at the lowest skill levels.
- Members of the workforce with vocational high school level education have a higher percentage of employment (88%) compared to their high school cohorts with 79% employment with respective rates of unemployment.
- Members of the workforce with post-secondary and university level education are virtually equal in percentages of employment (90%) and unemployment (10%) even though only 3% of the working age population has post-secondary education.

#### **II.1.4 Education**

The Indonesian public education system is a two track system, one oriented toward academic and university studies, and the other oriented toward vocational and technical training. Annex IV provides a diagram of the public Ministry of National Education (MONE) system which helps explain the system and how each track relates to the other. This does not directly include private schools; however, since MONE certifies private institutions, the team assumes that they most likely follow similar tracks.

Current, available statistics reveal that the Indonesian government's investment in education is the lowest in ASEAN, at 2.95% of GNP. MONE officials reported that the GOI budget allocation for Polytechnics is Rp 18 – 20,000,000 per year per student.

Indications are that on the national level, approximately 15% of high school graduates progress to tertiary education (University or Polytechnic). With approximately 20,000,000 students between the ages of 19 and 24, this would indicate that there are approximately 3,000,000 students entering tertiary education yearly (\*- Ir. Arif Djaubari – MONE – Jakarta). The number of students in Aceh entering the university is about 11,000 or 11 % of the high school and vocational SMK graduates. Another 36% (36,632) enrolled in vocational and technical post-secondary/tertiary education in Aceh Province, pre-tsunami. This tends to suggest a very positive environment to provide an additional polytechnic/post-secondary education institution.

The following tables describe the status of the secondary and post-secondary (tertiary) students and institutions in Aceh Province with a more comprehensive analysis of the vocational and technical programs provided through the existing institutions. D3 level can be described as a level of professional education offering a minimum of 110 credits and a maximum of 120 credits in 6-12 semesters of advanced training after high school education. D4 level consists of professional education offering a minimum of 144 credits and a maximum of 160 credits in 8-14 semesters after high school education.

#### **II.1.5 High School & Vocational High School Graduates**

Before the tsunami there were 81,109 high school graduates annually from 239 high schools in Aceh with an additional 21,954 Technical High School graduates from 55 (SMK) schools, totaling to 103,063 per year. Approximately 10, 893 (10.6%) high school graduates were accepted into universities and another estimated 25,739 (25%) enrolled in Tertiary Vocational Education (D3/D4) programs at public and private universities and institutions. Of the 103,063 high school graduates, an estimated 36,632 (36%) entered post-secondary/tertiary education programs, with the remaining 66,431 (64%) not enrolling in post-secondary education after high school.

Table 4: Aceh High School Graduates Accepted into University &amp; Attending Polytechnic Institutions (D3 / D4)

Year	Number of HS Graduates	Number of Vocational High School Graduates	Total High School + Vocational HS Graduates	Number Accepted to University	Currently Attending Aceh Polytechnic Institutions *	Balance of Graduates
2004	81,109	21,954	103,063	10,893	36,632	66,431

Source: Departemen Pendidikan Nasional/ Ministry of National Education

\* Estimated based on average of similar schools with enrollment data.

According to the Aceh Office of Education's 2002 data, there were 56 vocational high schools (SMKs) in Aceh Province, (See Annex V for a complete list by location). This is pre-tsunami data, but trends can be extrapolated to better understand the nature and status of the existing institutions and their programs. There are primarily six major categories of program offerings as listed in Table 5 below. Numbers of students and teachers were estimated by using averages of numbers of students in similar institutions to project student to teacher ratios when data were not available.

Data indicate that six subject areas are offered by the 56<sup>4</sup> vocational high schools in Aceh. There are almost an equal number of public and private institutions, 28 and 27 respectively. The overall average student to teacher ratio was 12:1 and ranged from a low of 3:1 at a public arts and crafts school to a high of 22:1 at a public management and business high school. The largest number of institutions offered management and business with the highest number of students and the highest ratio of students to teachers. The lowest number of schools and students were in the public arts and crafts schools, followed closely by the nautical and shipping schools.

Table 5: Summary of Vocational High Schools (SMKs) in Aceh by Subjects Offered with Type of Institution and Student Teacher Ratios

Subject Area	Number of Schools			Total Number of Students (estimated)	Total Number of Teachers (estimated)	Student Teacher Ratio (Average in Subject Area)
	Public	Private	Total			
Agriculture and Animal Husbandry	3	4	7	1,052	175	6.1
Arts and Crafts	2	0	2	216	58	4:1
Industrial Engineering	5	11	16	8,138	803	10:1
Management and Business	12	11	24	10,342	728	14:1
Nautical and Ships Engineering	2	1	3	903	51	17:1
Tourism and Hospitality	4	0	4	1,303	196	7:1
<b>Total</b>	<b>28</b>	<b>27</b>	<b>56</b>	<b>21,954</b>	<b>2,011</b>	<b>12:1</b>

Source: Aceh Office of Education

\*) According to the Statistical Yearbook of Indonesia 2004 (p. 126), there are 56 SMKs. However, one was destroyed completely in the tsunami.

The team also learned that most of the teachers at both the high school and D3/D4 level institutions are recruited from university graduates in their respective fields of study. This does not comply with international standards, which recommend teachers of vocational and technical schools recruit experienced industry practitioners as teachers who can better prepare students based on their explicit knowledge of industry skill needs. This practice may warrant further examination and consideration when recruiting staff for a new polytechnic and strengthening industry linkages.

The questions to be answered are:

<sup>4</sup> 56 vocational high schools are reported statistically; however, the list the team obtained from the Internet had only 55 listed. The team learned that SMK4 in Banda Aceh was destroyed and therefore assumed this is the reason for a discrepancy in the number of institutions. 56 is used throughout the report.

1. If another polytechnic institution is established, would high school graduates enroll? In 1999, PT. Caltex Pacific Indonesia conducted an extensive survey of high school students in Riau to learn high school students' plans for continuing education and, more specifically, their level of interest in studying technical areas for a polytechnic. Results indicated that about 68% of the more than 3,000 plus students surveyed were interested in and planning to attend a university. Additionally about 18% indicated an interest in attending a polytechnic institution. After reviewing the information initially presented to the assessment team, it was concluded that this survey was helpful in documenting what is generally the preference of high school students, and their families. A university degree is more highly valued socially, though employment statistics seem to indicate the rates of employment and unemployment of university graduates and polytechnic tertiary graduates are virtually the same, 90% and 10 % respectively. The results of the Caltex Pacific survey were viewed as most likely valid for the high school students in Aceh today and a similar survey would likely obtain similar attitudes and interests and results. Also as shown above, there are a higher percentage of students in Aceh who are currently attending post-secondary technical training, i.e., 36% thus there may be an even stronger interest in Aceh than was found in Riau. The process of conducting such a survey if repeated in Aceh should be viewed and used as an awareness raising and good marketing strategy.

Furthermore, it should be noted that there is very little career education and counseling in most high schools. Recognizing that few high school students have had opportunities to examine careers they may not be familiar with, it is the recommendation of the team that the planning processes for establishing a new polytechnic needs to include outreach to high school students to help them become familiar with the polytechnic institution and what it can offer them for their career and job possibilities. There will need to be continuous outreach and recruitment of students for the proposed polytechnic institution.

2. Is the market already saturated with opportunities for post-secondary education? If one were to speculate that half of the high school graduates who do not go on to further education (66,431) would not be able to afford tuition, there would still be a potential enrollment population of approximately 33,000 high school graduates, many of whom may have desired to attend either the university programs or another polytechnic that did not have space available.
3. Is there a linkage between technical high schools and polytechnic enrollment? Here the data are difficult to obtain from available resources. Further data analysis of the SMK graduates who enroll in tertiary education (both university and polytechnic institutions) would provide additional insight on how likely many technical high school graduates are to go on for further training in a technical area and how many go on to university education. This data is most likely available only through interviews with students at existing institutions. In the cases where D3 and D4 training is conducted at a university, there is likely to be a very high rate of university enrollment. Likewise, where a technical high school is "co-located" with D3 and D4 training, as is the case with the recommended option for the new polytechnic, and as was observed in a field visit to ATMI (Technical Academy of Mechanical Engineering) in Solo, there is likely to be a "feed into" factor, which would be especially important for process engineering – a new field of study for this region.

The student-teacher ratio is often used as a proxy indicator of education quality. Data show very favorable student-teacher ratios when compared to worldwide standards which recommend 26:1 for lecture and 12:1 for workshop sessions in vocational education. The assessment team was surprised at the number of teachers in many of the schools visited. Many school administrators mentioned the overwhelming cost of maintaining the teaching staff, since housing is provided for teachers at some institutions along with low salaries. The team feels it would be helpful to further assess these factors to determine why the student-teacher ratios are so low and the costs of teachers to the institution so high. Perhaps included in the teacher count are administrative staff and other staff members who have teacher rank but are really doing other jobs related to supporting the administration and operations of the school. These types of staff should not be included in the student-teacher ratio. The team often felt that school administrators and some of the teaching staff were more bureaucratically-oriented than business management-oriented, which may also explain why the team sensed there may be a need for administrators to focus more on economical management and entrepreneurship.

Table 6: Aceh High Schools: Schools, Students, Teachers, Student/Teacher Ratio Compared to SMKs

Year	Number of High Schools	Number of HS Students	Number of Teachers	High School Student Teacher Ratio	Number of Vocational/ Technical High Schools (SMKs)	Number of SMK Students	Number of SMK Teachers	SMK Student Teacher Ratio
2004	239	81,109	7,042	12:1	55 <sup>*)</sup>	21,954	2,011	11:1

Source: Departemen Pendidikan Nasional / Ministry of National Education

<sup>\*)</sup> According to the Statistical Yearbook of Indonesia 2004 (p. 126), there are 56 SMKs. However, one was destroyed completely in the tsunami.

### II.1.6 Tertiary Vocational/Technical Institutions (D3/D4 Level) in Aceh Province

There are 30 institutions (two public) offering 65 programs at D3 and D4 levels (see Annex V for a complete listing of D3/D4 Vocational/Technical Institutions by location with programs listed). Data were not complete for all institutions, so the team estimated the approximate number of students based on averages in other schools. This was done to ascertain trends and to get an estimated profile of the status of this level of vocational and technical education in Aceh.

Table 7 provides a summary of the programs offered by subject categories. As indicated in Annex V, there are only two institutions that offer D4 level training, Civil Engineering at Politeknik Negeri Lhokseumawe and Computer Informatics Engineering at Universitas Jabal Ghafur. Among the 30 institutions providing D3 and D4 level training, there are also only two public institutions. This tends to suggest that the public investment in technical education is comparatively small and apparently not meeting the demands of employers or industry since there are so many private schools.

Table 7: Summary of Post Secondary Vocational/Technical Education (D3 and D4 Levels) in Aceh by Subject

Subject	Number of Programs
<b>Commercial:</b> Accounting, Banking, Finance, Management, etc.	23
<b>Computers and Informatics</b>	9
<b>Education:</b> Education – Pre-School, Elementary, Pedagogy, English, Non-Formal	9
<b>Engineering:</b> Civil, Electrical, Mechanical	8
<b>Sciences:</b> Biology, Chemistry, Health, Midwifery, Nursing	7
<b>Agriculture:</b> Agro-Industry, Forest Management, Socio-Economics of Agriculture,	6
<b>Indonesian Language and Literature</b>	2
<b>Hotel Management</b>	1
<b>Total Programs in 30 Institutions</b>	<b>65</b>

(a) Disaggregated data on number of students were insufficient to identify trends and thus is not analyzed here

(b) Sources: Data for public institution are from the corresponding institutions; Data for private institution are from Kopertis I website, <http://www.pts.co.id>

It is noteworthy that the highest number of programs are the commercially-oriented subjects (23) followed by Computers, Informatics, and Education with nine programs each. Annex V also shows that the public institutions focus largely on education and engineering while the private schools tend to offer programs in the commercial sector.

In summary, only six of the 65 programs directly relate to the areas of highest employment activity in Aceh--agro-industries, forestry, aqua-culture and fisheries. None of the programs are readily identifiable as providing training in process engineering nor in port management and maritime operations which are the primary areas targeted for economic growth by planning organizations in Aceh.

Based on the analysis of existing institutions and what they offer in terms of programs for vocational and technical training, the team's assessment is that there is a lack of direct connection between the economic activities and the training provided by technical schools in the region. This suggests there is a weak link between what is demanded by the marketplace for a skilled labor force and what is being supplied by the education system. Based on the analysis of existing vocational and technical institutions and the programs they provide, the assessment team recommends support for a new polytechnic institution that focuses on process skills to support agro-industries, aqua-industries, and maritime operations since there are virtually no D3/D4 institutions currently meeting the need for creating a skilled labor force in these areas.

## II.2 ASSESSMENT OF LABOR FORCE POTENTIAL TO SUPPORT LONG TERM SUSTAINABLE ECONOMIC DEVELOPMENT IN ACEH

Indonesia's ability to compete in the global market, use technologies that can increase income and productivity, and thus increase the country's attractiveness to investors, is shaped by the skill level of its human resources. Indonesia needs to quickly catch up with its neighboring countries' education standards. A 2003 survey of Japanese manufacturing firms about their operations in other Asian countries reveals that the perceived low level of human resources and inadequate supply of management skills in Indonesia diminishes its appeal to investors. (\*- Kankyo Corp. – Tokyo)

The development of human resources is vital to the economic future of Indonesia. Improving the education, skills, and quality of life of the Indonesian people will achieve faster economic growth, realize more (higher) individual income, and reduce poverty. (\*- Boediono et al., 1992)

The BRR Master Plan states: "The economy of Aceh does not have any leading sector that is capable of involving and promoting the progress of other sectors through inter-regional as well as inter-sectoral linkages." Economic activity in Aceh is still dominated by agriculture and agro-industry with approximately 24% of the NAD population gaining their livelihood from farming, plantation, and animal husbandry activities.

To better understand the distribution of jobs across economic activities to estimate the areas where technical skills need to be enhanced, the team tried to find reliable data on the number of people employed in each economic sector. Unfortunately, the team did not find reliable and consistent data that provided an accurate picture. Thus, the figures below are the team's best estimates extrapolated from several sources and should be viewed as indicators of trends in employment. We recognize that much information was destroyed in the tsunami and may not have been systematically gathered to provide the disaggregated information that would be more helpful. We found several sources of aggregated data (for example agriculture included fishing, fisheries, forestry and animal husbandry as well as plantation and field crops). The team examined several sources of information and extrapolated the following trends to the best of our abilities. Several statistical analyses are expected on 2005 data but will not be available until August.

To better understand labor force trends, the team examined employment data by sector.

Table 8 provides employment estimates for the seven sectors analyzed and considered as the curriculum focus for a new polytechnic to meet the needs for a skilled labor force in Aceh.

Table 8: Employment Trends in Aceh from Estimates in Seven Sectors Examined

Sector	People Employed by Sector	% of totally employed (of 2.4 M)	Totals
<b>Agriculture/Plantation</b>		<b>Percent within the sector</b>	
Plantation	107,800	18.8%	18.8%
Paddy	319,600	55.8%	55.8%
Horticulture (fruits and vegetables)	73,300	12.8%	12.8%
Field crops	31,500	05.5%	05.5%
Forestry	2,800	00.5%	00.5%
Animal Husbandry	37,500	06.6%	06.6%
<b>Total Agriculture</b>	<b>572,500</b>	<b>24% (of 2.4 M)</b>	<b>100.00%</b>
<b>Fisheries/Fishing/Marine</b>		<b>Percent within the sector</b>	
Aquaculture	41,000	08.2%	08.2%
Coastal Waters	70,300	14.0%	14.0%
Deep Sea Fishing	134,700	26.9%	26.9%
Other related	255,000	50.9%	50.9%
<b>Total Fishing, Fisheries, Aqua-culture</b>	<b>501,000</b>	<b>21% (of 2.4 M)</b>	<b>100.00%</b>
<b>Port Operations and Management</b>	<b>0 (Unavailable)</b>	<b>0.0% (of 2.4 M)</b>	
<b>Oil/Gas/Fertilizer</b>	<b>10,100</b>	<b>0.4% (of 2.4 M)</b>	
<b>Processing Industries</b>	<b>87,000</b>	<b>3.6% (of 2.4 M)</b>	
<b>Public Services (incl. waste mgmt)</b>	<b>8,500</b>	<b>0.4% (of 2.4 M)</b>	
<b>Tourism</b>	<b>800</b>	<b>0.03% (of 2.4 M)</b>	
<b>Total Employed</b>	<b>1,179,900 *)</b>		

Sources: BPS and Aceh Master Plan

\*) this number reflects the total number of people employed in the seven sectors examined, out of an overall workforce of 2.4 million

### Key Findings from the data:

- Nearly 45% of the population is engaged in production agriculture and fisheries – mostly at the lowest skill levels;
- Paddy has the highest number of people (55% of those employed by agriculture) earning a livelihood from production;
- If higher technology is to be used and better management practices implemented there is a need for higher technology and skilled management capacity; and
- Tourism accounts for a very minor proportion of employment in Aceh.

In assessing the need for a polytechnic institution, it is important to understand the overall manpower projections as well as the skills needed to support investment and growth industries. The team was able to locate workforce (manpower) projections for Aceh Province disaggregated by sex but not by sectors. That information is provided in Table 9 along with the total number from North Sumatra which borders Aceh and includes Medan -- a major industrial area to which Acehnese have migrated. It is currently estimated there are over 500,000 Acehnese in Medan. Most have settled there for the economic and education opportunities and to avoid the previous security risks from the conflict situation in Aceh. Since these figures are pre-tsunami and pre-conflict settlement, caution should be used in the analysis of the data. That said, some trends were identified that should be considered in plans for a new polytechnic institution in Aceh.

The highest percentages of increased labor are projected for both males and females in the 45–54 and the 55–64 age groups, 28% and 27% totally respectively. This suggests that the workforce is graying and that there will be a need to re-train existing workers if the proposed developments lead to expanded industry. As suggested in the best practices for vocational and technical education (see Annex XI), to be responsive to the needs of the community as well as industry, offering flexible short courses for retraining older workers should be considered.

**Table 9: Aceh Labor Force (Manpower) Projections by Age Group 2003 – 2010 with North Sumatra Totals**

Year/Age Group	Male			Female			Total		
	2003	2010	Increase %	2003	2010	Increase %	2003	2010	Increase %
15 – 19	97.5	107.3	9%	67.9	72.0	6%	165.5	179.3	8%
20 – 24	172.2	194.2	11%	109.8	113.6	3%	282.0	307.9	8%
25 – 34	353.8	403.6	12%	207.0	233.4	11%	560.8	636.9	12%
35 – 44	286.5	332.6	14%	153.8	194.2	21%	440.3	526.8	16%
45-54	182.0	246.0	26%	97.2	139.8	30%	279.2	385.8	28%
55 – 64	265.0	122.8	28%	43.0	57.9	26%	131.7	180.8	27%
+ 65	39.8	51.8	23%	17.3	23.6	27%	57.0	75.4	24%
<b>Total Aceh</b>	<b>1,220.5</b>	<b>1,458.3</b>	<b>16%</b>	<b>1,959</b>	<b>834.5</b>	<b>17%</b>	<b>1,916.7</b>	<b>2,292.8</b>	<b>16%</b>
<b>Total N. Sumatra (Medan area)</b>	<b>3,471.9</b>	<b>3,987.7</b>	<b>13%</b>	<b>2,375.4</b>	<b>2,776.7</b>	<b>14%</b>	<b>5,877.3</b>	<b>6766.0</b>	<b>13%</b>

\*Numbers plus a thousand

Source: BPS (Biro Pusat Statistik/Central Statistics Bureau), Pre-Tsunami data; revised projections are to be published in August, 2006

If the data are combined for the 15–19 and 19-24 age groups, the combined percentages of increased members in the workforce would be approximately the same as for the 35–44 age group, i.e., 16% for each group. The lowest percentage increases in the labor force are among females in the 20–24 (3%) and the 14-19 age groups (6%) as might be expected since this is the prime time that females marry and have children, thus temporarily taking them out of the formal employment sectors temporarily. There are not significant differences between Aceh and North Sumatra (overall 16% compared to 13% respectively) which may change dramatically with revised projections as Acehnese residing in Medan may return to Aceh with recovery and reconstruction and the peace accord holding, thereby reducing the security risks from the previous conflict.

## II.3 STATUS OF WOMEN'S PARTICIPATION IN EDUCATION AND THE WORKFORCE IN ACEH

As indicated in the previous section (Table 9), women have the highest percentage increase (30%) in the 45 -54 age group. This is indicative of women entering or returning to the labor force after their household and parenting roles in family life may be somewhat reduced. This also has implications for designing vocational and technical education in such a way that women can train and retrain as needed to enter the workforce with the skills needed by industry.

A further analysis of workforce participation shows that females participate in the labor force at a rate of 49.2% overall compared to males who participate in the labor force at an 80.8% rate. The assumption is that these figures represent those who are participating in the formal labor market. Further analysis should be done to ascertain why the number of males seeking work (those who had registered as job seekers with the Department of Labor) is much higher, 103,176 compared to the 74,384 females seeking work even while taking into account that there are nearly 3 times more women who are not in the labor force (681,003 females compared to 242,436). Again, further analysis would be required to document reasons for this phenomena but given the status of economic engagement of nearly 70% of the population in Aceh in low level agricultural and maritime and fisheries raw product production, it is highly likely that women are engaged in economic activities such as planting, tending and harvesting rice paddy or raising livestock which may not be reflected as being available for work.

**Table 10: Participation in the Labor Force Disaggregated by Sex in Aceh**

	Employed	Seeking Work	Available for Work	Not in the Labor Force	Labor Force Participation Rate
Males	896,580	103,176	60,105	242,436	80.8
Females	525,932	74,384	71,954	681,003	49.2
<b>Total</b>	<b>1,422,512</b>	<b>177,560</b>	<b>132,059</b>	<b>923,439</b>	<b>64.7</b>

Source: BPS (Biro Pusat Statistik/Central Statistic Bureau)

Note: the team found that frequently numbers from the same source did not match up so the numbers here should be viewed as a trend.

A closer look at the nature of job seekers by level of education is provided in Table 11. Overall, regardless of level of education, there are more male job seekers than female (67% compared to 52%, - a 15% difference). Further analysis is necessary to determine the reason there are fewer job seekers among female high school graduates than males. It is interesting to note that there are slightly more female job seekers who are graduates of polytechnics (nearly 500 or 5% more). This may be because the polytechnics are graduating more female students than there are jobs in traditionally female dominated fields, such as secretaries and commercial studies. This suggests again, a weak link with the demands of the marketplace as well as traditional studies and jobs in male and female dominated trades. Or there may be other social reasons for this difference. Further analysis is necessary to come to solid conclusions.

Polytechnic graduates are the lowest percentage of job seekers: 12% compared to job seekers with university degrees (16%) and high school graduates constituting 72% of the job seekers.

**Table 11: Job Seekers (Unemployment) by Level of Education and Gender**

Level of Education	Male	% of Job Seekers who are Male	Female	% of Job Seekers who are Female	Total Number of Job Seekers	Total % of Job Seekers by Level of Education
Senior H.S. and similar degrees	36,884	59%	25,414	41%	62,298	72%
Polytechnic (D3 and D4), Sarjana Muda Degree	5,010	47%	5,558	53%	10,568	12%
Undergraduate (S1), Sarjana Degree	7,002	50%	6,916	50%	13,918	16%
<b>Number and % of Total Job Seekers by Gender</b>	<b>48,896</b>	<b>67%</b>	<b>37,888</b>	<b>52%</b>	<b>86,784</b>	<b>100%</b>

Source: BPS (Biro Pusat Statistik/Central Statistics Bureau)

While visiting technical high schools and polytechnic institutions, the team asked questions about if and how many female students attended. The answers were usually in the range of about 30% - 40% (38%, for example at Lhokseumawe Polytechnic). School administrators were usually quick and proud to tell us that there were female students and that there really were no barriers or restrictions for women taking any course of study. The team also observed that there were women studying in most of the areas of most of the schools visited, including masonry and chemical engineering at Lhokseumawe and 30% female students at Ladong SUPM --mostly studying aqua-culture.

To get a better personal sense of the participation of female students in the technical training environment at the Lhokseumawe Polytechnic, team members interviewed several female students. One was learning masonry techniques and when asked how she anticipated using her education, her reply indicated very career and goal directed learning. She indicated that she wanted to become a construction consultant and needed to learn construction techniques to do so. Another female chemical engineering student at the same institution shrugged her shoulders and smiled indicating she did not know what she was going to do after she finished school. These interviews represented the range of responses from students one might expect and supported the team's observations that there was little evidence of restrictions on what women students could and do and study in the technical vocational education institutions that we visited. This is anecdotal evidence made by the team and serves as such. Though the team recognizes the importance of data to support observations, obtaining the disaggregated data has been problematic.

## II.4 CURRENT STRATEGY OF BRR (REHABILITATION AND RECONSTRUCTION BOARD) IN ACEH

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Coordination among all stakeholders is continually improving and BRR has established coordination forums, policy advisory groups and other mechanisms to ensure that needs are filled with a minimum of duplication. It is also helping to strengthen coordination at the local level, by opening local offices and working with local governments and community leaders. BRR has set four key priorities for 2006:

- **Provide decent shelter to all:** Through the transitional shelter campaign, accelerating the pace of permanent house-building, resolving the remaining policy and strategy dilemmas, and meeting remaining gaps through direct implementation, where needed, are the strategies to be used.
- **Rehabilitate vital infrastructure:** The transport links along the west coast (with individual sections funded by USAID, JICA and World Bank) are particular priorities, in addition to urban drainage and facilities, coastal protection, and the development of a long term infrastructure plan.
- **Strengthen institutional and human capacities:** Priority actions include building the capacities of local governments to handle complex infrastructure and development schemes; building the capacities of independent organizations to monitor this and help guard against corruption; and **continuing to restore education and health facilities and services.**
- **Restore livelihoods:** This will be accomplished by ensuring the construction boom is used **to create sustainable job opportunities and new skills;** completing the revitalization of 58,000 hectares of damaged farmland; developing new potential in the plantation sector; **ensuring a more holistic approach to recovery in fisheries; and providing more support to SMEs.**

The priority sectors of BRR for **economic development** are agro-industries and fisheries, with emphasis on restoring livelihoods by rehabilitation of productive capacity and processing raw products to increase revenues from value added processing. Since Aceh is located near key shipping areas with both natural and constructed port facilities, BRR is also investing significant funds into infrastructure improvements of port facilities to attract processing and shipping business to the area. Several donors are supporting these efforts as well, i.e., The Netherlands, AusAID, and UNDP. USAID and JICA are also providing assistance with road reconstruction along the western coast of Aceh which will help support transportation of goods to containerized ports when they are completed. Additionally, the Ministries of Agriculture, Marine Affairs and Fisheries, and Trade are working with BRR to provide additional funding and resources to aid in the recovery and rehabili-

tation of Aceh. Additional, specific port reconstruction data are provided as part of the recommendations in Section V.3, Port Operations and Management Program Components.

## II.5 MONE MASTER PLAN FOR VOCATIONAL AND TECHNICAL IMPROVEMENT

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Discussions with MONE officials and several planning organizations indicated a need for improving vocational and technical education in Aceh. The national plan is to improve the quality and relevancy of vocational high-school level. Officials indicated a need for additional skill development in the following sectors:

1. Food processing / Engineering
2. Modern automotive technology
3. Telecommunications
4. Hotel and Tourism/Restaurants
5. Ports and Marine / Aquaculture development
6. Ethnic arts and craftsmanship
7. Manufacturing
8. Agro-Industry / Horticulture

Vocational schools are encouraged to develop programs to improve competitive skills similar to those adopted for the junior high-school (SMP). The target is to maximize skills in ICT at senior high-schools and vocational schools nationwide by 2009. Additional recommendations proposed by MONE are included in Annex IX, MONE Master Plan for Voc/Tech Education Improvement.

Process engineering and port operations skill development proposed for a new polytechnic institution by this assessment are consistent with the GOI priorities for education and are linked to the economic development plans in related industry areas, i.e., agro-industry, aqua-culture and maritime industries.

## III INDUSTRIAL SECTORS WITH HIGH DEMAND FOR POLYTECHNIC

The team examined seven sectors as possible areas where a polytechnic institution would support Aceh economic growth and development. Economic development requires opportunity, potential for return on the investment, along with skilled human resources. Thus the team examined the sectors in order to identify technical skills that are most needed to support economic growth.

The following section presents the assessment team's findings and analysis from field site visits and data review of the three areas it concluded had the highest potential for growth. This analysis led the team to conclude and recommend support to establish a process skills/port operations and management focused polytechnic institution. Additional criteria for support and analysis are provided in Table 1, page 10.

### III.1 AQUA-CULTURE

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#### III.1.1 Growth Potential

Possible expansion and economic growth is seen in deep water fishing, which could realize 85% growth potential, and in expanded fisheries capacity to 259,308 hectares in aqua-culture production throughout the 20 regencies in Aceh. It is estimated that the expanded fisheries will require 2,593 additional highly skilled people with aqua-culture skills at D3 level (one per 100 hectares) and require an additional 500 plus fishery operators. Coastal fishing is still a very important part of

the economy for about 14 % of the 501,000 people who are engaged in coastal fishing for their livelihood. The number of coastal fishing boats has increased substantially since the tsunami. Prior to the tsunami, there were about 3,500 fishing boats, while currently it is estimated there are over 10,000 through donor contributions and boat building work programs for survivors. Concern has been raised that this may lead to over fishing and reduce the per capital harvest to about 5 kilos per boat per day. Most planning officials, however, think this is a temporary situation which will naturally even out as reconstruction provides other options. However, the concern warrants careful monitoring.

Deep sea fishing is defined as fishing that exceeds the 200 mile coastal waters zone. NAD Maximum sustainable yield equals 1,057,000 tons/ year. Catch to date is 228,834 Tons or 21.65 % of total possible sustainable yield which suggests a potential possible growth of 85% as mentioned above. Purse Seine and bottom long line fishing grounds currently only extend to the 50 mile limit and do not include the recognized economic zone which extends to the 200 mile limit. There is therefore great potential to harvest from the remaining 150 miles. (The Department. of Marine Affairs and Fisheries is currently conducting research through the Oceanographic Institute at Ancol, North Jakarta.) Tuna fishing production in Sabang is the second largest in Indonesia (after Maluku) with Japan as an "insatiable" nearby market for tuna and Sabang in a strategic location.

### III.1.2 Priorities and Investments by Government, Donors, and Private Sector

The priority sectors of development being considered by the BRR economic development unit are agro industry and fisheries with emphasis on the processing / engineering skills to add value to raw products and gain increased foreign earnings. Their favored location for a polytechnic specializing in aqua / fisheries industry and processing would be the Aceh Besar area (close to both the Malahayati and Sabang Ports).

Damage to fishing fleets, gear, small scale fish processing and fish ponds was extensive from the tsunami. BRR action plans call for replacement of fishing fleet, gear, and small scale fish processing and cooperatives totaling 486 billion Rp. (US\$ 54 M) and an additional 285 billion Rp. (US\$ 31.6 M) for fish pond reconstruction, water pumps and business capital for fisheries. The plan also includes rebuilding several fishing ports and landing docks, pond channel rehabilitation, and cultivation technical assistance totaling an additional 871 B Rp. (US\$ 96.7 M).

Private sector and donor support has also been applied for port reconstruction but the amount of funding provided by the Indonesian/Aceh government is a strong indication of a high level of support to this industry. Additionally land has been set aside for developing an industrial park near the Malahayati Port which is designed to attract investors to the area to take advantage of the proposed port expansion.

### III.1.3 Employment Estimates and Skills Needed by Industry

Expanded deep sea fishing, with a possible 85% increase, will require skilled labor in boat maintenance and engineering and support services. It requires special international certifications and qualifications for captain, first and graded engineers, refrigeration, etc. (refer to Annex XIV below for examples of certifications to meet international maritime requirements). Table 12 below provides a description of the kinds of boats and level of engineers and personnel that are required for fishing boats and the number of people needed on the Indonesia/National level. No data were available specifically for Aceh but this provides an idea of the kinds of skills and the level needed in Indonesia as a whole.

Table 12: Manpower Requirements for Fishing Boats at International/National/NAD Levels

Skill Area	Number of Boats	Number of People / Boat	Total Number of People	Aceh
<b>Domestic Harvesting Capacity</b>			14,535	
<u>Fishing Boat Manager</u>				
Foreign Fleets	945	1	945	NA
New Fleets	660	1	660	NA
<u>Chief Ship/Boat</u>				
Engineers				
Foreign Fleets	945	1	945	NA
New Fleets	660	1	660	NA
<u>Fishing Boat Crew Members</u>				
Foreign Fleets	945	5	4,725	NA

New Fleets	660	10	6,600	NA
<b>Foreign Harvesting Capacity</b>			15,941	
<u>Fishing Boat Equipment Master</u>				
60 – 200 GT		1,234	1,234	NA
600 GT		53	53	NA
<b>Total</b>	<b>1,234</b>		<b>30,449</b>	

Source: Agriculture News No. 144/T.XXI

Potential expansion also is projected to increase the number of hectares in aqua culture production to 259,308 located throughout the 20 regencies in Aceh. Such expansion will require 2,593 people with aqua culture skills at D3 level (1/each 100 hectares). For each hectare, spawn needs can be met by one unit of a hatchery (medium size). 518 hatcheries are needed throughout the province. 518 additional unit managers and operators would be needed with spawning expertise in addition to experts required for work with government departments. Furthermore, this does not include personnel required for processing value added products, operating and maintaining the equipment for such processing.

The best data available indicate that 3.6% of the population (pre-tsunami) was involved in processing trades which had a 3.4% annual growth rate in the GDP. Given the amount of infrastructure investments planned and those lost in the tsunami, it is reasonable to expect an increase in the need for people with technical skills to support the process industries. No reliable data were found by the assessment team that indicated employment predictions by sector post-tsunami. Data on 2005 Aceh statistics are to be available in August which may provide more complete predictions on manpower needs.

As indicated in

Table 8 (abbreviated in Table 13 below) approximately 501,000 people (25% of the total working population in Aceh) are employed in the aqua-culture, fishing and maritime sectors and related activities. Manpower requirements to meet demands of the industry at the D3 technology level are estimated to be 10,500. The current high school and vocational high school level schools have 190 students enrolled. Thus, the assessment team determined there is relatively high demand for additional polytechnic graduates at D3 and D4 levels to meet that demand, especially given the replacement labor needs from losses suffered during the tsunami which devastated the coastal regions and the relatively few graduates with the needed technical knowledge and skills to meet the demands of the fisheries and fishing industry with planned expansion.

The proposed new polytechnic institution would begin with 140 – 160 graduates in five years and expand to approximately 450 over the following five years.

**Table 13: Employment Trends in the Aqua-culture, Fisheries and Maritime Sectors**

Sector	People Employed by Sector	% of totally employed (of 2.4 M)	Totals
<b>Fisheries/Fishing/Marine</b>		<b>Percent within the sector</b>	
Aquaculture	41,000	08.2%	08.2%
Coastal Waters	70,300	14.0%	14.0%
Deep Sea Fishing	134,700	26.9%	26.9%
Other related	255,000	50.9%	50.9%
<b>Total Fishing, Fisheries, Aqua-culture</b>	<b>501,000</b>	<b>21% (of 2.4 M)</b>	<b>100.00%</b>

#### III.1.4 Existing Education Providers

SUPM Ladong (approximately 30 km east of Banda Aceh) is one of 8 similar vocational high schools throughout Indonesia that specialize in Aquaculture / Fishery and Marine Officer and Engineering training. It is operated on a semi-military disciplinary education system and is equipped with dormitories for 280 trainees. Though the facility has been established for many years, the assessment team found it was in very good repair and looked better than some of the newer facilities visited.

The facility has 14 Ha of land and 1 Ha of fish/shrimp ponds, together with hatchery and nursery facilities, which are in use but require upgrading. The fish/shrimp pond was destroyed by the tsunami, and to date has not been refurbished. The current high school has 8 Ha of the 14 Ha land and has 6 additional Ha available for expansion. Plans have been developed

for expanding the school to a polytechnic at the D3 level and there is a willingness to explore possible co-location. Plans were provided to the assessment team for analysis.

The school currently offers three fields of study:

- Program Keahlian Nautika Perikanan Laut (NPL) = Fish Catching
- Program Keahlian Teknik Perikanan Laut (TPL) = Fishing Machinery
- Program Keahlian Budidaya Perikanan = Aquaculture (sea, fresh brackish).

The curriculum also includes:

- Business management.
- Navigation
- Entrepreneurship (e.g. students are given Rp. 100,000 each and they have to produce saleable produce (in groups)).

The current programs consist of approximately 40% theory; 60% practical. Students are on full scholarship provided by the Department of Fishery and Oceanography. During field training, where training costs are generally higher than that provided by the scholarship, the students must provide the difference.

There are currently 120 students enrolled of which 30% are female (all studying aquaculture.)The number decreased in 2004 / 5 from 280 students due to the conflict and the tsunami. The current maximum capacity is 280 students (based on the number of rooms in the dormitory). Currently, there are 18 teachers, all of which were recruited from university graduates (IPB, UNDIP etc). They have, however, received further skills training in partner institutes and industry. Much of the lab equipment is in need of replacement and upgrading.

The Budget for 2005 (from the Ministry of Marine Affairs and Fisheries) was:

- Rp. 800 million: Students logistic (meals, etc.)
- Rp. 600 million: Staff salaries
- Rp. 1.6 billion: Operational costs and maintenance

### III.1.5 Possible Partner Institutions

SUPM Ladong has established a foundation, *Yayasan Pendidikan Nanggroe Aceh*, to provide private support to expand and upgrade the institution to a D3 level polytechnic institution.

In addition, the team learned that Yayasan Pena, a foundation formed to establish an agriculturally based polytechnic in Aceh Besar has plans to send their students to Ladong once their proposed school is established for fisheries and aquaculture instruction and practical training. It would also seem logical that there could be partnerships arranged with other polytechnic and university institutions that would enhance the practical application of research and theory, such as demonstration plots to introduce new and better techniques.

### III.1.6 Possible Threats and Weaknesses

- Infrastructure improvements planned by BRR and Bappeda may not develop at the pace required to provide sustainable employment opportunities for polytechnic graduates
- Land issues need to be discussed and worked out with existing entities. It may not be possible to work out mutually agreed upon plans and ownership issues.

- That the over-riding control could be administered by two government ministries (Ministry of Marine Affairs and Fisheries – for scholarship funding and Industry standards) and (Ministry of National Education – for VET standards, national curriculum and certification) along with input from the Yayasan that has already been established as well as the USAID/CHEVRON GDA partnership.
- The Polytechnic Management team may not subscribe to the pro-active industry focused strategy.

### III.1.7 Conclusions

The assessment team concluded:

- The best option for establishing a new polytechnic institution would be to co-locate with the SUPM facility in Ladong.
- Co-locating the proposed polytechnic institution with the Ladong SUPM high school provides an immediate feeder school for D3 & D4 level students.
- Existing land is available for development and there is a strong interest in collaboration and a great deal of planning has already taken place.
- The location is close to a port with existing facilities that could be upgraded and shared between SUPM and proposed polytechnic
- Aquaculture is a priority sector of development for BRR with focus on processing raw product for added value.
- There is an expected demand for higher level skills with expanded infrastructure and processing capacity.

Specific detailed recommendations are included in the Recommendations Sections: V, VI, and VII.

## III.2 PORT OPERATIONS AND MANAGEMENT

### III.2.1 Growth Potential

As shown in the map, Weh Island (Sabang), Pulo Aceh and Ulee Lheu and Malahayati form a triangle of ports that can



provide shipping and port operations once they are rebuilt, restored, and upgraded. BRR advised that they are funding restructuring of the Port of Sabang in the near future to provide for international containerized exports and increase trade within the region. Additional port reconstruction, both from the government and from private and donor funds are planned to rehabilitate and upgrade several ports along the coastlines of Aceh Province (refer to Table 14 below). There is also support from the Ministry of Trade and Agriculture to provide processing facilities that will help with storage, processing and packaging raw product for retail or for export associated with the renovation of port facilities according to the BRR Master Plan. These will also require skilled workers to operate and maintain equipment such as dock loading equipment, refrigerated storage units,

as well as processing and packaging mechanical, electrical, and electronic/megatronic, and computerized systems. As mentioned in the previous section, an industrial park is planned in the area around Malahayati which would increase use of that port when rehabilitated and provide additional need for expanded skills in processing engineering and port operations and management.

As also pointed out in the previous section, the potential for increased development of deep sea fishing has a high potential for expansion which will be directly tied to port facilities if Aceh is to benefit from such expansion. Likewise the expansion of fishery production will be practical only if the additional production can be processed or packaged with added value and shipped from nearby port facilities.

Shipping is also considered a growth industry that, if and when the ports are rehabilitated, will also require additional skilled labor for port operations and management along with ship crew training in various jobs. A recent article in the Jakarta Post reported that Indonesian shipments have increased from 473.93 million tons transported in 2004 which increased to 492.97 in 2005 and domestic lines increased their percentage of those shipments from 4.7% to 5% over the same period of time. Meanwhile domestic shipments increased from 177.3 million tons to 206.3% with 52.7 % shipped by domestic lines in 2004 and 55.5% in 2005. Indonesia has the highest number of vessels when measured by deadweight tonnage in comparison to Singapore, Malaysia, the Philippines and Thailand. Currently the number of Indonesian registered merchant vessels is 6,791 which is an increase of 12.4% from 2005 according to the Ministry of Transportation.

### III.2.2 Priorities and Investments by Government Donors and Private Sector

BRR puts a high priority on the reconstruction and development of Aceh ports. Table 14 below provides a list of the ports scheduled for reconstruction including the type of port facility, the location, and amount of BRR funding proposed for reconstruction. BRR information indicated that the activities to be undertaken include: "land clearing, plaster work, rehabilitation of harbor complex roads, drainage, pier, fish auction market, ice factory, ice factory and storage, clean water tank and facilities, solar packed dealer for fishermen (SPDN) electricity and lighting installation, doc and workshop, wastewater treatment plant, harbor channel dredging, office and other public facilities, parking area and fencing and consultation service." Port reconstruction is currently underway and scheduled for completion by 2009 with public funds totaling approximately 20 M US\$ which does not include private and donor contributions.

**Table 14: Aceh Master Plan Port Reconstruction**

Infrastructure / Facilities to be Built/Rebuilt	District/City	Total Proposed Budget (2005- 2009), Trillion Rp.
Lampulo Fishing	Banda Aceh	27.9
Landing Dock	Banda Besar	12.9
Kuala Tapu Fishing Port	Nagan Raya	12.9
Sigli Fishing Port	Sigli	12.9
Peudada Fishing Port	Bireuen	12.9
Lhoknga Fishing Port	Aceh Besar	12.9
Ulee Lheu Fishing Port *)	Banda Aceh	12,9 Containerized port supported by AusAid and UNDP)
Meuredeu Fishing Port	Pidie	28.1
Meulaboh Fishing Port	West Aceh	28.1
Lhokseumawe Fishing Port	Lhokseumawe	28.1
Calang Fishing port	Aceh Jaya	28.1
Pasiran Fishing Port and Krueng Raya Fish Landing Dock	Sabang	520 M
Seuriget Fishing Port	Langsa	150 M
Malahayati*	Aceh Besar	Being renovated with Dutch aid
Total investment in Port reconstruction		179 Billion Rp (20M US\$)

Source: BRR Aceh Master Plan

\*) The UNDP in cooperation with AusAID are currently rebuilding the port of Ulee Lheu in Banda Aceh.

### Key Points:

- Further analysis is needed to project the number of employment opportunities ports will generate, as a result of both increased business and the consequent need for technically skilled employees to manage and operate port facilities. Despite intensive searching, the team was unable to obtain projected employment data from the Ministry of Labor or from the Ministry of Marine Affairs and Fisheries.
- The triangle of containerized ports projected to provide the best opportunities for sustainable economic growth are Sabang, Malahayati (receiving additional support from The Netherlands for rehabilitation), and Ulee-Lheu (AusAid and UNDP funding for rehabilitation in addition to BRR). These will generate additional needs for port management and operation skills.
- An industrial park has also been identified at Blang Ulam (near Malahayati). It would seem that additional investment from companies would be possible now that the conflict situation has subsided, and security less of a risk factor. In addition, with improved port facilities, processing industries would be a natural next step with the abundant raw products produced in the region.
- Meulaboh can be useful for developing and servicing oil transportation from the Middle East and deep sea fishing (Blue Fin Tuna) off the coast near Meulaboh.
- Export earning potential comes to Aceh with containerization ports to develop exports.

### III.2.3 Employment Estimates and Skills Needed by Industry

The assessment team was unable to find data that estimated the number of employees needed for port operations and management despite one of the team members going to the Ministry of Marine Affairs and Fisheries to get the information. Information from BRR and other sources of statistical information did not disaggregate employment figures, except for a few categories, as shown in

Table 8, page 20. In discussions with the Director General of Sea Transportation of the Port Operations and Management Manpower Office, Captain Indra Priyanta, the assessment team was informed that it is almost impossible to project manpower and skill needs until there is information on the type of ports and the level of shipping that goes through the ports. These figures are unknown until there is a history of use. Further in-depth analysis, with private shipping companies and other government agencies as well as existing port facilities is needed to get additional data for this sector. As indicated in the discussion on growth potential, the shipping and port operations management has been increasing which would lead to additional demand for highly trained personnel on an international level (refer to Annex XIV).

### III.2.4 Existing Education Providers

There are currently no post-secondary polytechnic institutions in port management and shipping in Aceh that are under the supervision of MONE. Sabang has a maritime school which UNDP is supporting for basic maritime skills. The Academy of Maritime Sciences (STIMAR, Sekolah Tinggi Ilmu Maritim) in Jakarta is another institution that provides certified training for ship and port personnel (see Annex XIV below for specific certificates issued).

There are opportunities to provide scholarships in maritime training (through GTZ, UNDP, and the Ports Authorities), as Indonesia is in the process of becoming a signatory to an international agreement in ship crew certification. The certification applies for national and international crews. (Medan, Jakarta, and Surabaya all are currently doing this training). SUPM Ladong is about to get this certification through IMO (International Maritime Organization).

There is also a research study centre in Sabang which specializes in oceanography and aquaculture and which is administered by the University Syiah Kuala, in Banda Aceh. The academy was funded and built by JICA and equipment is to be installed in the near future.

### III.2.5 Possible Partner Institutions

The schools listed above could become collaborating partners with the polytechnic and work cooperatively with specialized training as well as in close association with international certification authorities for transferable skill documentation that is required in the shipping industry.

### III.2.6 Possible Threats and Weaknesses

- The Polytechnic Management team may not subscribe to the proactive industry focused strategy.
- The reconstruction of ports may be delayed or insufficiently funded.
- The over-riding control could be administered by two government ministries (Ministry of Marine Affairs and Fisheries – for scholarship funding and Industry standards) and (Ministry of National Education – for VET standards, national curriculum and certification).
- The current facility is a public institute, funded and administered by the Ministry of Marine Affairs and Fisheries, and the new proposed facility would require staff to be employed on three year contracts, as is common in the private sector.
- A paradigm shift in thinking is required to employ industry experienced staff and not inexperienced graduates from universities.

### III.2.7 Conclusions

#### The assessment team concluded:

- Co-locating the proposed polytechnic institution with the Ladong SUPM high school provides an immediate feeder school for D3 & D4 level students.
- There is a “triangle” of ports to be developed near Banda Aceh (Sabang, Ulee Lheu, Malahayati). Port operations and management are a natural complement to process engineering in this area because of the planned port rehabilitation and expansion of facilities.
- All port reconstruction is scheduled for completion in 2009, about the same time as the graduation of the first class from the proposed polytechnic institution.
- Priority sector of development for BRR with focus on processing raw product for added value.
- Bappeda plans to establish an Industry Park at Blang Ulam (near Malahayati).
- There is an expected demand for higher level skills with expanded infrastructure and processing capacity.
- GOI is committed to become a signatory to IMO (International Maritime Organization) compliance and certification. The existing SUPM Ladong institution is currently training to those standards.

## III.3 AGRO-INDUSTRY AND ANIMAL HUSBANDRY

### III.3.1 Growth Potential

Agriculture and plantation, including animal husbandry, has traditionally been the core of Indonesia Economic Development. The area utilized for agriculture and horticulture in Aceh accounts for nearly 23% of the total provincial area of 57.4 thousand km<sup>2</sup>, involving about 25% of the total population. The agricultural sector contributed more than 28 percent to the Aceh Gross Regional Domestic Product in 2003. The sector has, however, been conducted on a small scale basis and is managed with low levels of capital, with little application of technology and value added processing. Aceh's economy is therefore still commodity-based, with input-output relations between the lower sectors. Agro-industrial activities have not been able to develop well, primarily due to the prolonged armed conflict in the area. The 2004 tsunami has also exacer-

bated the situation, as a large percentage of the population affected by the disaster has lost their agriculturally based livelihoods. With reconstruction efforts proceeding as mentioned below, the agricultural sector will be helped by the funds available to help restore productive land from tsunami damage other infrastructure developments.

Potential for growth in the agricultural products area is limited until there is more complete recovery of agricultural lands and the infrastructure to support value added processing locally as well as for export. Discussion with experts did indicate hopefulness regarding exporting value added commodities from Aceh, with coffee being one of the primary exports of interest. The team was informed that several plantations are now growing organic coffee and exporting at higher prices through contracts with Starbucks. Palm oil, wood and wood products, tobacco and shrimp are also frequently mentioned as export goods with potential for expansion and export. The primary need in the agricultural area is to expand production in higher end products, such as organic products, medicinal herbs, spices, etc. instead of paddy, since the climate and natural environment is conducive to multiple crops in a year if managed properly. Again, if there is going to be potential growth in this area, it will come from higher level skills and capacity and from the introduction of processing and packaging for value added. Since much of the land is in production at the lowest levels of capital input and labor, additional training will be required with higher level skills to begin to convert agricultural production to agro-industries. Thus, there is a perceived need for additional higher level training in the area of agriculture with experience and skills to assist lower level farmers convert to new crops and procedures that produce higher end products to expand the industry.

### **III.3.2 Priorities and Investments by Government, Donors, and Private Sector**

The scope of the BRR rehabilitation and reconstruction plan includes the agriculture and plantation sectors with a budget allocation of nearly Rp. 492 billion over the four-year implementation period (2006 -2009) for public service facilities. Items on the list for agricultural rehabilitation include rehabilitation and construction of: 1) waterways--tertiary and quaternary irrigation according the scheme and type; 2) land structure; 3) agricultural roadways; 4) seed production and nursery production facilities; 5) marketing facility for agricultural products; 6) animal health center; 7) research and development of appropriate technology; and facilities for the Office of Agriculture, Quarantine, Extension Centre, Agriculture Training Center and Laboratory.

The Ministry of Agriculture is also investing another 1.9 Billion Rp for land amelioration; re-initiating food crops; horticulture; plantation crops; animal husbandry; integrated agriculture (presumably for pest management and petrochemically-based fertilizer alternatives as costs become prohibitive for petro-chemicals); working capital; processing and marketing facilities, along with training, guidance and support services. The Ministry of Trade is also contributing about 20 Billion Rp with an additional 73 Billion Rp for SME & Cooperatives.

The assessment team did not learn of donor or private sector support to the agriculture sector at the same level of their support for fisheries, port improvements, and roads. There is always the prevalent mind set and perception that agriculture is low level production on a small scale with low return on the investment, so it is not an area where many seek to promote the agri-business aspects of agriculture.

The Aceh Planning Board (Bappeda) also has a mission to develop Aceh focusing on broad areas of agriculture and fishery. Bappeda suggested that agro-industry and fishery, especially in process engineering, has potential in the future mainly because Aceh is blessed with natural resources. The Ministry of Agriculture also looks to the 14 August 2005 peace agreement between Indonesia Government and the Aceh Independence Movement (GAM) as hopefully creating economic stability in the region, thus encouraging investment.

### **III.3.3 Employment Estimates and Skills Needed by Industry**

Currently, the lowest levels of production represent the largest share of current labor. However, primary employment needs are anticipated in the area of process engineering. Projections indicate promising expansion of exported products, such as palm oil, wood, tobacco, coffee, and shrimp. Officials also expressed the view that there was a need for more people with better skill sets in order to support the processing and packaging of coffee for export. As indicated in Table 15 (abbreviated from

Table 8), over half of the population that is earning its livelihood from agricultural production (319,600 workers) is specifically engaged in paddy production. The team heard that Indonesia is a net importer of rice but did not find the data needed to verify that information.

Table 15: Employment Trends in the Agriculture and Animal Husbandry Sector

Sector	People Employed by Sector	% of totally employed (of 2.4 M)	Totals
<b>Agriculture/Plantation</b>		<b>Percent within the sector</b>	
Plantation	107,800	18.8%	18.8%
Paddy	319,600	55.8%	55.8%
Horticulture (fruits and vegetables)	73,300	12.8%	12.8%
Field crops	31,500	05.5%	05.5%
Forestry	2,800	00.5%	00.5%
Animal Husbandry	37,500	06.6%	06.6%
<b>Total Agriculture</b>	<b>572,500</b>	<b>24% (of 2.4 M)</b>	<b>100.00%</b>

With current concern over the spread of bird flue, certainly there will be increased need for animal/avian health trained specialists and educators if the spread of this virus is to be contained. That will require highly trained specialists who can help health officials convey the needed message to protect the population.

### III.3.4 Existing Education Providers

#### Current Tertiary Level Providers for Vocational Training in Agriculture / Animal Husbandry in Aceh

There are a limited number of vocational training providers at the tertiary level under the MONE (Annex VII). The only state institution offering courses at the D3 level in agriculture and animal husbandry is Syiah Kuala University (Unsyiah). In 2004, there were only 23 and 18 students enrolled in agro-business and animal husbandry courses at Unsyiah, respectively. There is another private institution that offers D3 courses in Agriculture, i.e. Akademi Pertanian Iskandar Muda. As indicated in Annex VI, there are also eight Vocational High Schools in Aceh (SMK s) with four located in Aceh Besar that would serve as feeder schools for D3 and D4 level programs.

There is another tertiary institution under the Department of Agriculture offering vocational training in agriculture and animal husbandry, i.e. STPP Saree. STPP Saree (Sekolah Tinggi Penyuluhan Pertanian, Academy for Agricultural Extension) started in 2002. It is located approximately 70 Km south of Banda Aceh and is one of seven similar vocational higher institutions throughout Indonesia under the Ministry of Agriculture. The institution, occupying 167 Ha of land, offers D4 programs in: 1) Agriculture service, and 2) Animal husbandry service. Currently, there are a total of about 240 students, e.g. 60 students per year studying at the institution. Students are recruited from young farmers with appropriate high school qualification (30%), SPMA distinguish students – an Agriculture high school located next to STPP (30%), Aceh Office of Agriculture (30%) and others (10%). Students are coming from all districts in Aceh and are on full scholarships from the Provincial Department of Agriculture. The STPP has yet to produce graduates.

There are 52 administrative staff (government employees) and 40 teaching staff (mostly from the Faculty of Agriculture Syiah Kuala University and some are from Aceh Office of Agriculture who have practical skills). The students have to finish 146 credits before graduation. The curriculum is based on a national curriculum with 30% theory and 70% practical experience. Funding for the school is provided from the provincial and national budget. In 2005, Rp. 2.7 billion was allocated, of which about Rp. 2.0 billion was spent on salaries, and the remaining was for operational. Only a fraction of the budget comes from the production units.

The graduates are trained to be independent consultants and entrepreneurs, for example to provide services to farmers (e.g. artificial insemination) while managing the operations of their own farm. Although it has an extensive area of land, it is not being utilized to full capacity. STPP has nevertheless production units (e.g. corn farm, sweet potato, ducks etc) which they use as incentives to the students. The team was surprised to learn that funds raised through the production unit were given to the students instead of going to the institution to offset tuition costs across the board for all students rather than only for those who had been engaged in the production activity. It is recommended that production units be managed for the benefit of all students at the institution and not just those engaged in the activity. However, incentives need to be provided. Production units need to be used as "learning laboratories" to teach students the business of agro-business as well as the applying appropriate technology and production processing practices.

The assessment team found the equipment and facilities to be limited and under utilized for production units. The team found there to be a lack of management capacity and entrepreneurship attitude within the schools. Bureaucracy is a major

obstacle, so that the management cannot actively approach the private sector to get additional funding or contributions of equipment and supplies. The more entrepreneurial schools seem to have found a way around such bureaucratic hurdles by forming foundations through which they can seek additional funding from the government or from donors and the private sector.

### III.3.5 Possible Partner Institutions

The Aceh Government has set up a foundation (Yayasan Pendidikan Nanggroe Aceh - Yayasan PENA) to deal with the polytechnic establishment and it appointed Mr. Al Qudri A. Gani as the head of the foundation. (Coincidentally, Mr. Qudri is also the Executive Director of Aceh Chamber of Commerce, KADIN). A land area of 4 Ha for the polytechnic has been bought in Aceh Besar area from the provincial budget. The Ministry of Foreign Affairs had initially committed the funding for building the polytechnic, but progress has been halted since June of last year. The main mission of the foundation was to establish an agro-forestry polytechnic. A complete proposal including the site plan is already available. The proposed plan suggests four main programs: 1) Plantation management; 2) Agriculture industry technology; 3) Horticulture; 4) Animal husbandry – including Agro-business in animal husbandry & 5) Fishery – including fish catching technology, fish machinery and equipment, and aquaculture-breeding management and technology.

The initial concept was that the new polytechnic will serve all first year students at the same location. According to their field of study they will then be distributed to SUPM Ladong for fishery and STPP Saree for plantation management/horticulture/animal husbandry. The corresponding institutions will thus be upgraded to a D3 polytechnic level. This is a particularly interesting concept because it is a cooperative venture with other schools, rather than competing for the same students.

There is strong interest on the part of the Foundation leadership to collaborate and cooperate with the USAID/Chevron Partnership to determine if a partnership could be developed to initiate the proposed polytechnic institution on the land they have already secured from the government.

### III.3.6 Possible Threats and Weaknesses

- The land currently available is under ownership of the Yayasan PENA. Agreements would need to be worked out regarding how ownership of the land would affect establishing the proposed polytechnic.
- The establishment of the polytechnic is not contingent on use of the land currently owned by the Yayasan PENA. Alternative land could be purchased or provided by the Aceh government. However, this could require land to be purchased from the allocated USAID / Chevron budget – thus reducing the amount available for constructing and equipping the Polytechnic.
- The establishment of processing plants to add value to raw products will be dependent on private Industry investments and the completion of proposed infrastructure improvements, i.e. ports, roads, and wholesale market facilities as planned by BRR. The proposed piece of land is close to the airport but not to the port facility.
- Polytechnic management team may not subscribe to the pro-active industry focused strategy to employ industry experienced staff rather than in-experienced graduates from universities.

### III.3.7 Conclusions

#### The assessment team concluded:

- The proposed polytechnic should focus on raw product processing skills to support the agri-business and fisheries production which dominates Aceh economic activities.
- There is a high level of support from the government to focus on process engineering skills for the plentiful natural resources of Aceh and to promote higher levels of livelihood for producers by adding value to agricultural products.
- The current undeveloped site for the Yayasan Pena proposed polytechnic institution may be considered as a

possible alternative for the assessment team's first priority recommendation to co-locate with the SUPM Ladong institution.

- Land ownership issues will need to be resolved
- The advantage would be that there is land available, plans have been developed, government approval is there, and there is willingness and eagerness on the part of the leadership to collaborate and cooperate.
- The disadvantage is that it is not close to the ports and does not have the focus on fisheries, fishing, port operations and management which are already a strong foundation of the Ladong institution.

## IV INDUSTRIAL SECTORS WITH LOW DEMAND FOR POLYTECHNIC

### IV.1 HOSPITALITY AND TOURISM

#### IV.1.1 Growth Potential

Hospitality and tourism are frequently mentioned in discussions on potential areas for future development and economic growth. BRR suggests in its Aceh and Nias report, "One year After the Tsunami" (December 2005) that tourism may be an area for further economic growth: "with scenic beauty, good beaches, and a world class National Park, Aceh and Nias have the potential to develop tourism." However, the Aceh Master Plan for reconstruction acknowledges that neither Aceh nor North Sumatra is a major tourist destination. ".....in 2003, out of 3.8 million visitors to Indonesia, only 76,000 (2% of the total) traveled through Medan and even less came to visit Aceh because of the conflict."

There are reportedly more than 230 tourist destinations in Aceh Province. The most popular is Palau We (Sabang) because of its beaches, snorkeling, sea turtles and the Leuser National Park, which offers wildlife, hot springs, jungle trekking, and river rafting. 1998 information indicated a total of 25,400 foreign and 560,000 domestic tourists with average stays of two days in Aceh province. At that time, there were 13 "star" hotels, 151 "non-star" hotels with rooms totaling less than 3,000 and occupancy rates of less than 5.6%.

Current indications are that tourism has declined due to the conflict and resulting security issues in Aceh over the past few years. Martial law was in effect until 2004 due to the conflict with the Aceh Independence Movement (GAM). People hope that a sustained peace agreement will reduce the negative effect security issues have had on tourism. That being said, the local infrastructure must be rebuilt and developed to attract additional tourism. For example, the airport in Sabang needs to be rehabilitated to accommodate direct international flights. As it is, the roads and travel time to get to and from site destinations is impractical for high volume/high income tourism.

#### IV.1.2 Priorities and Investments by Government, Donors, and Private Sector

Some funds were set aside by BRR (approximately 4.75 billion Rp or about US\$ 500,000) solely for reconstructing tourism areas after the tsunami but much more work is required and a very small fraction of the funds needed have been allocated for tourism, an understandable choice given the immediate need for reconstruction for creating livelihoods.

To assure support for local development strategies, BRR has emphasized the importance of involving the local community in determining the direction of development "post-tsunami." This has been especially important in the tourism industry since there is concern that there may be a clash of values when combining "Western tourism" with Muslim conservative lifestyles. There will be a seminar on tourism, conducted at the Institute of Islamic Studies (IAIN) in Banda Aceh around July 2006. Plans include inviting Islamic scholars, academia, government representatives, tourism and related industry representatives to discuss issues such as isolated tourist areas, gender segregated systems at tourist premises, use of alcohol, scanty swimwear etc.

Bappeda is sponsoring a survey on tourist destinations to be conducted by experts from the Institute Technology Bandung (ITB) in June to provide additional information for planning.

### IV.1.3 Employment Estimates and Skills Needed by Industry

Employment statistics indicated approximately 800 people were employed by the tourism sector in 2003 before the tsunami while enrollees in Aceh hotel and hospitality training institutions totaled 1,800. Tourism statistics indicated there were 111 establishments in 2003 with an average of 7.5 workers per establishment in Aceh. The estimates provided further indicated that there were an average of 549 guests per day to Aceh, 548 Indonesian and one foreigner.

There is, therefore, an oversupply of trained workers for the number of establishments and the labor demand in Aceh. Fortunately for those trainees who are mobile, hotel and hospitality training is quite transferable, especially if international standards and certification are met and certified.

### IV.1.4 Existing Education Providers

Currently there is only one private Tourism Academy (Akademi Pariwisata Muhammadiyah), a vocational school under MONE at D3 level in Aceh. There is also a SMK3 (Vocational High School) in Banda Aceh that has a vocational focus on hospitality and food catering. This school operates a student learning production unit for a hotel and a catering business. There is also a Tourism Academy operating in Medan which Aceh high school graduates may attend. GTZ has indicated they are supporting the reconstruction and rehabilitation of all SMKs in Aceh Province. There are also tourism academies that are under the direction of the Department of Tourism. In addition, larger hotels provide their own staff training.

### IV.1.5 Possible Partner Institutions

Tourism training could be linked to history, religion, art and culture (performing arts-dance and story telling) at universities and public and private institutions. Other possible partner institutions would include maritime and ship crew training institutions for those who are mobile and can transfer their hotel and hospitality skills to other areas of similar service providers.

### IV.1.6 Possible Threats and Weaknesses

- A failure to replace and develop the infrastructure needed for tourism could hamper additional growth of the tourism industry. Massive tourism from international sources will only be attracted to the region if there is "easy access" i.e., direct flights to and from Sabang (as is part of the Sabang development plan) and/or Banda Aceh. Road improvements are needed to get to sites of interest. If coral reef "adventure tourism" is to expand, care must be taken to preserve existing coral reef which is counter to massive tourism and high levels of shipping which tends to pollute the waters from lack of proper waste management.
- If the peace agreement does not hold, security risks will continue to hamper expansion. Also if the religious conservatives are successful in stopping foreign tourism due to disapproval of "Western ways" – such as alcohol use and "non-exposure" attire for women, this will also threaten the growth of tourism in the region.

### IV.1.7 Conclusion

The assessment team **does not recommend** hospitality and tourism for polytechnic development for the following reasons:

- Although there is an urgent need for infrastructure development to attract investors in tourism, currently there is little or no allocation from the government (national or provincial) either in policy or funding to support the development of the requirements for a thriving tourism industry.
- Sufficient planning on a national / regional / provincial basis has not been done to date.
- Tourism does not appear to be an economic growth area in Aceh at this time. Consequently, there is little demand for skills and thus little hope of employment for prospective graduates of any proposed hospitality and tourism schools or polytechnics while there is high competition for the few employment opportunities in the region.

## IV.2 PETROCHEMICAL INDUSTRIES

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### IV.2.1 Growth Potential

As stated earlier in the section on business and economic activities, oil, gas, and related industries such as fertilizer are on the decline in Aceh. There is potential for growth, however, if there is a strong movement toward bio-fuels and alternative energy sources which can use the capacity of the petro-industry skills and infrastructure and if that is compatible with the company's policies and vision. As the global reserves of oil diminish and the demand and costs for energy fuels continue to climb, alternative sources need to be exploited and oil companies are making adjustments to transition and remain on the cutting edge of energy technology. The costs of fuel have increased significantly enough to impact the production costs of small scale producers, where most of the population of Aceh is earning their livelihood, such that they can not afford the high costs of petro-fertilizers or fuel to operate machinery. This impacts overall economic growth all around and is a further impact on the decline of oil and gas production in the region.

### IV.2.2 Priorities and Investments by Government, Donors, and Private Sector

Government planning officials noted that oil/gas/fertilizer exports have traditionally been a large component of the gross domestic product for the region but that it is in decline. BRR budget allocations indicate funding for repairing a fuel depot and a special dock for fuel at a depot at Meulaboh. Donor help is being provided to upgrade and rebuild ports that will provide docking as well as containerized shipping facilities.

Donors and the government are providing major support for rebuilding roads, ports, and the infrastructure in Aceh. Improved infrastructure will continue to expand access and use of motorized vehicles for personal use as well as industry as recovery and additional development occurs. It is unlikely that government resources will be used to invest in the oil industry. Rather, government, private donors, and NGOs will call on the resources of the oil companies to invest in human capital (as Chevron is doing with its support of technical training in Riau and for Aceh) and to make financial and in-kind contributions to help in the recovery efforts and spur economic growth. Social responsibility is part and parcel of the company's interest in supporting human resource development in Aceh. It is in the interest of the company and of the community in which it operates.

Donors are seeking and will continue to seek partnership with the private sector to meet their objectives in helping the recovery of Aceh. GTZ and Indo-German representatives with whom the assessment team met are interested in examining bio-fuel and solar energy pilot projects to help offset some of the needs of local communities where electrical infrastructure has been destroyed and not yet restored. They also see this approach as important for job creation.

### IV.2.3 Employment Estimates and Skills Needed by Industry

Employment data indicate there are approximately 10,100 (about 0.4%) people employed by the oil/gas/and fertilizer industry in Aceh. The best estimate is that there will be a gradual decline in those numbers over the next five years.

### IV.2.4 Existing Education Providers

Politeknik Negeri Lhokseumawe is currently the only polytechnic institute in Aceh. It offers a D3 program to serve the needs of the petrochemical industries and companies in North Aceh, such as Exxon Mobil and Arun, both of which are located in the area. While these and related industries are currently downsizing, administrators of the polytechnic indicated that graduates are finding work in other industries and that they are still getting contracts for the school from local industry even though it has been more difficult lately.

### IV.2.5 Possible Partner Institutions

Regional planning, collaboration, and specialization among education providers may be areas for further exploration as a new polytechnic is established. Some collaboration already exists as PCR instructors receive some training in preparation for their teaching assignment at ATMI in Solo. This practice should be encouraged and strengthened with each polytechnic specializing in some components so as to complement more than compete.

#### IV.2.6 Possible Threats and Weaknesses

- Infrastructure improvements may stall and there is further decline in the oil/gas and related industry
- Industry may not be ready to transition to new energy source exploration and “scaling up.” It takes much more than one or two pilots by donor agencies... it takes the “big guys” in the industry to make it work.
- Collaboration may not be part of the suggested institutional “culture” of education providers. Competition for students and teachers may be too high. However, with downsizing it would seem there is a ready cadre of teachers with experience to serve as faculty and instructors.

#### IV.2.7 Conclusion

The assessment team **does not recommend** the petro-chemical industry for the focus of the new polytechnic institution, primarily because:

- The petrochemical industry in Aceh is declining.
- Skills needed by the industry are currently being met at existing institutions:
  - Politeknik Negeri Lhokseumawe in Aceh Province
  - University Syiah Kuala in Banda Aceh
  - 9 additional programs in computer science and informatics in Aceh (see Annex V)

### IV.3 TELECOMMUNICATIONS

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#### IV.3.1 Growth Potential

The assessment team determined that the telecommunications industry was likely to expand in Aceh as the infrastructure destroyed in the tsunami is replaced with additional radio and wireless communication systems and as telecommunications becomes increasingly integrated with computer technology. Since this was not an area of high priority with the government planning offices, the assessment team did not conduct an in-depth analysis of the industry. However, telecommunication should be viewed as an integrated component of maritime ship and port skills development and computer technology literacy.

#### IV.3.2 Priorities and Investments by Government, Donors, and Private Sector

In several discussions on priorities with BRR and Bappeda, there was no mention of the telecommunications sector as a priority growth industry. A review of the BRR Energy sub-sector budget and plans, however, shows line items in the budgets for rehabilitation and reconstruction of telecommunication facilities for emergency response systems. In addition, over 102 billion Rp. (about US\$ 1.2 M) is allocated in the electricity sub-sector for the repair of medium voltage air wave networks throughout the province. The use of wireless systems and cell phones is overwhelmingly pervasive at all levels of society. It is interesting to note that as an industry it is not reported as a disaggregated component in statistical analysis.

#### IV.3.3 Employment Estimates and Skills Needed by Industry

Further in-depth analysis of this industry to identify skill needs and employment trends is needed. It was extremely difficult to obtain labor assessments by industry and skills needed as most of this data did not disaggregate this information beyond the repair of infrastructure found in the BRR Energy budget items as indicated above. None of the data reviewed by the assessment team provided information on telecommunications workers, nor were they mentioned by any of the planning officials with whom the team met.

#### IV.3.4 Existing Education Providers

No existing public or private education providers at the high school level or polytechnic level (D3/D4) were found in Aceh Province that could be identified as offering a telecommunications degree program. There are nine institutions in Aceh that offer tertiary programs at the D3 & D4 level in Computer Sciences and Informatics. Computer Informatics Engineering at Universitas Jamal Gaur is the only institution providing D4 level training. These schools should be viewed as potential partners for the proposed polytechnic school for establishing the telecommunications and computer literacy components of their curriculum. No vocational high schools were identified as providing telecommunications or computer science and informatics education.

That said, discussions with the Ladong SUPM staff regarding the training received for ship board communications did include a component on telecommunications. Furthermore, it is also highly likely that many of the computer science and informatics programs will have telecommunications components as these systems become more fully integrated with additional technological advancements and as the Internet becomes more widely used.

#### IV.3.5 Possible Partner Institutions

Possible partner institutions would include private industry training schools, similar to Motorola University, and universities with telecommunications courses and programs. Military and security forces are also a source of highly trained in telecommunications experts who could be recruited for adding telecommunications to computer and technology components in multiple cross-cutting curricula.

#### IV.3.6 Possible Threats and Weaknesses

- Telecommunications is a field that is dominated by company-specific training systems where employees are trained on the systems of the company for which they are working. The weakness of such a system is that there is also a need for telecommunications specialists that can evaluate public systems. If telecommunications specialists are needed for public service, they need to be trained on multiple systems and be able to determine the value of services and evaluate effectiveness of systems used for the public infrastructure.
- By not focusing attention on the need for telecommunications training specifically and if there are not enough trained personnel in the field, telecommunications will not be built into computer literacy programming which is one of the goals of MONE.
- Telecommunications systems are increasingly connected to computer and electronic systems. Engineering them in "user friendly" modalities is becoming increasingly important as additional people and businesses become more reliant on telecommunications as an integral part of doing business.

#### IV.3.7 Conclusion

The assessment team **does not recommend** the telecommunications sector for the focus of the new polytechnic institution, mainly because:

- The telecommunications sector is not an area of high priority with the government planning offices
- Nevertheless, the team suggests to include telecommunications as part of the curriculum of the proposed new polytechnic institution as an integrated component of maritime ship and port skills development and computer technology literacy.

## IV.4 WASTE MANAGEMENT

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### IV.4.1 Growth Potential

Throughout the assessment team's field visits and in discussion with donor representatives, the need for technical training and assistance in waste management was a very visible and obvious need. There is an obvious need and large potential for growth in this area. However, there is a lack of personal and political will to invest in this area of activity. It is largely seen as a public service which people with few financial resources are likely to pay for. In fact the assessment team was advised that it is very problematic to even charge for garbage pick-up since in the past people were paid for their garbage by the collectors. It was the team's sense that perhaps there is so much focus on rehabilitation and restoration post-tsunami with overwhelming needs for infrastructure and livelihoods that the potential of this as an area of economic growth is not yet recognized.

Two donor representatives, GTZ and Indo-Germ mentioned knowledge of potential bio-fuel projects in an area where there are many ex-combatants who are beginning to re-integrate into the community and there are a few efforts in using 'green technologies' to deal with waste management.

The overall assessment by the team is that this area holds potential for economic growth but that there is little interest, commitment or demand at this time.

### IV.4.2 Priorities and Investments by Government, Donors, and Private Sector

The assessment team found that private or public representatives recognized there is a need but essentially do not have waste management in their vision for a sustainable development. If prompted to address this as an issue, officials and business representatives would agree that it is an area of need then quickly move on to another subject. If investments are going to be made in this area and if there is potential for growth in the future, it would seem likely that international donors and/or representatives would need to get some demonstration projects and / or businesses as catalyst for developing this sector.

One item in the BRR plan for rehabilitation of the fisheries and maritime development indicated a budget of 404 Billion Rp. for "coastal and small island management, inclusive of ecosystem rehabilitation." One could assume that any good ecosystem development would include systems for waste management. Thus, it cannot be said there is no priority being given to this issue, it just does not warrant a high level of investment in training at this point.

### IV.4.3 Employment Estimates and Skills Needed by Industry

Employment data provided by BPS and the Aceh Master Plan indicate that overall, public services employ approximately 8,500 (0.4%) of the working population in Aceh. A proportion of these people would likely include waste management employees though no disaggregated data were found to determine how many of these might be employed in this area. Additionally, no private companies were identified by the team that could serve as a model. Additional research would be needed if this area were to be further assessed and developed.

### IV.4.4 Existing Education Providers

The assessment team found no evidence of any education providers addressing this area.

### IV.4.5 Possible Partner Institutions

With the increasing concern over deaths from Asian bird flu and health practices, it would seem that health related institutions would be logical partners. Process industries would also be logical partners as the by-products of processing become a waste management issue, and these industries could benefit economically from partnering with bio-fuel operations and "natural fertilizer" production. As the price of oil-generated fertilizer becomes prohibitive for small land holders and the infrastructure for both agriculture and aqua-culture raises production capacity, waste management in ecologically sound ways become increasingly important.

#### IV.4.6 Possible Threats and Weaknesses

- The assessment team does not recommend developing a polytechnic institution that focuses on developing and skills focused on waste management.
- The greatest threat in not addressing issues of waste management is damage to the environment and the ecosystem that in the long run could hinder economic growth, particularly in the areas of agricultural production and tourism.
- By not managing waste or having a cadre of skilled and knowledgeable specialists who are engaged in regional and community planning processes, more damage will occur since waste management systems and costs will not be included in development strategies.
- The public and private costs of waste management grow exponentially the longer it is not addressed. By addressing waste management as a part of eco-system management, it becomes an integrated component of economic development. The biggest risk is that the demand and funding for doing so will not be included in development costs and the private sector will not invest if it has to spend a lot of money to clean up the environment to either produce or process goods.

#### IV.4.7 Conclusion

The assessment team **does not recommend** the waste management sector for the focus of the new polytechnic institution because:

- There exists little attention for the sector despite its growing importance.
- The potential of this sector as an area of economic growth is not recognized at this point of time.
- The personal and political will to invest in the sector is lacking.
- The demand to develop this sector is not present.

## V RECOMMENDATIONS: ACADEMIC PROGRAM

### V.1 OVERALL RATIONALE

The team concluded that a polytechnic covering the prime skill areas of Process Engineering, Port Operations and Management, and Shipping (Crew and Engineering) would serve the needs of all the sectors (Agro-industry, Aquaculture, Fisheries, Port operations, and Maritime / Nautical) at the operations and maintenance level of skills training. The following rationale supports this recommendation:

- Relevancy to economic activity: Economic development plans call for additional processing industries to increase Aceh revenues and add value to raw products. There are government and donor commitments to establish an industrial park, wholesale warehouses, and port and road infrastructure.
- Port and containerized shipping restoration and development is planned that will create a need for a more highly skilled workforce to attract private sector investment and meet industry demands. Indonesia is about to become signatory to and compliant with IMO (International Maritime Organization) requirements which will require higher level skills for ship engineering, ship crew and port management.
- Lack of post secondary/tertiary education in process engineering and aquaculture in Aceh Province: There are no higher level (D3/D4) post-secondary/tertiary institutions in aqua-culture, fisheries, maritime/port operations and management, even though 21% of the population is engaged in fishing and fishing related economic activities.

- Presence of "feeder" vocational high schools: There are two technical high schools in the fishing and related industry sector with 190 students that could serve as related schools to feed into the polytechnic institution. In addition, there are 15 technical high schools that offer engineering programs (primarily electrical and mechanical) and computer science and informatics.
- A top priority for economic development (BRR / Bappeda) is to expand and develop process industries to add value to agricultural and fishing raw products. A highly skilled workforce is an attraction for investors. Economic growth is expected to occur from building on the natural strengths of the region, i.e. producing agriculture, plantation products, and fish products through processing, packaging, and exporting value added products and using higher levels of appropriate technology.

#### Recommendations for Next Planning Steps:

- The assessment team recommends that an advisory board and planning team be established once the decision has been made regarding the core curriculum and location. It is recommended that members of the planning board include: local industry representatives, i.e., process industry and port and shipping representatives, government planning and vocational education representatives, and appropriate donor, vocational education curriculum experts, and the proposed polytechnic management team.
- The assessment team recommends the proposed Process Engineering and Port Operations and Management Polytechnic offer programs at the D4 level and initially focus on 6 main programs for a minimum intake of 144 students annually (6 x 24 per program) with 432 students after four years. A more detailed curriculum planning process would need to identify the six areas of concentration between process engineering and port operations and management based on further in depth analysis of industry needs in the specific location of the polytechnic site.

## V.2 PROCESS ENGINEERING

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### V.2.1 Rationale

- Regardless of the source of the raw product (fish, coffee, rice, animal products, fruit, wood, palm oil), it needs to be moved from its source, processed, transported to a port, and shipped via a port.
- Process engineering skills (electronics, mechatronics, electrical, pneumatic, computer programming, etc.) have a wide range of industrial uses (canning, freezing, packaging, etc.) adaptable to additional industry needs.
- Process engineering is currently not being provided by existing institutions (high school, diploma programs, polytechnic, or university) and more specifically, not adapted to food processing and packaging processes.

### V.2.2 Process Engineering Program: Core Curriculum & Skill Development:

- **Electronics and electrical engineering:** Graduates of this program would be able to repair, operate and maintain electrical and electronic components for packaging, and processing plants & machinery within all sectors of food production and transferable to other industries.
- **Mechatronics and pneumatics:** Graduates of this program would be able to repair, operate and maintain specific mechanical components for packaging and processing plants & machinery within all sectors of food packaging and processing with transferability to other industries.
- **Computer programming:** Graduates of this program would be able to design and troubleshoot computerized machinery that processes food products, as well as develop specific computer programs to effect specific process systems. (Both electrical and mechanical). These skills would also be transferable to other industries.
- **Marketing:** Graduates of this program would be able to understand & follow international food trends and market value-added processed foods to the international community.

## V.3 PORT OPERATIONS AND MANAGEMENT PROGRAM COMPONENTS

### V.3.1 Rationale

- Large investments in port reconstruction and facilities are planned and supported by the government and donors in Aceh.
- Additional port restoration and containerized shipping will create a need for a more highly skilled workforce in this sector.
- IMO compliance will require higher level skills for ship engineering, ship crew and port management.

### V.3.2 Port Operations and Management: Core Curriculum and Skill Development

- **Commercial air conditioning, refrigeration, and ice production:** Graduates of this program would be able to repair, operate and maintain refrigerated chiller and freezing plants, ice making facilities for the storage of processed food items, together with the operation and repair of air conditioning installations which are transferable to other industries and settings.
- **Container movement and management:** Graduates of this program would be able to operate computer controlled container operations and management within a port, together with the transportation & storage of processed foods, for national & international export. Additional three month courses could be offered in skill areas such as crane and forklift operations, dependant of industry demand.
- **Small and medium engine repair and maintenance:** Graduates of this program would be able to repair, and maintain all small engine systems such as fork lifts, outboard engines, etc. ...
- **Large engine repair and maintenance:** Graduates of this program would be able to repair, operate and maintain large boat diesel engines, truck engines, and other forms of transport drive systems.

## V.4 PROPOSED PROGRAMS: FACILITIES

The team assessed two potential sites for the proposed new polytechnic institution and did a comparative cost analysis of two types of building construction. The assessment team's **recommendations** are:

- The proposed polytechnic co-locate at the site of the SUPM Ladong Facility.
- The new polytechnic facility be constructed and resourced on the available seven hectares of land at Ladong (see section **Error! Reference source not found., Error! Reference source not found.**, - with both institutes being administered and managed by one central management unit.
- The SUPM facility in Ladong be renovated and equipped with new equipment according to current technology standards as part of the construction of the new Polytechnic.
- Short term courses are also conducted in suitable low skill areas to fulfill industry needs.
- The current student scholarship funding from the Ministry of Marine Affairs and Fisheries be continued and further subsidized through the private funding for the first three years – to allow sufficient lead time for polytechnic management to establish and implement self-funding strategies and production units.
- Tuition fees (for non-scholarship students) be within the economic reach of the average Acehnese family and should be between 500,000 Rp. and a maximum of 800,000 Rp. / year to be competitive with fees charged in Medan and other Aceh polytechnic institutes (refer to section VI.1 and Annex V)
- The operation and maintenance costs be fully subsidized for years three through seven.
- Accreditation be completed within the first two years to D4 level

## VI RECOMMENDATIONS: MANAGEMENT CONSIDERATIONS

### VI.1 TUITION COSTS

The assessment team recommends that the targeted tuition for the new polytechnic institution be in the range of Rp. 500,000 – 800,000 per year to be competitive with similar institutions in the area. Every effort should be made to keep the tuition at the minimum cost given the recovery status in Aceh and the limited resources of many families. The team also strongly recommends developing cost effective production units to offset tuition through contract work and business modeling production units at the polytechnic.

Assessment of the tuition costs at polytechnic institutions in Aceh ranged from a low of Rp. 150,000 / year to a high of Rp. 750,000 / year with the average at Rp. 425,000 per year, for those institutions with data (see Annex V). In site visits to PCR, Solo, and Surabaya, the team observed production that appeared to be quite effective and to serve as good models for helping offset the tuition for students significantly. For example, at ATMI in Solo the cost to students was Rp. 80M for three years which is reduced to Rp. 17M through contract work by the school. Not only is the contract work offsetting tuition costs, it is also used to help students gain skills in production as well as marketing and wholesale and retail product development. PCR also models this design by securing contract work for students from businesses.

This provides an effective financial support model as well as assuring strong linkages with the local business community and is an internationally accepted best practice for vocational and technical education providers.

### VI.2 LOCATION

The assessment team visited two possible locations for the proposed Process Engineering and Port Operations Polytechnic Institution. Both sites have a Foundation (Yayasan) that has been established to acquire land and to plan a polytechnic, and both have received support from government to do so. Both sites have land available to build a new polytechnic institution. Both have well-developed plans that were provided to the assessment team for analysis. While other locations are a possibility, the assessment team strongly recommends co-locating the polytechnic at the SUPM site. However, either of these sites would be preferable. Both of the preferred options save time and funding that can be used for building construction rather than land search and purchase. The following is a summary of findings for each location and of the team's recommendations.

#### VI.2.1 Co-Location with SUPM in Ladong

The assessment team **recommends** that the proposed new polytechnic facility be co-located with the SUPM at Ladong.

##### Rationale:

- Land is available for expansion;
- A strong willingness to collaborate with the USAID/Chevron Partnership on the part of the existing school leadership;
- Foundation has had plans drawn up for expanding the facility to a polytechnic and has made them available to the assessment team.
- Location is close to port operations and fisheries – it is located on a coastal hillside within sight of the Malahayati port.
- Government has already approved further development of the existing institution to the polytechnic D3/D4 level.
- Allows for a “feeder” effect for the SUPM high school students to progress to higher level skills at the proposed D4 Polytechnic.

### Challenges/Threats:

- The school is operated under the supervision of the Ministry of Marine Affairs and Fisheries and MONE (Ministry of National Education) along with an existing foundation. Coordination between two ministries and the foundation might prove difficult.
- Working out mutually agreed upon details regarding how the existing SUPM would be managed and operated along with the proposed new polytechnic under a central management system could be challenging.
- Leadership for cooperation would be necessary from all entities.

#### VI.2.1.1 Proposed Polytechnic Site with Yayasan PENA in Cot Suruy, Aceh Besar

The assessment team recommends that the Yayasan Pena site in Cot Suruy, Aceh Besar (near a road to the airport outside Banda Aceh) be considered as an alternative to co-locating with the SUPM in Ladong

#### Rationale:

- Land is available for expansion and there is a strong willingness to collaborate with the USAID/Chevron Partnership.
- Land has been surveyed and plans have been developed for a polytechnic institution focusing on agriculture and fisheries.
- Government has already approved plans and supported acquisition of the land by the Yayasan Pena.
- A foundation has been formed to provide leadership to the planning and implementation process. Plans have been made and were made available to the assessment team.

#### Challenges/Threats:

- There are 17 post secondary programs at the D3 and D4 level in Aceh Province with 10 located in Banda Aceh offering Agriculture, Engineering, Computer Sciences and Informatics. A new institution would have a high level of competition for students in the area.
- Does not have a "feeder" school nearby as is the case with the facility at Ladong.
- Coordination between the existing foundation and the USAID/Chevron Partnership regarding leadership and management roles and responsibilities.
- Reconciling current plans for an agriculture based curriculum/program versus the proposed process engineering and port operations and management curriculum
- Leadership for cooperation would be necessary from both entities.
- This site is not located near port operations.

### VI.3 LAND OWNERSHIP

Land ownership needs to be clarified at the initial stages of planning. Questions to address include: Who will hold ownership? What are the risks of owning or not owning the land? What will be the decision making process in determining land use? Does the existing institution own the land, or is it owned by the Foundation, Chevron, USAID, or the government? If the government owns the land, which Department or Ministry owns it and what impact might that have on decisions? What are the legal ramifications of ownership? What are the risk factors in land ownership by the institution or in not owning the land?

Recommendations to examine co-location at Ladong are made on the assumption that these details can be satisfactorily resolved between all stakeholders.

#### VI.4 LINKAGES WITH INDUSTRY

The assessment team has made the following recommendations to assure there are strong linkages with the industry:

- Representatives should serve on the planning and advisory board. See Annex XI, Best Practice in Vocational Education (a Summary).
- Teachers should be recruited from among experienced industry practitioners with training to apply appropriate teaching methodology and practices to their technical skill base.
- Production units serve as a linkage with the community. A possible management decision might be to assign one staff member as industry outreach coordinator who would provide leadership to securing contracts for production units as well as internships and field practica for hands-on-learning in the industry environment.

#### VI.5 MANAGEMENT STRUCTURE RECOMMENDATIONS FOR BEST PRACTICES

Pro-active management recommendations for the proposed new process engineering and port management polytechnic:

- Establish an over-arching advisory and planning board to provide guidance, strategic planning, vision and financial advice with representation from: business / industry / academic staff / local government and funding partners.
- Aim for annual student intake of 144 students (6 x 24 for the six major skill areas) for the three-year D3 programs, and that those students wishing to progress on to D4 programs can do so upon successful completion of D3.
- Employ senior management with relevant, practical industry experience to administer and operate the new facility.
- Assure that senior management and faculty have a pro-active approach to business and industry in order to facilitate student work experience, create industry-focused production programs, and involve industry in the formulation of course programs and curricula.
- Employ management and staff of the polytechnic on a non-government 3 year contract, with wage levels set to attract industry experienced personnel with extension of contract dependent on yearly performance assessments.
- Install internet server within the facility that is capable of allowing a maximum of 600 students and staff internet / research access, with an integral M.I.S (management information system) to allow staff and students to constantly monitor student progress.
- Plan for a staff to student ratio not to exceed 12:1 in any lab or workshop and 24:1 in a classroom or technology room. Management should also have the flexibility to employ part time / visiting lecturers as required.
- Provide students with career counseling and planning services
- Pursue GOI accreditation for four-year D4-level programs as well as D3 programs: pursue international accreditation for IMO certification. (international maritime organization) and initiate accreditation process within three months of beginning institution's operations
- Use tropical construction design to save on energy costs without over reliance on air conditioning.
- Subsidize operating costs of the institution for years three through seven.

(See Annex XI for additional best practices discussion)

## VII RECOMMENDATIONS: CONSTRUCTION ISSUES

### VII.1 RATIONALES FOR CONSTRUCTION

The team recommends developing a polytechnic co-located with Ladong SUPM. There are seven hectares available for development. Not having to purchase land would significantly increase the funding available for construction and equipping the polytechnic. There are five recommended core programs, i.e. 1) Electronics & Electrical Engineering; 2) Mechatronics & Pneumatics; 3) Telecommunications & Computer Networking; 4) Computer Programming & Application; and 5) Marketing. The team also identified four additional program areas for expansion and consideration. They are: 6) Commercial Air Conditioning, Refrigeration & Ice Production; 7) Container Movement & Management; 8) Small engine repair & maintenance; and 9) Large engine repair and maintenance.

#### VII.1.1 Estimated Student Body

The number of students at the new polytechnic is recommended not to exceed 24 students per department. This is to ensure that the lab facilities can sufficiently cater to all the students. By having a small class, the students can also be more engaged in classroom activities. As there are 5 programs recommended, there would be a total 144 students per year giving 432 students by year three.

#### VII.1.2 Size of Facilities

The recommended size of the proposed polytechnic building is 15,320 m<sup>2</sup> which is based on the already available development plan at SUPM. This would include a high quality main building with two floors consisting of 2,120 m<sup>2</sup> to be built in the first year of construction. The main building would include: administrative headquarters, classrooms, library, laboratories, and lecture rooms. Other support buildings would total 13,200 m<sup>2</sup> and include: laboratories, a multi-function room, space for security, warehouse, guard house, canteen, additional classrooms, offices, and sport facilities.

#### VII.1.3 Type of Design

The team recommends using of a tropical construction design. In reviewing types and costs of construction, the assessment team analyzed and compared two methods: a tropical design with minimum air conditioning, compared to a large concrete structure that is heavily dependent on air conditioning.

##### VII.1.3.1 Design Detail for Construction

Detailed construction plans must take into account Aceh's post-tsunami conditions, its tropical climate, and the availability of building material in the Aceh region. There is a need to involve the local contractors. Based on the observation at some other higher institutions (e.g. Unsyiah, ITS, PCR, ATMI, STPP Saree, Polytechnic Lhokseumawe, Polytechnic Electro ITS, Shipping Polytechnic in ITS, SUPM Ladong, SMKN 3 NAD etc), there is an urgent need to minimize the use of power consumption to reduce the maintenance and operational costs. For example, the building should consider using as much as natural lighting and ventilation as possible. However this can be achieved, theoretically, by rooms having ceilings that are not less than 4.00 meters (class room, administration, laboratory, library, dormitory, and other rooms). The ceilings for labs and the hall/multifunction room should be at least six meters. This requires considerably higher building costs initially but with less power consumption and lower operating costs later on.

All classrooms and other study rooms are suggested to have natural lights from two sides: left and right. The air circulation should use rolling ways, to make rooms cooler and to design the arrangement, type, and ventilation without too much compromising with the design and aesthetical values.

If the building construction of the PCR design will be implemented for the Polytechnic in Aceh, it needs to be adjusted to meet the operational economizing costs, the building maintenance costs, and other comforts provided by the PCR design. The building layout is also very dependent on the topography of the land where the building will be constructed.

## VII.2 COST OF CONSTRUCTIONS AND OPERATIONS

Construction is estimated to be completed over a two year timeframe; see Table 17 for a sample timeframe. The costs of the recommended polytechnic take into account building and equipment (based on the number of programs and intake students), staff development, maintenance and operational issues.

The basis of this building cost estimate was adapted from the existing plans of Academy/Polytechnic in Ladong. The unit prices follow The Decree of the Governor of Nanggroe Aceh Darussalam Province No: 050.205/295/2005 about The Government Unit Price for Building Material and Service in Nanggroe Aceh Darussalam Province for year 2006 and The Decree of the Governor of Nanggroe Aceh Darussalam Province No: 050.205/296/2005 about The Standardization of Material and Unit Price of Government Service Standard in Nanggroe Aceh Darussalam Province in year 2006.

- The cost of building a new polytechnic with a total of 15,320 m<sup>2</sup> is estimated at US\$ 10,258,900, which includes the operating costs from years three through seven (see Table 16 for details). Initial operating costs were estimated at of US\$ 322,000 in years three and four. It is estimated that these will increase to US\$ 403,000 per year in year five. The operating costs are included in the estimate for years three through seven.

Table 16: Costing Politeknik Perikanan Ladong

No	Construction Cost	Unit	Cost	Volume	Cost (US\$)		Total (US\$)
					1st Yr	2nd Yr	
1	Construction Main Building (grade 1)	m <sup>2</sup>	275	2,120	583,000	0	583,000
2	Construction Other Facilities (grade 2)	m <sup>2</sup>	230	13,200	607,200	2,428,800	3,036,000
3	Mechanical and Electrical (Incl. Genset, Out door system, Arrester and Early Streamer)	Package	210,000	1	168,000	42,000	210,000
4	Furniture (for Office, Lab, Class Room, etc)	Package	275,000	1	55,000	220,000	275,000
5	Landscaping (incl. paving, wall, re-greening)	Package	158,700	1	31,740	126,960	158,700
6	Sport Facilities	Package	16,700	1	3,340	13,360	16,700
7	Consultancy Service (DED, MC)	Package	150,000	1	150,000	0	150,000
8	Team Budget, Permit/IMB and Dedication ceremony	Package	147,500	1	59,000	88,500	147,500
	<b>Total</b>				<b>1,657,280</b>	<b>2,919,620</b>	<b>4,576,900</b>
<b>NO</b>	<b>Laboratory Equipment</b>	<b>Unit</b>	<b>Cost</b>	<b>Volume</b>	<b>1st Yr</b>	<b>2nd Yr</b>	<b>(US\$)</b>
1	Laboratories	Package	125,000	25	1,250,000	1,875,000	3,125,000
	<b>Total</b>				<b>1,250,000</b>	<b>1,875,000</b>	<b>3,125,000</b>
<b>NO</b>	<b>Staff Development</b>	<b>Unit</b>	<b>Cost</b>	<b>Volume</b>	<b>1st Yr</b>	<b>2nd Yr</b>	<b>(US\$)</b>
1	Recruitment Plan and Process, Lecturer and Instructor	Package	383,000	1	306,400	76,600	383,000
	Internship, Government Permit Process, Proposal						
	Development Fee						
2	Team Cost and Consultant for Academics Dev, 4 yr	Package	324,000	1	162,000	162,000	324,000
	<b>Total</b>				<b>468,400</b>	<b>238,600</b>	<b>707,000</b>
<b>Subsidy</b>		<b>US\$</b>			<b>Total</b>		
<b>NO</b>	<b>Operational Cost for 5 Year</b>	<b>3rd Yr</b>	<b>4th Yr</b>	<b>5th Yr</b>	<b>6th Yr</b>	<b>7th Yr</b>	<b>(US\$)</b>
1	Power	24,000	24,000	24,000	24,000	24,000	120,000
2	Staff Salary	158,000	158,000	158,000	158,000	158,000	790,000

3	Maintenance			20,000	20,000	20,000	60,000
4	Equipment replacement			60,000	60,000	60,000	180,000
5	Consumables	120,000	120,000	120,000	120,000	120,000	600,000
6	Administration Cost	20,000	20,000	20,000	20,000	20,000	100,000
	<b>Total</b>	<b>322,000</b>	<b>322,000</b>	<b>402,000</b>	<b>402,000</b>	<b>402,000</b>	<b>1,850,000</b>
	<b>Grand Total ( 5 = 1 + 2 + 3 + 4 )</b>						<b>10,258,900</b>

Specific details are provided in Annex XV and Annex XVI: Cost Details of two other Polytechnics used for comparative analysis (PCR and Yayasan PENA at Cot Suruy).

### VII.2.1 Cost Comparison with some other Polytechnics

The assessment team compared the costs of constructing the new polytechnic at Ladong with two other polytechnics, i.e PCR and Yayasan Pena. Figures used in the analysis in Table 16 are for estimation purposes only and actual costs will need to be determined relative and building design on the specific site. PCR costs are based on start up costs for that facility. However, they do provide comparison based on differences in construction design with the Ladong costing calculated on the basis of information updated from three years ago when they did their initial plan and adapted to take into account the use of a tropical design. Table 17 provides summary information and basis of costing for the PCR and PENA facilities.

Table 17: Summary of Costing

Polytechnic	Building		Laboratory		Staff devt		Operational		Total Cost US\$
	Area m <sup>2</sup>	Cost US\$	Package	Cost US\$	No	Cost US\$	Year	Cost US\$	
PCR	8,400	5,348,000	18	3,434,000	30	962,750	5	1,390,000	11,134,750
Y-PENA	13,890	4,751,350	25	3,125,000	36	707,000	5	1,850,000	10,433,350
LADONG	15,320	4,576,900	25	3,125,000	36	707,000	5	1,850,000	10,258,900

Specific details are provided in Annex XV and Annex XVI: Cost Details of two other Polytechnics used for comparative analysis (PCR and Yayasan PENA at Cot Suruy).

### VII.3 SUGGESTED TIME LINE

The team adapted a timeline from that found in the documentation regarding the development and construction of the PCR facility. Its suggested timeline is provided below. It is important to note that the timeline naturally will be subject to adjustment as decisions are made and implementation deadlines set.

Table 18: Suggested Time Line

NO	DESCRIPTION	TIME LINE																							
		2006				2007				2008				2009				2010				2011			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	<b>Phase - I</b>																								
	Identify Polytechnic Requirements																								
	Develop Recommendation & Business Case																								
	Present to Government & Obtain Agreement																								
2	<b>Phase - II</b>																								
	Prepare Foundation, Legal Permit, other Administrative Matters																								
	Develop Detailed Plan for Design, Building, Equipment, Cost																								
	Develop Relations with IT S, IT B, Government																								
3	<b>Phase - III</b>																								
	Identify Business Partner(s) to Build the Polytechnic																								
	Prepare Land for Building Development																								
	Develop Laboratory Equipment Plan																								
4	<b>Phase - IV</b>																								
	Recruit Lecturers, Instructors, and Management																								
	Construction of each Building Module																								
	Specification, and Purchase of Equipment and Resources																								
	Recruit Best Students																								
5	<b>Phase - V</b>																								
	Conduct Inauguration																								
	Operate the Polytechnic																								
	Formally Hand Over to the Polytechnic Management																								

#### VII.4 BUILDING DESIGN AND COST SUSTAINABILITY

A major criterion for the assessment team’s recommendation for building construction recommendations was the sustainability of the institution given the costs for electricity and power. Most institutions’ administrators interviewed by the team were concerned about rising electricity costs. An announcement in the Jakarta Post in March, 2006 indicated that cell phone companies had determined timing was not correct to raise prices because the costs of electricity were scheduled to be raised by 18-46% within the next month. Electrical power back-up systems are necessary because there are frequent power outages. One of the ways to address this issue is to use a construction design that takes advantage of natural air currents, when possible, and uses air conditioning only where it is absolutely necessary, such as in laboratories or places where computers need to be kept cool.

To better understand the cost differences, the team did a “side by side” analysis of the same spatial area using 10%, 20% and 30%, and 40% of the area air conditioned (Table 19 below). The table shows the amount of savings that can be realized when the amount of air conditioning is varied, such as 10% air conditioning costing 20M Rp./year compared to 40% costing 86M Rp./year. This comparison offers supporting evidence to the advantages of a tropical construction design with limited air conditioning in terms of long term cost savings for sustainability.

The assessment team therefore concluded that the use of a tropical construction design along with limited air conditioning provides the best option for sustainability at the least annual operating cost over time.

Table 19: Example of Cost Estimation for Electricity Need for Air Conditioning

Tariff group S2-197000		(S2 is for a social or educational establishment)	
Fixed cost/month		Rp.6,008,500	
Area 30 m <sup>2</sup> needs AC	1	pK	
1 pK	746	W	
Total area	7600	m <sup>2</sup>	
10 % area air-conditioned	760	m <sup>2</sup>	
pK needed	25	pK	
Watt needed	18899	W	
Total working hours	10	hour/day	
Total working days	24	day/month	
Total kWh for AC	4536	kWh/month	
Electricity cost only for AC	1.7	Rp million/month*	
Month	12	months	
<b>Total cost only for AC</b>	<b>20.4</b>	<b>Rp million/year</b>	
Area 30 m <sup>2</sup> needs AC	1	pK	
1PK	746	W	
Total area	7600	m <sup>2</sup>	
20 % area air-conditioned	1520	m <sup>2</sup>	
pK needed	51	pK	
Watt needed	37797	W	
Total working hours	10	h	
Total working days	24	d	
Total kWh for AC	9071	kWh/month	
Electricity cost only for AC	3.5	Rp million/month*	
Month	12	months	
<b>Total cost only for AC</b>	<b>42</b>	<b>Rp million/year</b>	
Area 30 m <sup>2</sup> needs AC	1	pK	
1 pK	746	W	
Total area	7600	m <sup>2</sup>	
30 % area air-conditioned	2280	m <sup>2</sup>	
pK needed	76	pK	
Watt needed	56696	W	
Total working hours	10	h	
Total working days	24	d	
Total kWh for AC	13607	kWh/month	
Electricity cost only for AC	5.3	Rp million/month*	
Month	12	months	
<b>Total cost only for AC</b>	<b>63</b>	<b>Rp million/year</b>	
Area 30 m <sup>2</sup> needs AC	1	pK	
1PK	746	W	
Total area	7600	m <sup>2</sup>	
40 % area air-conditioned	3040	m <sup>2</sup>	
pK needed	101	pK	
Watt needed	75595	W	
Total working hours	10	h	
Total working days	24	d	
Total kWh for AC	18143	kWh/month	
Electricity cost only for AC	7.2	Rp million/month	
Month	12	months	
<b>Total cost only for AC</b>	<b>86.4</b>	<b>Rp million/year</b>	

\* Estimated using Bill Estimation Query in www.pln.co.id

## ANNEX I COMPARISON OF DELIVERABLES TO REPORT

Table 20: Comparison Deliverables vs. Report Tables

Deliverable	Report Table Number	Page
Table(s) summarizing anticipated employment numbers during reconstruction and after by industry, business, and skill	Table 2: Aceh Population, Employment, Level of Poverty Pre- and Post-Tsunami	14
	Table 3: Workforce and Unemployment Percentages by Level of Education in 2004 in Aceh	15
	Table 8: Employment Trends in Aceh from Estimates in Seven Sectors Examined	20
	Table 9: Aceh Labor Force (Manpower) Projections by Age Group 2003 – 2010 with North Sumatra Totals	21
	Table 10: Participation in the Labor Force Disaggregated by Sex in Aceh	22
	Table 11: Job Seekers (Unemployment) by Level of Education and Gender	22
	Table 12: Manpower Requirements for Fishing Boats at International/National/NAD Levels	25
	Table 13: Employment Trends in the Aqua-culture, Fisheries and Maritime Sectors	26
	Table 14: Aceh Master Plan Port Reconstruction	29
	Table 15: Employment Trends in the Agriculture and Animal Husbandry Sector	33
Table(s) summarizing high school graduates - how many students from SMU, SMA, SMK; how many continue to technical and non-technical education.	Table 27: Employment and Unemployment in Aceh Province	84
	Table 4: Aceh High School Graduates Accepted into University & Attending Polytechnic Institutions (D3 / D4)	17
Table(s) summarizing existing providers of technical education in Aceh – location, student enrollment, number of lecturers, type of degree(s), type of program(s), public or private, institutional link-ages to potential employers, approximate tuition costs, what students do after graduation.	Table 5: Summary of Vocational High Schools (SMKs) in Aceh by Subjects Offered with Type of Institution and Student Teacher Ratios	17
	Table 6: Aceh High Schools: Schools, Students, Teachers, Student/Teacher Ratio Compared to SMKs	19
	Table 7: Summary of Post Secondary Vocational/Technical Education (D3 and D4 Levels) in Aceh by <b>Subject</b>	19
	Table 21: Providers of Vocational and Technical Education in Aceh by Location	64
	Table 22: Vocational High Schools (SMKs): Location, Subject, Number of Students and Teachers, and Student to Teacher (S/T Ratio) under Aceh Office of Education	68
	Table 23: Providers of Technical Education in Aceh by Subject Area	70
	Table 24: National Vocational High School Skill Areas	73

Table(s) summarizing approximate start-up and operational costs of existing providers of technical education in Aceh.	Table 16: Costing Politeknik Perikanan Ladong Table 28: Costing PCR Table 29: Costing Politeknik NAD Table 17: Summary of Costing Table 18: Suggested Time Line	48 94 96 49 50
Table reflecting financial and operational issues	Table 19: Example of Cost Estimation for Electricity Need for Air Conditioning	51
Table(s) reflecting budget estimates related to construction and building costs.	(see above tables)	
Table summarizing Acehnese enrollment at institutes of higher education in Medan.	After review and analysis of enrollment data from one school in Medan, the team determined that short of interviewing a random number of students in each of several higher education institutions in Medan, the information provided from enrollment alone was not sufficient to draw accurate conclusions or trends, and was beyond the time and level of effort of this assessment.	
Recommendations including multiple options that discuss options, considerations to ensure sustainability of the project with clear rationale and indication of advantages and drawbacks among options, which is recommended and why.	Table 1: Summary of Sectors Considered Table 16: Costing Politeknik Perikanan Ladong Table 28: Costing PCR Table 29: Costing Politeknik NAD	12 48 94 96
Appendices and tables containing additional background or descriptive information.	Table 20: Comparison Deliverables vs. Report Tables Table 24: National Vocational High School Skill Areas Table 25: Typical VET Systems Table 26: Best Practice of Relevant VETS	52 73 81 82

## ANNEX II LIST OF CONTACTS

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## ANNEX III SURVEY QUESTIONNAIRE

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Organization: \_\_\_\_\_

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Phone Number (Office) \_\_\_\_\_ (Mobile) \_\_\_\_\_

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**Purpose:** to identify possible options for strengthening the quality, relevance and access to vocational/ technical education in Aceh province.

The objective of the USAID / Chevron Alliance is to increase the capacity of Acehnese people, particularly women, to participate in reconstruction, obtain employment and support overall economic development in Aceh province.

The purpose of this assessment is to identify existing capacity and technical skill needs for sustainable, longer term, technical and vocational training required for long-term sustainable economic recovery of the Aceh region.

### 5. Is there a demand for vocational/technical education?

Labor and skills requirements

- What is the current critical labor demand for 2006-07 reconstruction?
- What specific skills are needed for road construction, water and sanitation and housing projects?
- What is the current participation level of women / in what skill areas?
- Which skill areas of reconstruction can realistically be filled by women?
- Projected labour demands for longer term economic development 2007-12?
- What skills are most lacking?
- What general business / enterprise skills are required? Such as entrepreneurship/micro-enterprise and SME training and Skills?
- What skills are being filled by external (non-Aceh) labour?

### 6. Industry Questions Specific to Aceh

- What industry / business is currently active?
- What are the anticipated growth sectors / industries in the province? (Fishing, Agri, General business, Boat building, Hospitality and Eco Tourism, Medical and Health Services, Ports (Sabang)?
- What are the projected skill needs for those anticipated growth sectors?
- What skills are currently being taught by existing programs to meet skill needs for growth?
- What are the gaps in supply and demand of needed skills?
- Which skill areas can realistically be filled by women?

- What is the current participation level of women / in what skill areas?
- Where are the jobs / skills more likely to be located?
- Is micro-financing available? What? With Whom?
- Is existing training linked to potential employment/employers?
- Is there an unmet demand for specific areas of technical education?
- What are the options for fulfilling this demand?
- Are there currently apprenticeships and internships available for practical “hands on learning”?
- Could apprenticeships and internships be made available with economic growth industries?

#### 7. General Education Questions

- What is the current 5 year plan for vocation/technical training in Aceh province?
- What are the priority sectors of technical education in Aceh?
- What are the trends in technical high school education in Aceh?
- What fields of post secondary technical education are currently provided in Aceh?
- How many students 1) are enrolled? 2) How many graduate from SMA, SMU and SMK in Aceh?
- Is the level of Math and Science sufficient for students to continue into Technical Education?
- How many students continue to Higher Vocational/Technical Education?
  - Who goes to Medan?
  - % who graduate HE from Aceh?
  - In what subjects?
- Should there be support be for formal or non- formal Voc. Tech. Education?
- What are other donors and Gov. agencies are providing support to SMK?
- What are the (industry, business, service) sector priorities for skills?
  - Equipment appropriate and up to date?
  - Tuition Costs?
  - Facilities location (distance? On-sight?)
  - Quality of Instruction?
  - Employment Opportunities?
  - Certification?

#### 8. What are Key Vocational/Technical Facility design recommendations to meet demands?

##### Students

- What programs / courses should be offered? – (Same as Riau or longer term)
- What is the target enrolment?
- What is the acceptable age range of students?

### Staff

- From where would teachers be recruited?
- What is the current supply and ability of teachers / instructors?
- How do they gain their skills – institute taught or industry?
- What would be the number of teachers required, and required qualification level?

### Location

- What kind of facility should be provided (Modular, Multi, Individual)
- Where should it be located?
- Should it have dormitory facilities?
- What will be the role of Industry in providing resources, skill needs assessments, and mentoring?

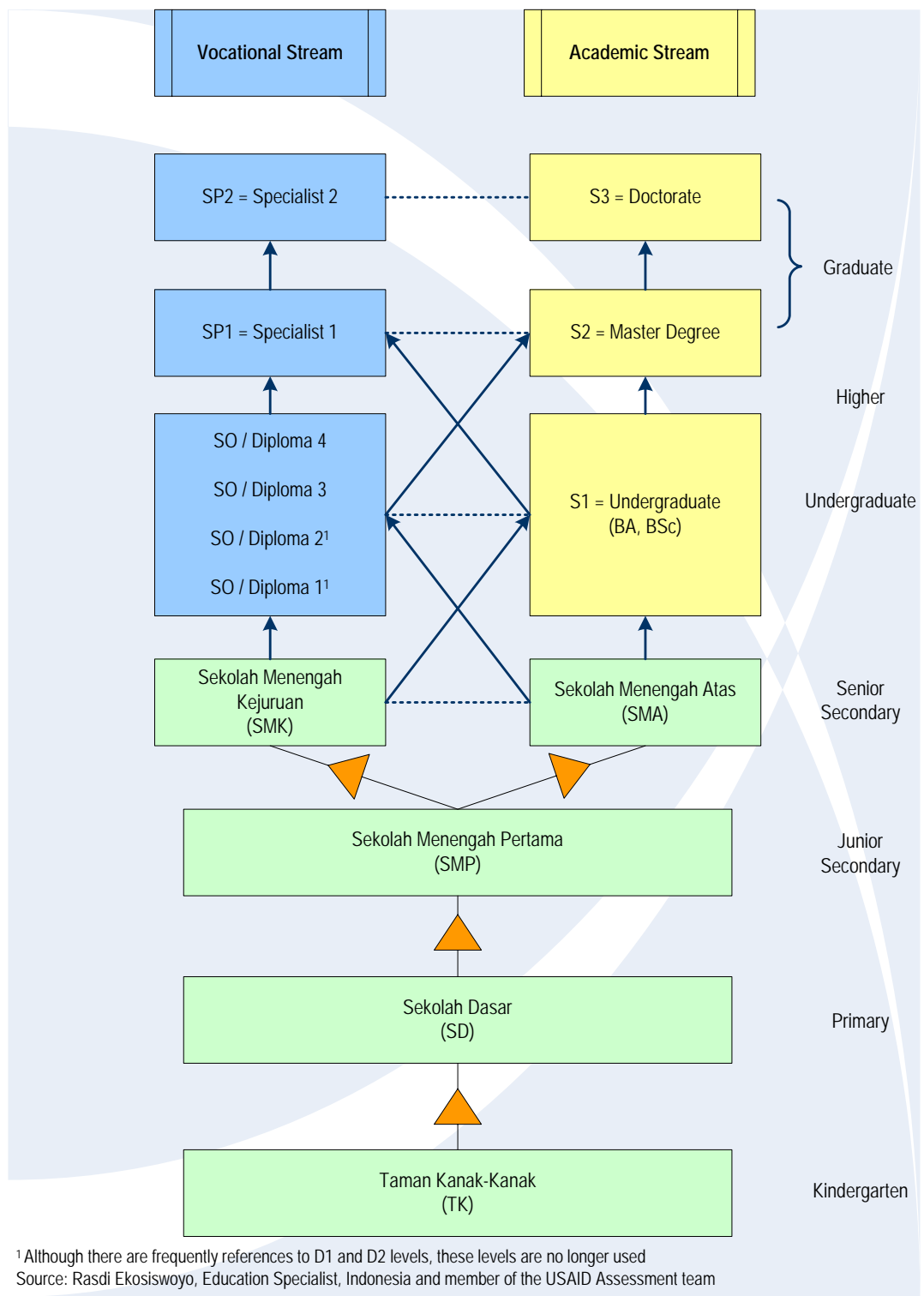
### Facilities

- Are there current facilities that can be upgraded?
- Liaison / combined use of resources with other institutes?
- Private? / Public? / Partnership? – What ownership model?
- What will be the management model?
- Type of Building requirements? – Options?
- Estimated cost of construction and equipment for each option?
- Estimated construction time required?

### Finance and Funding

- What is the current financial model of other similar institutes?
- Can the institute be run successfully without government funding? Without private funding?
- How long should financial support come from USAID/ Chevron?
- Estimated start up / operational costs (for first 3 years?) – (based on Riau?)
- What are the realistic levels of tuition costs to provide even student participation from all socio- economic levels?
- Would “In – kind” contributions be acceptable?
- Would industry scholarships be available?
- What would be the Industry contribution to on- going costs? (Levy? Input of resources? Etc.)

**ANNEX IV PUBLIC EDUCATION SYSTEM OF INDONESIA**



## ANNEX V PROVIDERS OF VOC. / TECH. EDUCATION IN ACEH BY LOCATION

Table 21: Providers of Vocational and Technical Education in Aceh by Location

– location, student enrollment, number of lecturers type of degree(s), type of program(s), public or private, institutional linkages to potential employers, approximate tuition costs, what students do after graduation

Regency/City	Academy/Sekolah Tinggi	Subject	Level	Status	No of students	No of teachers	Tuition fees (Rp. 000/year)	Est.
Aceh Barat	Sekolah Tinggi Ilmu Manajemen Meulaboh	Management	D3	Private	na	na	na	na
Aceh Barat	Sekolah Tinggi Pertanian YP. Tgk. Dirundeng Meulaboh	Agriculture	D3	Private	na	na	na	na
		Socio-economic of Agriculture	D3		na	na	na	na
Aceh Tenggara	Akademi Manajemen Gunung Leuser	Finance and marketing management	D3	Private	na	na	na	na
Banda Aceh	Akademi Keuangan dan Perbankan Getsempena Banda Aceh	Finance and banking	D3	Private	na	na	na	1999
Banda Aceh	Akademi Keuangan dan Perbankan Nusantara	Finance and banking, trade administration	D3	Private	122	32 <sup>x</sup>	400	1998
Banda Aceh	Akademi Manajemen Banda Aceh	Company management	D3	Private	40	24 <sup>x</sup>	405	1970
Banda Aceh	Akademi Manajemen Informatika dan Komputer Indonesia Banda Aceh	Informatics management	D3	Private	590	63 <sup>x</sup>	505	1992
Banda Aceh	Akademi Pariwisata Muhammadiyah Banda Aceh	Hotel management	D3	Private	196	26 <sup>x</sup>	400	1993
Banda Aceh	Akademi Pertanian Iskandar Muda	Agriculture	D3	Private	na	na	na	1984
Banda Aceh	Akademi Sekretaris dan Manajemen Nusantara Banda Aceh	Management and secretariats	D3	Private	230	35 <sup>x</sup>	400	1993
Banda Aceh	Akademi Teknik Iskandar Muda Banda Aceh	Civil and mechanical engineering	D3	Private	362	19 <sup>x</sup>	370	1983
Banda Aceh	Akademi Teknologi Industri Cut Meutia	Chemical and industrial management engineering	D3	Private	208	59 <sup>x</sup>	750	1987
Banda Aceh	Sekolah Tinggi Ilmu Ekonomi Indonesia (STIEI) Banda Aceh	Finance and banking	D3	Private	1888*	74 <sup>x</sup>	600	1985
Banda Aceh	Sekolah Tinggi Ilmu Kehutanan Pante Kulu Banda Aceh	Forest management	D3	Private	1703*	172 <sup>x</sup>	500	1987
Banda Aceh	Sekolah Tinggi Ilmu Kesehatan (STIKES) U'Budiyah	Midwifery	D3	Private	na	na	na	na

Regency/City	Academy/Sekolah Tinggi	Subject	Level	Status	No of students	No of teachers	Tuition fees (Rp. 000/year)	Est.
Banda Aceh	Sekolah Tinggi Ilmu Manajemen Banda Aceh	Management	D3	Private	na	na	na	na
Banda Aceh	Sekolah Tinggi Ilmu Pendidikan (STKIP) Bina Bangsa Getsempena	Elementary school teacher training	D2	Private	na	na	na	na
Banda Aceh	Sekolah Tinggi Ilmu Pendidikan (STKIP) Bina Bangsa Getsempena	Pre-school teacher training	D2	Private	na	na	na	na
Banda Aceh	Sekolah Tinggi Manajemen dan Ilmu Komputer (STMIK) Abulyatama	Informatics management	D3	Private	na	na	na	na
Banda Aceh	Universitas Abulyatama	Biology pedagogy	D3	Private	5473*	478 <sup>x</sup>	150	1984
		Electrical engineering pedagogy	D3					
		English pedagogy	D3					
		Exercise, health, recreation	D3					
		Indonesian language and literature	D3					
		Mathematics pedagogy	D3					
		Non-formal education	D3					
		Nursing	D3					
Banda Aceh	Universitas Muhammadiyah	Accounting	D3	Private	693	145 <sup>x</sup>	525	1987 <sup>+</sup>
Banda Aceh	Universitas Serambi Mekkah	Environmental health	D3	Private	na	na	na	na
Banda Aceh	Universitas Syiah Kuala	Accounting	D3	Public	79	b	~500	na
		Agribusiness	D3		18	e		2003
		Animal husbandry	D3		23	d		2001
		Banking	D3		66	b		na
		Chemical engineering	D3		13	c		2000
		Civil engineering	D3		71	c		2000
		Computer sciences and informatics management	D3		48	f		1999
		Cooperative business	D3		45	b		na
		Electrical engineering	D3		22	c		2000

Regency/City	Academy/Sekolah Tinggi	Subject	Level	Status	No of students	No of teachers	Tuition fees (Rp. 000/year)	Est.
		Elementary school sports teacher training	D2		140	a		2002
		Elementary school teacher training	D2		264	a		2002
		Instrumentation and computation	D3		37	f		2000
		Marketing	D3		76	b		na
		Mechanical engineering	D3		33	c		2000
		Pre-school teacher training(stopped in 2005)	D2		31	a		2004
		Secretariats	D3		56	b		na
		Tax	D3		73	b		na
Bireuen	Universitas Al Muslim Bireuen	Informatics management	D3	Private	na	na	na	na
Langsa	Sekolah Tinggi Ekonomi Manajemen (STIM) Pase Langsa	Management and secretariats	D3	Private	616*	96 <sup>x</sup>	400	1992
Lhokseumawe	Akademi Keuangan dan Perbankan Nasional Lhokseumawe	Finance and banking	D3	Private	na	na	na	1999
Lhokseumawe	Akademi Sekretari dan Manajemen Tanah Rencong	Office management	D3	Private	160	36 <sup>x</sup>	150	1987
Lhokseumawe	Politeknik Negeri Lhokseumawe	Chemical engineering	D3	Public	~1500	276	~401	1987
		Civil engineering	D3 and D4					
		Electrical engineering	D3					
		Mechanical engineering	D3					
		Trading management	D3					
Lhokseumawe	Sekolah Tinggi Manajemen Informatika dan Komputer Bina Bangsa	Informatics engineering	D3	Private	na	na	na	na
		Informatics management	D3		na	na	na	na
Pidie	Akademi Manajemen Informatika dan Komputer Jabal Ghafur Sigli	Informatics management	D3	Private	na	na	na	1997
Pidie	Universitas Jabal Ghafur	Accounting	D3	Private	2363*	194 <sup>x</sup>	350	1982+
		Biology	D3					
		Chemistry	D3					

Regency/City	Academy/Sekolah Tinggi	Subject	Level	Status	No of students	No of teachers	Tuition fees (Rp. 000/year)	Est.
		Computer Informatics Engineering	D4					
		English pedagogy	D3					
		Finance	D3					
		Indonesian Language and literature	D3					

Data for public institutions were from corresponding institutions and data for private institutions were from Kopertis I <http://www.pts.co.id/>

<sup>a</sup> Staff from Faculty of Teacher Training, <sup>b</sup> Staff from Faculty of Economics, <sup>c</sup> Staff from Faculty of Engineering, <sup>d</sup> Staff from faculty of Vet. Science, <sup>e</sup> Staff from faculty of Agriculture, <sup>f</sup> Staff from faculty of Math and Natural Sciences, <sup>x</sup> including non-permanent teachers, \* including S1 students, + the establishment of the University

## ANNEX VI VOCATIONAL HIGH SCHOOLS (SMKS) IN ACEH BY LOCATION

**Table 22: Vocational High Schools (SMKs): Location, Subject, Number of Students and Teachers, and Student to Teacher (S/T Ratio) under Aceh Office of Education**

(2002 data from Aceh Office of Education)

Regency/City	SMK	Subject	Status	No of students	No of teachers	S/T Ratio
Aceh Besar	SMK 1 Jantho	Agriculture / animal husbandry	Private	150	30	5
Aceh Besar	SMK Jantho	Agriculture / animal husbandry	Private	?	8	
Aceh Selatan	SMK 2 Kluet Utara	Agriculture / animal husbandry	State	79	19	4
Aceh Singkil	SMK Pert. Yashafa	Agriculture / animal husbandry	Private	?	?	
Aceh Tengah	SMK 1 Pegasing	Agriculture / animal husbandry	State	308	59	5
Aceh Timur	SMK 1 Peurelak	Agriculture / animal husbandry	State	201	25	8
Aceh Utara	SMK 1 Lhoksukon	Agriculture / animal husbandry	State	186	26	7
Aceh Besar	SMK 1 Mesjid Raya	Art and craft	State	149	31	5
Lhokseumawe	SMK 4 Lhokseumawe	Art and craft	State	197	27	7
Aceh Barat	SMK 2 Meulaboh	Industrial engineering	State	1012	74	14
Aceh Tamiang	SMK Maimun Habsyah	Industrial engineering	Private	277	22	13
Aceh Tenggara	SMK Darul Amin	Industrial engineering	Private	93	13	7
Banda Aceh	SMK 2 Banda Aceh	Industrial engineering	State	1305	141	9
Banda Aceh	SMK Muda Sedia	Industrial engineering	Private	164	48	3
Banda Aceh	SMK Muhammadiyah	Industrial engineering	Private	301	33	9
Bireuen	SMK 1 Jeumpa	Industrial engineering	State	1063	86	12
Bireuen	SMK ReKayasa	Industrial engineering	Private	354	45	8
Kota Langsa	SMK 2 Langsa	Industrial engineering	State	1169	107	11
Kota Langsa	SMK Cut Nyak Dhien 2	Industrial engineering	Private	462	33	14
Lhokseumawe	SMK PGRI Lhokseumawe	Industrial engineering	Private			
Lhokseumawe	SMK Karya Beringin	Industrial engineering	Private	269	32	8
Pidie	SMK 2 Sigli	Industrial engineering	State	578	40	14
Pidie	SMK Lilawangsa	Industrial engineering	Private	325	32	10
Pidie	SMK Mutiara	Industrial engineering	Private	101	14	7
Bireuen	SMK Kimia PGRI	Industrial engineering/chemistry	Private	187	33	6
Aceh Barat	SMK 1 Meulaboh	Management business	State	542	34	16
Aceh Barat Daya	SMK Blang Pidie	Management business	Private	119	15	8
Aceh Selatan	SMK 1 Tapaktuan	Management business	State	382	32	12
Aceh Singkil	SMK Simpang Kiri	Management business	Private	294	19	15
Aceh Tamiang	SMK Banta Achmad	Management business	Private	446	39	11
Aceh Tengah	SMK 1 Takengon	Management business	State	924	59	16
Aceh Tenggara	SMK 1 Kutacane	Management business	State	686	31	22

Regency/City	SMK	Subject	Status	No of students	No of teachers	S/T Ratio
Aceh Tenggara	SMK Ulang Kisat	Management business	Private	?	12	
Aceh Utara	SMK Harapan Bangsa	Management business	Private	124	18	7
Aceh Utara	SMK Dewantara	Management business	Private	144	15	10
Banda Aceh	SMK 1 Banda Aceh	Management business	State	802	57	14
Banda Aceh	SMK Cut Meutia	Management business	Private	121	11	11
Bireuen	SMK 1 Peusangan	Management business	State	556	44	13
Kota Langsa	SMK 1 Langsa	Management business	State	711	46	15
Kota Langsa	SMK Cut Nyak Dhien 1	Management business	Private	354	34	10
Kota Langsa	SMK Al Wasliyah	Management business	Private	130	25	5
Lhokseumawe	SMK 1 Lhokseumawe	Management business	State	925	56	17
Lhokseumawe	SMK 3 Lhokseumawe	Management business	State	799	47	17
Pidie	SMK 1 Sigli	Management business	State	666	43	15
Pidie	SMK Tunas Harapan	Management business	Private	182	23	8
Pidie	SMK Al-Fitri Mutiara	Management business	Private	?	25	
Sabang	SMK 1 Sabang	Management business	State	306	23	13
Simeulue	SMK Dt. Mohd Zein	Management business	State	229	20	11
Banda Aceh	SMK 4 Banda Aceh	Nautical marine fishery	State	?	?	
Pidie	SMK 3 Sigli	Nautical marine fishery	State	?	?	
Sabang	SMK Perkapalan	Ships engineering	Private	?	16	
Aceh Barat	SMK 3 Meulaboh	Tourism/Hospitality	State	104	35	3
Banda Aceh	SMK 3 Banda Aceh	Tourism/Hospitality	State	541	67	8
Kota Langsa	SMK 3 Langsa	Tourism/Hospitality	State	430	49	9
Lhokseumawe	SMK 2 Lhokseumawe	Tourism/Hospitality	State	228	45	5
			26 Private	22,073	1,918	12
Total	55 Institutions	8 Subject Areas	29 Public	25,268(a)	2,068 (b)	12

(a) Estimated total # of students calculated by the adding the average # of students (459) X 8 schools with missing data

(b) Estimated total # of teachers calculated by adding the average # of teacher /school X 4 schools with missing data

Average Student to Teacher Ratio: 12: 1

## ANNEX VII PROVIDERS OF TECHNICAL EDUCATION IN ACEH BY SUBJECT AREA

- By Subject Area, Level, Status and Number of Students

Table 23: Providers of Technical Education in Aceh by Subject Area

Category	Subject	Academy/Sekolah Tinggi	Level	Status	Region/City	No of students	
Agriculture, Agro-Business, Animal Husbandry	Agriculture	Akademi Pertanian Iskandar Muda (destroyed in tsunami)	D3	Private	Banda Aceh	NA	
		Sekolah Tinggi Pertanian YP. Tgk. Dirundeng Meulaboh	D3	Private	Aceh Barat	NA	
	Agribusiness	Universitas Syiah Kuala (Unsyiah)	D3	Public	Banda Aceh	18	
	Animal husbandry	Universitas Syiah Kuala (Unsyiah)	D3	Public	Banda Aceh	23	
	Socio-economic of Agriculture	Sekolah Tinggi Pertanian YP. Tgk. Dirundeng Meulaboh	D3	Private	Aceh Barat	NA	
	Agriculture and animal husbandry	Agriculture and animal husbandry	Sekolah Tinggi Penyuluhan Pertanian Saree	D4	Public	Aceh Besar	120
			SMK 1 Jantho	High school	Public	Aceh Besar	150
			SMK 1 Lhoksukon	High school	Public	Aceh Utara	186
			SMK 1 Pegasing	High school	Public	Aceh Tengah	308
			SMK 1 Peurelak	High school	Public	Aceh Timur	201
			SMK 2 Kluet Utara	High school	Public	Aceh Selatan	79
			SMK Jantho	High school	Private	Aceh Besar	NA
			SMK Pert. Yashafa	High school	Private	Aceh Singkil	NA
			SPMA Saree	High school	Public	Aceh Besar	360
Summary Information		(8) High Schools, (5) D3 (1) D4	(9) Public Institutions (5) Private Institutions		1,445		
Fisheries* Aqua-Culture	Nautical marine fishery, aqua-culture	SUPM Ladong	High school	Public	Aceh Besar	120	
	Nautical marine fishery	SMK 4 Banda Aceh (destroyed in tsunami)	High school	Public	Banda Aceh	NA	
	Nautical marine fishery	SMK 3 Sigli	High school	Public	Sabang	NA	
	Summary Information		(3) High Schools	3 Public Institutions		120	
Engineering (Process and Marine/ship)	Ships engineering	SMK Perkapalan	High school	Private	Sabang	NA	

	Mechanical Engineering	Politeknik Negeri Lhokseumawe	D3	Public	Lhokseumawe	375
		Universitas Syiah Kuala	D3	Public	Banda Aceh	33
	Electrical engineering	Politeknik Negeri Lhokseumawe	D3	Public	Lhokseumawe	375
		Universitas Syiah Kuala	D3	Public	Banda Aceh	22
	Industrial Engineering	SMK 2 Meulaboh	High school	Public	Aceh Barat	1,012
		SMK Maimun Habsyah	High school	Private	Aceh Tamiang	277
		SMK Darul Amin	High school	Private	Aceh Tenggara	93
		SMK 2 Banda Aceh	High school	Public	Banda Aceh	1,305
		SMK Muda Sedia	High school	Private	Banda Aceh	164
		SMK Muhammadiyah	High school	Private	Banda Aceh	301
		SMK 1 Jeumpa	High school	Public	Bireuen	1,063
		SMK Rekayasa	High school	Private	Bireuen	354
		SMK 2 Langsa	High school	Public	Kota Langsa	1,169
		SMK Cut Nyak Dhien 2	High school	Private	Kota Langsa	462
		SMK PGRI Lhokseumawe	High school	Private	Lhokseumawe	NA
		SMK Karya Beringin	High school	Private	Lhokseumawe	269
		SMK 2 Sigli	High school	Public	Pidie	578
		SMK Lilawangsa	High school	Private	Pidie	325
		SMK Mutiara	High school	Private	Pidie	101
	<b>Summary Information</b>		<b>(15) High Schools</b> <b>(4) D3</b> <b>(0) D4</b>	<b>(9) Public Institutions</b> <b>(10) Private Institutions</b>		<b>8,278</b>
<b>Computer Sciences and Information Mgt.</b>	Computer sciences and informatics management	Universitas Syiah Kuala	D3	Public	Banda Aceh	48
	Informatics	Akademi Manajemen Informatika dan Komputer Indonesia	D3	Private	Banda Aceh	590
		Akademi Manajemen Informatika dan Komputer Jabal Gha-fur Sigli	D3	Private	Pidie	NA
		Sekolah Tinggi Manajemen dan Ilmu Komputer (STMIK) Abulyatama	D3	Private	Banda Aceh	NA
		Sekolah Tinggi Manajemen Informatika dan Komputer Bina Bangsa	D3	Private	Lhokseumawe	NA
		Universitas Al Muslim Bireuen	D3	Private	Bireuen	NA
	Informatics Engineering	Sekolah Tinggi Manajemen Informatika dan Komputer Bina	D3	Private	Lhokseumawe	NA

		Bangsa				
		Universitas Jabal Ghafur	D4	Private	Pidie	NA
	Instrumentation and computation	Universitas Syiah Kuala	D3	Public	Banda Aceh	37
	<b>Summary Information</b>	(2) Public Institutions and (7) Private Institutions	<b>(8) D3 Level (1) D4 Level Institutions</b>	<b>(2)Public (7) Private Institutions</b>		<b>675</b>
<b>Tourism related</b>	Hotel management	Akademi Pariwisata Muhammadiyah Banda Aceh	D3	Private	Banda Aceh	196
	Tourism/Hospitality	SMK 3 Meulaboh	High school	Public	Aceh Barat	104
		SMK 3 Banda Aceh	High school	Public	Banda Aceh	541
		SMK 3 Langsa	High school	Public	Kota Langsa	430
		SMK 2 Lhokseumawe	High school	Public	Lhokseumawe	228
<b>Summary Information</b>	<b>(4) High Schools, (1) D3 Level and (0) D4 Level Institutions</b> (4) Public Institutions and (1) Private Institutions	<b>(4) High Schools (1)D3 (0) D4</b>	<b>(4) Public (1) Private Institutions</b>		<b>1,499</b>	
					<b>Total</b>	<b>12,107</b>

\*Note: There are 8 fishery institutions under the Ministry of Marine Affairs and Fisheries.

## ANNEX VIII NATIONAL VOCATIONAL HIGH SCHOOL SKILL AREAS

Table 24: National Vocational High School Skill Areas

No	Skill Area	Program
1	Building engineering	Steel and aluminium construction engineering
2		Building drawing engineering
3		Wood construction engineering
4		Building finishing engineering
5		Stone and concrete engineering
6	Animal husbandry	Ruminants husbandry
7		Poultry husbandry
8		Potential cattle husbandry
9	Aquaculture	Seawater aquaculture
10		Freshwater aquaculture
11		Brackish aquaculture
12		Seaweed farming
13	Tailoring	Tailoring
14	Electronic	Audio video engineering
15		Industrial electronic engineering
16	Telecommunication	Transmission engineering
17		Customer network access engineering
18		Switching
19	Graphical	Graphical preparation
20		Graphical production
21	Cosmetology	Hair dressing
22		Skin cosmetology
23	Art and craft ship	Handicraft
24		Wooden craft
25		Ceramic craft
26		Skin craft
27		Metal craft
28		Textile craft
29	Mechanical engineering	Iron smelter engineering
30		Molding engineering
31		Engine process engineering
32		Engine drawing engineering
33		Welding engineering
34		Automotive body engineering
35		Industrial machinery maintenance engineering
36		Heavy equipment engineering
37		Tool machinery engineering
38	Oceanography	Nautical marine fishery
39		Nautical merchant marine
40		Technical marine fishery
41		Technical merchant marine
42	Agro-industry	Food agro-industry
43		Non food agro-industry
44		Quality control
45	Electrical	Power transmission engineering
46		Power engineering
47		Energy usage engineering
48		Power distribution engineering

No	Skill Area	Program
49		Air conditioning engineering
50	Chemistry	Analytical chemistry
51		Industrial chemistry
52		Ship electrical
53	Ship engineering	Ship engine installation
54		Wood and fiberglass ship construction
55		Ship welding
56		Construction and repairing steel ship
57		Ship design
58	Industrial instrumentation	Metal instrumentation
59		Glass instrumentation
60		Mechanical control
61		Process control
62	Management business	Secretariats
63		Accounting
64		Marketing
65	Tourism	Hostelry
66		Tourism services
67		Food and beverage
68	Mining geology	Mining geology
69	Social work	Social work
70	Textile	Artificial fibers spinning technology
71		Yarn making technology
72		Fabric technology
73		Textile finishing technology
74	Performance art	Music
75		Dancing
76		Kara witan
77		Theatre
78	Aerospace engineering	Aero plane machinery
79		Aero plane frame construction
80		Aero plane body construction
81		Airframe and Power plant
82		AET Maintenance and Repair
83		Airplane electrics
84		Airplane electronics
85	Information technology	Software engineering
86		Computer and network engineering
87		Multi Media
88	Nursing	Medical nursing
89		Dental nursing
90	Health analysis	Health analysis
91	Pharmacology	Pharmacy

Data are from Aceh Office of Education

## ANNEX IX MONE MASTER PLAN FOR VOC/TECH EDUCATION IMPROVEMENT

Discussions with MONE officials and several planning organizations indicated a need for improving vocational and technical education in Aceh. The national plan is to improve the quality and relevancy of vocational high-school level. Officials indicated a need for additional skill development in the following sectors:

1. Food processing / Engineering
2. Modern automotive technology
3. Telecommunications
4. Hotel and Tourism/Restaurants
5. Ports and Marine / Aquaculture development
6. Ethnic arts and craftsmanship
7. Manufacturing
8. Agro Industry / Horticulture

Vocational schools are encouraged to develop programs to improve competitive skills similar to those adopted for the junior high-school (SMP). The target is to maximize skills in ITC at senior high-schools and vocational schools nationally by 2009.

- **Management Empowerment, Accountability and Public Image**

These will be enhanced through social participation, capacity building and development of EMIS. It will be further enhanced by involving business and industry in vocational training.

- **Higher Learning Program**

**Objectives:**

1. Increase the access and opportunity to every citizen for higher education to attain bachelors, masters, specialist and PhDs.
2. Improve the quality, relevancy and competitiveness of higher education level in meeting market demand for job openings, technology/knowledge development in order to contribute to the social prosperity and the nation's competitiveness.
3. Improve the performance and productivity of universities through increased efficiency and accountability in the management of tertiary institutions

All of these objectives should be achieved autonomously through the BHPT (Higher Learning Entities).

- **The Distributive Spread and Expansion of Access:**

This will be achieved through the following:

Funding the poor but potentially good students:

- (a) Scholarships adopting selection criteria like economic condition, gender, special talents
- (b) Soft loans with low interest/longer payback time
- (c) Voucher system exempting students from various tuition/fees according to needs.

Links between LPTK and schools to expand the capacity of producing required number of quality teachers, especially in supporting the 'Wajar Dikdas' program and other expansion programs.

- **The Improvement of Quality, Relevancy and Competitiveness**

This will be achieved by the following.

Improve the education service, research and civic duties in line with the 'Tri Dharma Perguruan Tinggi' (Higher Learning Code of Conducts). The adoption of the autonomous knowledge is meant to back up tertiary institutions in conducting its role to develop knowledge and technology, and also to improve the quality, quantity and diversity of the R and D of higher learning institutions.

Curriculum development and effective group learning in the following subjects: Good character/faith in God, knowledge/technology, aesthetics, ethics and personality. These will be integrated into the learning process of all subjects.

Development of community colleges will be achieved by facilitating vocational education, based on local competitiveness, and by providing a skilled workforce to the local, national and international industries, together with the development of entrepreneurial skills.

The targets to be achieved:

- (a) Increase in number of higher learning study programs with A or B accreditation status from the 1,000 programs (2005) to 3,000 by 2009. To also develop international program to 32 study programs by 2009, by also considering knowledge development, national culture and skill competition at the international arena. For efficiency purposes it is hoped that there will be no more university with less than 100 students.
- (b) Improve study time effectiveness in order to meet the completion time of 80% for State-Run and 50% at private universities.
- (c) Achieving enrolment versus graduation ratio at an over-all 20% for Undergraduate/Bachelor programs and 30% for polytechnic programs.
- (d) To shorten job placement waiting period to not later than six month for at least 40% of the graduates.
- (e) To target a minimum of four universities should be included in the list of Asian 100 top universities by improving competitiveness.
- (f) Increasing the number of BHPT to 50% of the State-Run universities and 40% of the private universities by 2009.
- (g) Proportionally attempt to reach the ratio between sciences versus social programs from 30:70 (2004) to 50:50 by 2009.
- (h) Improve the lecturers with S2/S3 qualification which currently is at 54.55% (State-Run) and 34.50% (private) to, respectively, 85% and 55% by 2009. Moreover, lecturers with professorship qualification currently at 3% are programmed to be at 10% level by 2009.

- (i) Technical training at tertiary institutions is aimed in five years to 100 functional trainings involving 7,500 personnel, 70% from State-Run universities and 30% from private universities.
- (j) Research budget in five years is anticipated to reach 10% of the total annual DIKTI budget, producing all kind of intellectual property rights inclusive of 50 patents and other 200 publication titles at national as well as international level.
- (k) ICT literacy (access, use of radio/TV, computer and internet) to be at 80% for students and lecturers.
- (l) Development and additional infrastructure of tertiary institutions to reach the ratio of classroom of 2 m<sup>2</sup>/student, lab of 9 m<sup>2</sup>/student, and lecturer's room of 9 m<sup>2</sup>/lecturer.
- (m) To increase the capacity and effectiveness of library facilities by providing 80% of textbooks/teaching books and at least a service time of 40 hours/week.

- **Management Empowerment, Accountability and Public Image**

Will be achieved by developing an Act or Law for the establishment of the BHPT for State-Run as well as the private universities, as autonomous and accountable universities with non-profit orientation. It is anticipated that 50% State-Run universities and 40% private universities will achieve that status in 2009. Tertiary institutions will therefore need to improve their internal auditing capacity.

The capacity improvement of the tertiary institutions will be implemented through various funding programs such as the Block Grant, Partnerships, Research Funds, etc. It will also take into account the support of ITC adoption and development of the higher learning management information systems.

- **Non Formal Education Program**

The program is geared toward the achievement of learning services to citizens with no access to formal education, illiterate groups, school leavers, and to others whose formal education access is denied, males as well as females. The objective is to present to these people the opportunity of personal capacity improvement by way of knowledge and vocational skills. It will be an opportunity to develop skills through non formal learning method in lieu of the formal ways. In future, it is hoped that this non formal education can become an alternative in achieving education with national and international standards.

In achieving these, various PNF programs have been developed: (1) Standardization Education program for children aged 9 years and older at the 'Wajar Dikdas' level of age, as well as its follow up process supporting the 'Wajar Dikdas' up to SMU level, (2) Literacy training aimed at those 15 years and older who cannot read nor write with the objective of lowering the level significantly by end of 2009., (3) PAUD, so that students can develop themselves according to their age to prepare them for normal school age and process, (4) Improvement of Course management and Training programs.

## ANNEX X SUMMARY OF RELEVANT POLYTECHNIC REGULATIONS

### Section 1 Sub-section 7

A Polytechnic is a higher education institution offering professional education programs in specific skill areas.

### Section 1 Sub-section 16

Diploma III Program, hereafter referred as D III program, is a level of professional education offering a minimum of 110 credits and a maximum of 120 credits in 6-semester curriculum and the length of the program is between 6 and 10 semesters after high school education.

### Section 1 Sub-section 17

Diploma IV Program, hereafter referred as D IV program, is a level of professional education offering a minimum of 144 credits and a maximum of 160 credits in 8-semester curriculum and the length of the program is between 8 and 14 semesters after high school education.

### Section 2 Sub-section 3

A polytechnic consists of three or more study programs offering D I, D II, D III, and/or D IV programs.

### Section 3

Higher education institutions, as stipulated in Section 2, develop higher education focusing on:

- Developing and balancing knowledge, technology and art, emphasizing on the development of natural sciences and their applications.
- Region educational map describing the number and the type of the existing higher education institutions, programs offered, distribution, support capacity of the related region.
- Developing strategic fields of study and limiting those that are sufficiently available.

### Section 4

The requirement to establish a new higher education institution is as follow:

- Master plan;
- Curriculum;
- Teaching staff;
- Student candidates;
- Source of funding;
- Facilities and equipment;
- Management.

### Section 5

The Master Plan is the institutional development program for 5 years

It should consist of:

(a) Present conditions and expected development programs on:

- Academics, academic activity programs, curriculum, teaching staff, students, administrative staff, library, laboratories, and the likes;
- Organization, management structure, staffing and infrastructure;

- Campus development;
  - Funding.
- (b) A projection on qualitative and quantitative performance indicators and achievement in academics, organization, operational and campus development.

The Master Plan is based on a feasibility study.

### **Section 6**

The feasibility study should cover:

- Background and objectives for the establishment of the institution;
- The type and name of the institution;
- Statutes of the institution;
- Supporting facilities for teaching, research and community service, administration, including laboratories and library;
- Teaching staff and their development;
- Administrative staff and their development;
- Sources of funding;
- Land availability and ownership;
- Courses and programs offered;
- Predicted student capacity for 5 years;
- The demand on graduates;
- Candidates' interests;
- Physical facilities such as classroom, staff rooms, laboratories, studios, rooms for technical implementation units, installation rooms, office and their development program;
- Projected funding levels for five years, including investment, operation and maintenance and cash flow projection.
- Summary of feasibility study including academic and administrative analysis, financial analysis, and needs analysis.

### **Section 10**

For each study program proposed, the minimum number student for Diploma and S1 programs is 25. The maximum number of student must follow the staff student ratio of 1:30 and 1:25 for social/art and science/engineering, respectively.

Milestones for the establishment are:

- Submission of the proposal for establishment;
- Deliberation and agreement from the Director General – Higher Education;
- Submission of proposal establishment agreement;
- Agreement of the Minister of Education;
- Establishment, construction and resourcing of the institute;
- Statute declaration and implementation of the accreditation.

## Section 20

The proposal for establishment is submitted to:

Director General – Higher Education directly, for public institutions,

Director General through Kopertis, for private institution by enclosing the requirements and feasibility study as stipulated in section 4 and 6.

## Section 21

The Director General will give deliberation within 6 months to the proposing organization about the possibility to establish the new institution.

## Section 22

(1) Within three years after the deliberation with positive result, the proposing organization should submit the *proposal of establishment agreement* of the new institution which complies to the regulations stipulated in sections 4 to 17.

(2) The *proposal of establishment agreement* should be submitted to:

The Minister of National Education, through the Director General for public institutions,

The Minister of National Education, through Kopertis and the Director General for private institutions, by enclosing:

Bank reference and other related funding documentation;

The deed of the foundation establishment;

The statute of the Foundation;

Letter of reference stating that the managing members of the Foundation have never been involved in prohibited parties;

Land certificate or land leasing agreement.

## ANNEX XI BEST PRACTICE IN VOCATIONAL EDUCATION (A SUMMARY)

### • Types of Vocational Education and Training Systems

Vocational education and training systems (VETS) are networks of organizations and institutions providing wide variety training and educational services to various clients. This includes both public and private institutions and organizations that are accountable to various levels of government and industry organizations and may or may not comply with international and national standards.

VETS are normally administered through local, provincial, regional, and national government levels. They can be administered by several government ministries that target specific levels of knowledge and skill acquisition and/or seek to reach specific groups of trainees. VETS can be financed from several sources, and administered through governmental coordination (i.e., national, provincial, and local) or may be autonomous as is the case with private industry related institutions.

Management and organization of vocational education and training is usually categorized into three distinct systems:

- Vocational education
- Labour and manpower training
- Enterprise, private or industry training

The *vocational education* system offers long term technical and technological training with a large percentage of academic study as part of the curriculum. These systems are usually administered by Ministries of Education, and offered in vocational and technical schools, community colleges and universities.

The *labour and manpower* system normally provides short and longer term, job related courses for the unemployed, together with upgrading skills programs for existing employees. These systems are generally administered by Ministries of Labour, or specially authorized national labor departments.

The *enterprise, private or industry training* is provided or financed by employers and private training providers, to comply with specific industry association rulings and standards. Enterprises can provide training themselves, or contract educational institutions or other training providers. Employees may also be able to purchase training specific to their individual needs, with subsidies, endowments or scholarships provided by industry regulating authorities and employer groups.

For all three systems, Industry advisory groups are normally established to provide advice and participate in the formulation and development of curricula, and national vocational and training qualifications. However, if the training initiative is entirely motivated by an individual employer or enterprise, then there may be no link with these bodies, as the training becomes employer specific.

The training provided by differing VET systems is reviewed in Table 25.

This shows clearly that the formal vocational education systems have their specific targets, which differ strongly from the industry and manpower training, which are both linked to job and employment specific skill training.

Table 25: Typical VET Systems

<u>Government</u>		<u>Industry</u>
<u>Vocational Education</u> Engineer, Technician, Skilled and Semi-skilled worker levels	<u>Labour and Manpower</u> Job related, Training for the unemployed, Skills upgrading	<u>Industry Training</u> Specific employer and industry employee skill training,
Technical training schools, Community colleges and Universities	Labour and manpower training centers	Specialist training providers, and enterprise centers

- **Managing VET Systems**

### Keeping pace with technology?

The continuous advancement in technologies affects the management and organization of education and training institutions, as well as the specific knowledge, skills and attitude requirements of the trainees.

Theoretical learning and practical competence in technical skills require time, which, in many instances, can not be reduced. VET institutions employ considerable amount of time and effort to formulate and produce curricula, to meet industry standards. They purchase and use specialized and often sophisticated training equipment, which in many situations, cannot be changed or adjusted rapidly enough to respond to the changing industry and labour market skills demands. Therefore, any decision to establish new or upgraded training must be based on the future long term employment needs of a region or province, and should have strong linkages with local industry, to be flexible enough to respond to any changes.

The use of industry internships, on the job work experience, and cooperation between the training institutes, government departments, and all levels of industry must be encouraged. Skills learned in theory need to be put into practice and applied immediately for longer term acquisition. The longer the time-lapse between skills learned and putting them into practice, the greater the risk they will be lost or become obsolete. (Ideally skills of vocational training should be put into practice within 3 to 6 months).

Deep-seated ideas on 'traditional roles' can limit women's access to a variety of skills and therefore, jobs. Training women in only "traditional" women's skills such as sewing, cooking, handicrafts, will further reinforce these beliefs, and deny them access to jobs and meaningful income. Training can however be gender specific. This is particularly important after a crisis, such as the tsunami, in order to recognize how gender roles have changed (e.g. with more female heads of households) and to strategically target and include women. This can be done by developing training packages that allow for other daily responsibilities, by having flexible training hours, etc. Groups with special needs should be considered in a similar way.

Management of any proposed VET institution should be industry focused, with strong negotiation and coordination between the management and teaching faculty with local industry. Because of a training institutions limited ability to keep pace with industry changes, the style of management utilized by a new institute must develop ways to achieve greater flexibility. To achieve this, the following key responsibilities should be assigned to institute management:-

- **Planning and programming:** An institutional strategy that sets targets, and has flexibility to offer new, demand driven courses, or to terminate courses no longer deemed necessary by local industry.
- **Budgeting and finance:** Autonomy and authority to: determine budgetary allocations, modify pay systems, spend revenues, and to earn and retain income from production units, or contracted work.
- **Staffing:** Authority to hire and fire full time, contract, and part time / visiting staff, to develop new courses, be more flexible to market demands, and take advantage of industry experienced lecturers.
- **Technical support:** A specific department with responsibility to conduct labour market analysis negotiates production work, identify employment and internship opportunities, and develop flexible curricula and teaching materials.
- **Management Information System:** A fully computerized MIS capable of tracking all student progress, *in real time*, with internet access capability for every student to use for research and information gathering, thus eliminating the need for a paper / book based library.

**Table 26: Best Practice of Relevant VETS**

(c)	<b><u>Vocational Guidance and Counseling:</u></b> Limit student uncertainty regarding training and employment by having regular vocational guidance and counseling, resulting in a lower drop-out rate, and improved student com-
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	mitment.
(d)	<b><u>Liaison with industry</u></b> in developing curricula, and skill standards, and competency requirements. Identification of skill shortages through strong coordination with industry and industry associations. Involving local planning authorities in the development and implementation of new programs.
(e)	<b>Practical Hands on Learning:</b> Trainees have practical experience and measure achievements through competency based assessments of skills, which include the involvement of highly skilled, and experienced, independent industry based assessors.
(f)	<b><u>Improving the technical and management ability of staff:</u></b> By having the authority to recruit staff with a minimum of 10 years industrial experience, enhanced through a professional development program for all administrators and staff, including specific and compulsory annual training as a part of teaching/administration duties.
(g)	<b><u>Senior management autonomy:</u></b> To establish management and staff structures and conditions of employment based on industry standards and not government civil service levels.

## ANNEX XII EMPLOYMENT AND UNEMPLOYMENT IN ACEH PROVINCE

**Table 27: Employment and Unemployment in Aceh Province**

	Employed			Seeking work			Available for work			Not in labour force			
	M	F	MF	M	F	MF	M	F	MF	M	F	MF	MF
01. Simeulue	16,261	8,194	24,455	3,394	2,041	5,435	1,401	1,215	2,616	5,000	12,662	17,662	927
02. Aceh Singkil	32,958	15,029	47,987	2,790	1,725	4,515	1,383	1,906	3,289	6,797	24,297	31,094	722
03. Aceh Selatan	43,987	27,417	71,404	4,118	3,083	7,201	1,293	2,281	3,574	9,908	33,663	43,571	965
04. Aceh Tenggara	37,202	31,703	68,905	4,003	3,441	7,444	1,516	1,875	3,391	8,894	17,116	26,010	957
05. Aceh Timur	67,510	37,129	104,639	5,858	3,998	9,856	4,070	4,775	8,845	15,674	51,524	67,198	1,271
06. Aceh Tengah	41,870	34,066	75,936	2,972	2,268	5,240	785	1,157	1,942	7,683	15,224	22,907	368
07. Aceh Barat	37,864	21,019	58,883	3,809	2,904	6,713	2,173	2,388	4,561	8,950	24,172	33,122	2,230
08. Aceh Besar	63,270	26,224	89,494	9,623	6,000	15,623	6,212	7,076	13,288	21,946	58,701	80,647	0
09. Pidie	96,895	70,739	167,634	15,550	12,702	28,252	9,446	13,056	22,502	28,367	74,771	103,138	0
10. Bireuen	70,628	46,633	117,261	10,147	8,562	18,709	7,144	9,062	16,206	21,139	60,112	81,251	2,782
11. Aceh Utara	97,025	58,836	155,861	14,964	9,641	24,605	10,579	11,142	21,721	29,138	84,066	113,204	2,790
12. Aceh Barat Daya	27,774	16,758	44,532	2,367	1,507	3,874	1,263	2,490	3,753	5,587	18,859	24,446	987
13. Gayo Lues	17,904	15,276	33,180	758	702	1,460	281	178	459	3,206	7,195	10,401	124
14. Aceh Tamiang	58,124	22,691	80,815	4,232	2,692	6,924	2,515	2,558	5,073	12,658	49,508	62,166	1,793
15. Nagan Raya	30,620	20,701	51,321	2,877	2,364	5,241	1,576	2,239	3,815	5,199	15,950	21,149	3,127
16. Aceh Jaya	13,368	8,729	22,097	2,557	1,858	4,415	1,789	1,638	3,427	3,457	7,003	10,460	650
17. Bener Meriah	28,602	24,375	52,977	1,251	1,110	2,361	1,105	1,006	2,111	4,652	8,998	13,650	322
71. Banda Aceh	44,327	14,682	59,009	4,503	2,508	7,011	2,173	2,030	4,203	20,102	43,025	63,127	1,786
72. Sabang	7,801	3,878	11,679	602	295	897	347	324	671	1,636	5,426	7,062	0
73. Langsa	30,081	9,606	39,687	3,283	2,512	5,795	1,259	1,809	3,068	9,950	32,014	41,964	0

74. Lhokseumawe	32,509	12,247	44,756	3,518	2,471	5,989	1,795	1,749	3,544	12,493	36,717	49,210	529
Total NAD	896,580	525,932	1,422,512	103,176	74,384	177,560	60,105	71,954	132,059	242,436	681,003	923,439	22,330
Nias	97,216	99,307	196,523	7,582	5,753	13,335	2,983	3,418	6,401	20,699	33,738	54,437	0
Nias Selatan	59,338	57,729	117,067	4,313	2,906	7,219	1,432	1,649	3,081	10,995	17,482	28,477	
Total Nias	156,554	157,036	313,590	11,895	8,659	20,554	4,415	5,067	9,482	31,694	51,220	82,914	0
Total NAD and Nias	1,053,134	682,968	1,736,102	115,071	83,043	198,114	64,520	77,021	141,541	274,130	732,223	1,006,353	22,330
<i>INDONESIA</i>	<i>60,738,587</i>	<i>34,209,531</i>	<i>94,948,118</i>	<i>5,483,297</i>	<i>5,370,957</i>	<i>10,854,254</i>				<i>11,181,798</i>	<i>38,565,554</i>	<i>49,747,352</i>	
	Labour force			Not in labour force			Pop15+			LabForcePartRate			
	M	F	MF	M	F	MF	M	F	MF	M	F	MF	MF
01. Simeulue	21,056	11,450	32,506	5,000	12,662	17,662	26,431	24,664	51,095	79.7	46.4	63.6	47.9
02. Aceh Singkil	37,131	18,660	55,791	6,797	24,297	31,094	44,217	43,390	87,607	84.0	43.0	63.7	54.8
03. Aceh Selatan	49,398	32,781	82,179	9,908	33,663	43,571	59,687	67,028	126,715	82.8	48.9	64.9	56.4
04. Aceh Tenggara	42,721	37,019	79,740	8,894	17,116	26,010	52,040	54,667	106,707	82.1	67.7	74.7	64.6
05. Aceh Timur	77,438	45,902	123,340	15,674	51,524	67,198	93,546	98,263	191,809	82.8	46.7	64.3	54.6
06. Aceh Tengah	45,627	37,491	83,118	7,683	15,224	22,907	53,465	52,928	106,393	85.3	70.8	78.1	71.4
07. Aceh Barat	43,846	26,311	70,157	8,950	24,172	33,122	53,833	51,676	105,509	81.4	50.9	66.5	55.8
08. Aceh Besar	79,105	39,300	118,405	21,946	58,701	80,647	101,051	98,001	199,052	78.3	40.1	59.5	45.0
09. Pidie	121,891	96,497	218,388	28,367	74,771	103,138	150,258	171,268	321,526	81.1	56.3	67.9	52.1
10. Bireuen	87,919	64,257	152,176	21,139	60,112	81,251	110,163	126,046	236,209	79.8	51.0	64.4	49.6
11. Aceh Utara	122,568	79,619	202,187	29,138	84,066	113,204	152,833	165,348	318,181	80.2	48.2	63.5	49.0
12. Aceh Barat Daya	31,404	20,755	52,159	5,587	18,859	24,446	37,360	40,232	77,592	84.1	51.6	67.2	57.4
13. Gayo Lues	18,943	16,156	35,099	3,206	7,195	10,401	22,190	23,434	45,624	85.4	68.9	76.9	72.7
14. Aceh Tamiang	64,871	27,941	92,812	12,658	49,508	62,166	78,382	78,389	156,771	82.8	35.6	59.2	51.5
15. Nagan Raya	35,073	25,304	60,377	5,199	15,950	21,149	41,606	43,047	84,653	84.3	58.8	71.3	60.6
16. Aceh Jaya	17,714	12,225	29,939	3,457	7,003	10,460	21,465	19,584	41,049	82.5	62.4	72.9	53.8

17. Bener Meriah	30,958	26,491	57,449	4,652	8,998	13,650	35,749	35,672	71,421	86.6	74.3	80.4	74.2
71. Banda Aceh	51,003	19,220	70,223	20,102	43,025	63,127	71,869	63,267	135,136	71.0	30.4	52.0	43.7
72. Sabang	8,750	4,497	13,247	1,636	5,426	7,062	10,386	9,923	20,309	84.2	45.3	65.2	57.5
73. Langsa	34,623	13,927	48,550	9,950	32,014	41,964	44,573	45,941	90,514	77.7	30.3	53.6	43.8
74. Lhokseumawe	37,822	16,467	54,289	12,493	36,717	49,210	50,495	53,533	104,028	74.9	30.8	52.2	43.0
Total NAD	1,059,861	672,270	1,732,131	242,436	681,003	923,439	1,311,599	1,366,301	2,677,900	80.8	49.2	64.7	53.1
Nias	107,781	108,478	216,259	20,699	33,738	54,437	128,480	142,216	270,696	83.9	76.3	79.9	72.6
Nias Selatan	65,083	62,284	127,367	10,995	17,482	28,477	76,078	79,766	155,844	85.5	78.1	81.7	75.1
Total Nias	172,864	170,762	343,626	31,694	51,220	82,914	204,558	221,982	426,540	84.5	76.9	80.6	73.5
Total NAD and Nias	1,232,725	843,032	2,075,757	274,130	732,223	1,006,353	1,516,157	1,588,283	3,104,440	81.3	53.1	66.9	55.9
INDONESIA	66,221,884	39,580,488		11,181,798	38,565,554	49,747,352	77,403,682	78,146,042	#####	85.6	50.6	68.0	61.0

## ANNEX XIII CASE STUDY FOR TROPICAL DESIGN POLYTECHNIC

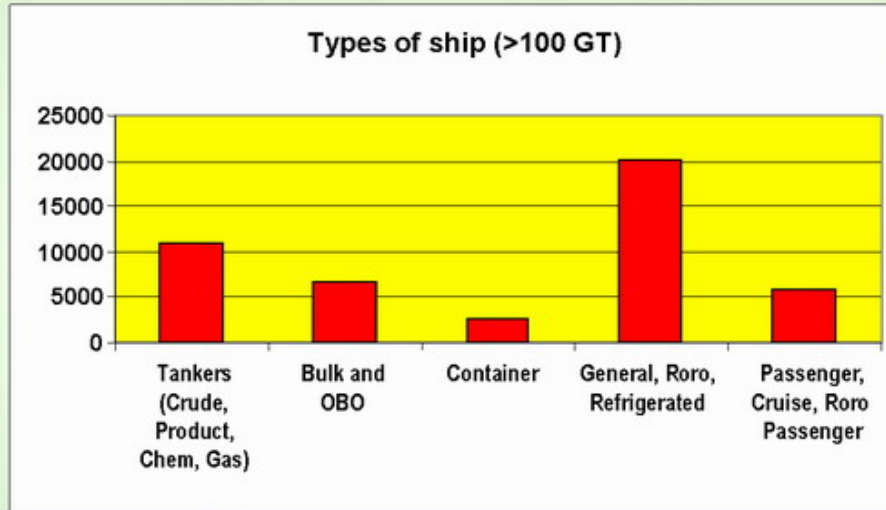


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## ANNEX XIV SUPPORTING DATA FOR NEED FOR SHIPS ENGINEERS AND DECK OFFICERS

### Illustration

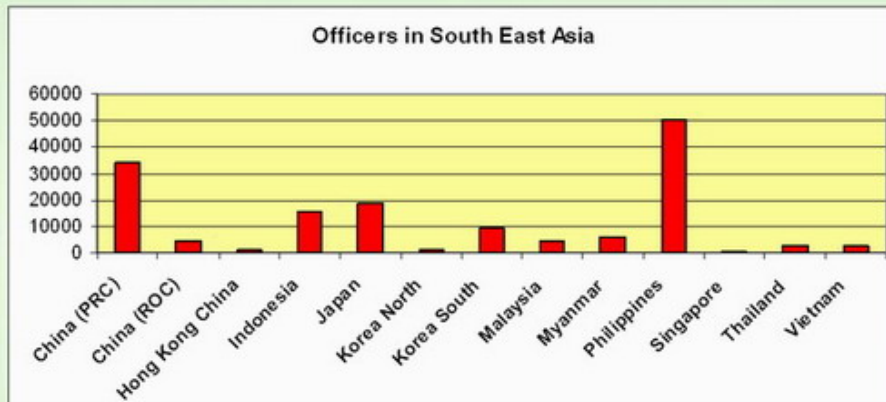
### World Fleet



Source: Ton Van Eszen, STC Rotterdam, 1 August 2003

6

½ of the world fleet is owned in Europe, but most of officers are in Asia



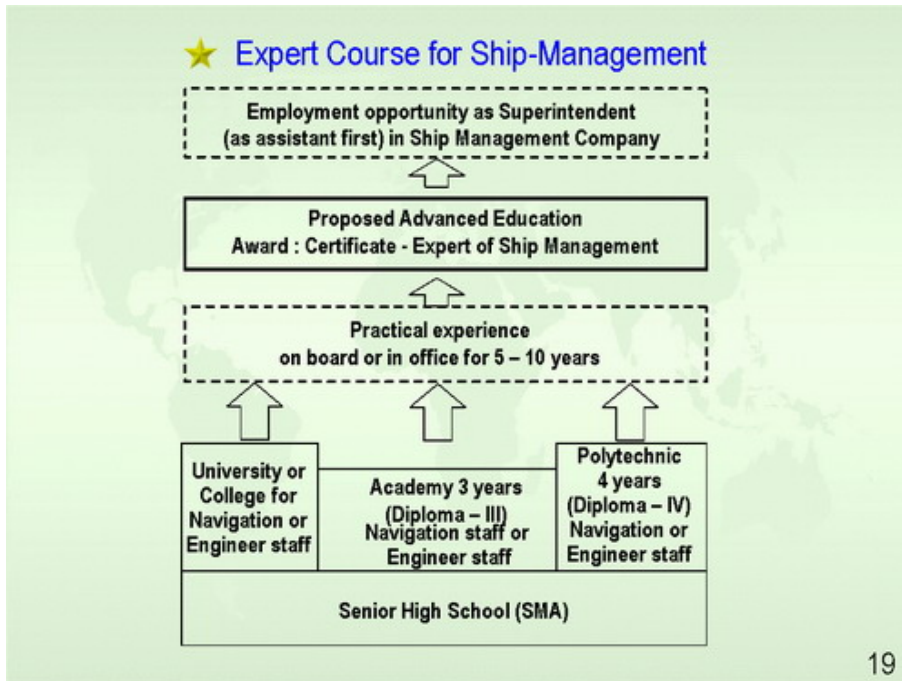
Shortage of Officers (BIMCO/ISF 2000)

in 2000: 4% of 400,000 = 16,000 seafarers

in 2010: 10% of 460,000 = 46,000 seafarers (competition)

Source: Ton Van Eszen, STC Rotterdam, 1 August 2003

8



19



20

## ★ Ship Management

- Planned Maintenance and Procurement
- Technical Management for Ship Operation
- Budget Control Accounting and Reporting
- Organization, Human resource management.



23

## Cost of Training for Crew and Staff

Ratio of training to operational cost

$$\frac{\text{Educational \& Training Expense}}{\text{Total Operating Cost}} = 0.5\%$$

Current World Average Reported

↓

**Future Target expected :** 2%

Source:  
Capt. Pradeep Chawla, LSM Manning & Training Conference in Manila, IFSMA Dec. 2003

29

1.2 Number of Graduates  
(Record 31 October 2005)

NO	DECK DEPARTMENT	SUB TOTAL	ENGINE DEPARTMENT	SUB TOTAL
1	Deck Officer Class – I	1,679	Engine Officer Class – I	902
2	Deck Officer Class – II	3,356	Engine Officer Class – II	2,790
3	Deck Officer Class – III	13,235	Engine Officer Class – III	11,646
4	Deck Officer Class – IV	6,940	Engine Officer Class – IV	6,142
5	Deck Officer Class – V	14,948	Engine Officer Class – V	13,805
6	Deck Rating	43,661	Engine Rating	22,490
TOTAL		83,819	TOTAL	57,775
GRAND TOTAL		141,594 Certificates of Competency		



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Number of  
Certificate of Proficiency  
(Record 01 April 2004)



1.3 MET System



NO	NAME OF CERTIFICATE	SUB TOTAL
1	Radar Simulator	9,933
2	ARPA Simulator	8,885
3	ROC for the GMDSS	3,065
4	GOC for the GMDSS	7,487
5	Tanker Familiarization Course	38,606
6	Oil Tanker Training	14,931
7	Chemical Tanker Training	5,035
8	Gas Tanker Training	3,513
9	Crowd Management	2,317
10	Crisis Management	2,326
11	Basic Safety Training	151,339
12	Advanced Fire Fighting	39,096
13	Survival Craft and Rescue Boats	64,619
14	Medical Emergency First Aid	32,913
15	Medical Care	17,752
16	Maritime English	146
17	Bridge Resource Management	317
TOTAL		402,280



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## 2. SCHEMES ON DISPATCH OF SEAFARERS

### 2.1 The National Organization Responsible for Recruitment and Placement of Seafarers:

- **Government:** Sub Directorate of Seafarers, Directorate of Marine Safety – Directorate General of Sea Transportation, while the Ministry of Manpower involve in the establishment of regulation for recruitment and placement, and permission for employment of foreign seafarers on board the Indonesian flagged vessels;
- **Private:** Consortium of Indonesian Manning Agency (CIMA) which is consist of 52 active members;
- **NGO:** Indonesian Seafarers Union (KPI).

### 2.2 Procedures on Dispatch of Seafarers:

- The seafarers shall provides their own documents;
- The seafarers submit their work application through manning agency;
- Manning agency arrange the signing of "Individual Working Contract" by and between the seafarers and the shipping coy; and then goes to the Union to obtain "Crew and Wage List" that is signed by the Union and the shipping coy;
- Manning agency brings those document to Sub Directorate of Seafarers for approval, and "muster" in the seafarer seaman's book.

## 3. IMPLEMENTATION OF THE REVISED STCW CONVENTION

### 3.1 The National Quality Standard System

#### **QSS:**

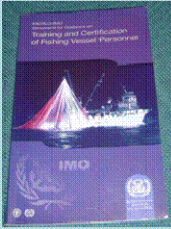
A system that provides for, and ensures that, the most practicable standards for seafarers competence are met.

#### **QSS activities would include:**

- Approval of training course
- Assessment of competence
- Certification, endorsement and revalidation
- Qualification of trainers and assessors
- Medical standards
- Evaluation process conducted by qualified persons not involved in the activities concerned.

**Number of Officer's Certificate for Fishing Vessel**  
(Record: 31 October 2005)

NO	DECK DEPARTMENT	SUB TOTAL	ENGINE DEPARTMENT	SUB TOTAL
1	ANKAPIN – I	410	ATKAPIN – I	419
2	ANKAPIN – II	2,644	ATKAPIN – II	1,515
3	ANKAPIN – III	491	ATKAPIN – III	211
TOTAL		3,545	TOTAL	2,145
GRAND TOTAL		5,690 certificates		



**Remarks:**

- ANKAPIN = Deck Officer for Fishing Vessel
- ATKAPIN = Engineer Officer for Fishing Vessel.

## ANNEX XV COSTING OF POLYTECHNIC CALTEX RIAU (PCR)

Table 28: Costing PCR

No	Construction Cost	Unit	Cost	Volume	Cost (US\$)		Total (US\$)
					1st Yr	2nd Yr	
1	Survey and measurement	m <sup>2</sup>			7,500	0	7,500
2	Cut and Fill	m <sup>2</sup>	3	100,000	300,000	0	300,000
3	Detail Engineering Design (DED) and Mock Up	LS	9	9,500	85,500	0	85,500
4	Construction High Quality Main Building	m <sup>2</sup>	450	7,500	675,000	2,700,000	3,375,000
5	Construction Other Facilities	m <sup>2</sup>	225	900	40,500	162,000	202,500
6	Water Storage Tank and Ground Tank	m <sup>2</sup>	200	125	25,000	0	25,000
7	Electrical and Mechanical	LS			225,000	0	225,000
8	In Campus Paving Road/Asphalt	m <sup>2</sup>	75	3,600	270,000	0	270,000
9	In Campus Drainage System	m <sup>2</sup>	75	1,000	15,000	60,000	75,000
10	Out Door Electrical System	LS			75,000	0	75,000
11	In Campus Re-greening	m <sup>2</sup>	12	5,000	12,000	48,000	60,000
12	Management Construction				35,000	55,000	90,000
13	Building Accessories				0	30,000	30,000
14	Office Furniture				0	75,000	75,000
15	Laboratory Furniture				0	125,000	125,000
16	Class Room Furniture				0	150,000	150,000
17	Permit (IMB)				12,500	0	12,500
18	Arrester and Early Streamer				25,000	0	25,000
19	Team Budget				50,000	75,000	125,000
20	Dedication Ceremony				5,000	10,000	15,000
	<b>Total</b>				<b>1,858,000</b>	<b>3,490,000</b>	<b>5,348,000</b>
No	Laboratory	Unit	Cost	Volume	1st Yr	2nd Yr	Cost (US\$)
1	Computer Laboratory - branded (37 PC in each lab)		45,000	6	54,000	216,000	270,000
2	Voice over Internet Protocol				0	150,000	150,000
3	Computer Centre - Server and Others				0	75,000	75,000
4	Application Software License				0	125,000	125,000
5	In Labs Networking Facilities and Electrical System.		7,500	6	9,000	36,000	45,000
6	Electronics/Electrical/Automation Labs		185,000	8	296,000	1,184,000	1,480,000
7	In Building Ducting System (developed during construction)				75,000	75,000	150,000
8	Mechanical Labs		225,000	2	90,000	360,000	450,000
9	Business Labs		80,000	2	160,000	0	160,000
10	Language Laboratory		85,000	1	85,000	0	85,000
11	Laptop		1,500	5	7,500	0	7,500
12	Meeting Room Sound System		7,500	4	30,000	0	30,000
13	Internet Equipment, Access. and PC 12 unit		5,000	12	12,000	48,000	60,000
14	Safety Protection Equipment		500	30	3,000	12,000	15,000
15	Audio Video For 1 Meeting room		12,500	1	12,500	0	12,500

16	Related Books		20	4,000	16,000	64,000	80,000
17	LCD		4,000	5	20,000	0	20,000
18	MIS System Development		75,000	1	15,000	60,000	75,000
19	MIS Hardware - Servers		2,000	7	14,000	0	14,000
20	MIS System Software License		5,000	8	8,000	32,000	40,000
21	Various Installation Cost		15,000	1	3,000	12,000	15,000
22	Design Consultant		25,000	3	75,000	0	75,000
	<b>Total</b>				<b>985,000</b>	<b>2,449,000</b>	<b>3,434,000</b>
<b>No</b>	<b>Lecturer, Instructor, Admin Preparation</b>	<b>Unit</b>	<b>Cost</b>	<b>Volume</b>	<b>1st Yr</b>	<b>2nd Yr</b>	<b>Cost (US\$)</b>
1	Recruitment Plan and Process		1,250	7	8,750	0	8,750
2	Lecturer and Instructor Internship, 1 Yr Program		12,000	30	72,000	288,000	360,000
3	Government Permit Process		15,000	1	15,000	0	15,000
4	Proposal Development Fee		25,000	3	75,000	0	75,000
5	Consultant for Academics Development, 4 Yr		36,000	12	86,400	345,600	432,000
6	Team Cost		36,000	2	14,400	57,600	72,000
	<b>Total</b>				<b>271,550</b>	<b>691,200</b>	<b>962,750</b>
	<b>Subsidy</b>	<b>US\$</b>			<b>Total</b>		
<b>No</b>	<b>Operational Cost for 5 Year</b>	<b>3rd Yr</b>	<b>4th Yr</b>	<b>5th Yr</b>	<b>6th Yr</b>	<b>7th Yr</b>	<b>Cost (US\$)</b>
1	Operational Cost for 5 Year	175,000	300,000	275,000	250,000	225,000	1,225,000
2	Maintenance Cost for 5 Year	0	25,000	40,000	50,000	50,000	165,000
	<b>Total</b>	<b>175,000</b>	<b>325,000</b>	<b>315,000</b>	<b>300,000</b>	<b>275,000</b>	<b>1,390,000</b>
	Note: Estimated income from Student fee	50000	100,000	150,000	150,000	150,000	
	<b>Grand Total ( 5 = 1 + 2 + 3 + 4 )</b>						<b>11,134,750</b>

## ANNEX XVICOSTING OF POLITEKNIK NAD (Y-PENA)

Table 29: Costing Politeknik NAD

No	Construction Cost	Unit	Cost	Volume	Cost (US\$)		Total (US\$)
					1 <sup>st</sup> Yr	2 <sup>nd</sup> Yr	
1	Construction Main Building (grade 1)	m <sup>2</sup>	275	11,750	1,938,750	1,292,500	3,231,250
2	Construction Building (grade 2)	m <sup>2</sup>	230	2,140	295,320	196,880	492,200
3	Mechanical and Electrical (Incl. Genset, Out door system, Arrester and Early Streamer)	Package	210,000	1	126,000	84,000	210,000
4	Furniture (for Office, Lab, Class Room, etc)	Package	275,000	1	55,000	220,000	275,000
5	Landscaping (incl. paving, wall, re-greening)	Package	228,700	1	45,740	182,960	228,700
6	Sport Facilities	Package	16,700	1	3,340	13,360	16,700
7	Consultancy Service (DED, MC)	Package	150,000	1	90,000	60,000	150,000
8	Team Budget, Permit/IMB and Dedication ceremony	Package	147,500	1	59,000	88,500	147,500
	<b>Total</b>				<b>2,613,150</b>	<b>2,138,200</b>	<b>4,751,350</b>
<b>NO</b>	<b>Laboratory Equipment</b>	<b>Unit</b>	<b>Cost</b>	<b>Volume</b>	<b>1st Yr</b>	<b>2nd Yr</b>	<b>(US\$)</b>
1	Laboratories	Package	125,000	25	1,250,000	1,875,000	3,125,000
	<b>Total</b>				<b>1,250,000</b>	<b>1,875,000</b>	<b>3,125,000</b>
<b>NO</b>	<b>Staff Development</b>	<b>Unit</b>	<b>Cost</b>	<b>Volume</b>	<b>1st Yr</b>	<b>2nd Yr</b>	<b>(US\$)</b>
1	Recruitment Plan and Process, Lecturer and Instructor Internship, Government Permit Process, Proposal Development Fee	Package	383,000	1	306,400	76,600	383,000
2	Team Cost and Consultant for Academics Dev, 4 yr	Package	324,000	1	162,000	162,000	324,000
	<b>Total</b>				<b>468,400</b>	<b>238,600</b>	<b>707,000</b>
<b>Subsidy</b>		<b>US\$</b>			<b>Total</b>		
<b>NO</b>	<b>Operational Cost for 5 Year</b>	<b>3rd Yr</b>	<b>4th Yr</b>	<b>5th Yr</b>	<b>6th Yr</b>	<b>7th Yr</b>	<b>(US\$)</b>
1	Power	24,000	24,000	24,000	24,000	24,000	120,000
2	Staff Salary	158,000	158,000	158,000	158,000	158,000	790,000
3	Maintenance			20,000	20,000	20,000	60,000
4	Equipment replacement			60,000	60,000	60,000	180,000
5	Consumables	120,000	120,000	120,000	120,000	120,000	600,000
6	Administration Cost	20,000	20,000	20,000	20,000	20,000	100,000
	<b>Total</b>	<b>322,000</b>	<b>322,000</b>	<b>402,000</b>	<b>402,000</b>	<b>402,000</b>	<b>1,850,000</b>
	<b>Grand Total (5 = 1 + 2 + 3 + 4)</b>						<b>10,433,350</b>

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