Ministry of Finance
The Democratic Republic of Timor-Leste

Data Collection Survey on Pragmatic Framework Study of Labour Force Plan

Final Report

March 2014

Japan International Cooperation Agency (JICA)

International Development Center of Japan Inc.

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Exchange Rate
March 2014

USD 1 = ¥ 102.20

(JICA Rate)

Source：National Statistics Directorate, Democratic Republic of Timor-Leste (2006)
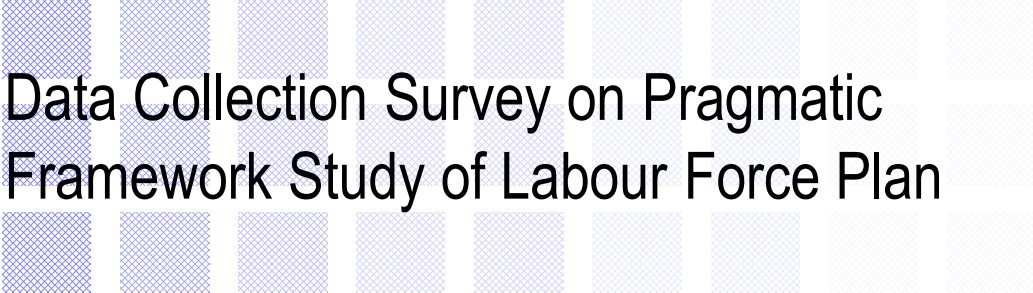"Timor-Leste Census of Population and Housing 2004."

Map of Timor-Leste (with Administrative Boundaries)

Acronyms

ADB: Asian Development Bank
ADN: Agéncia de Desenvolvimento Nacional
ANAAA: National Agency for Academic Assessment and Accreditation
ASEAN: Association of South‑East Asian Nations
ATP: Accredited Training Provider
BOI :   Board of Investment
BPD: barrels per day
CEOP: Employment and Career Guidance Center
CIF: Cost、Insurance and Freight, named port of destination
CP: Counterpart
DIT: Dili Institute of Technology
EFA: Education for All
EPC: Engineering, Procurement and Construction
FOB: free on board
FY: Fiscal Year
GDP/C: Gross Domestic Product per capita
GIS: Geographic Information System
GNI: Gross National Income
GOTL: Government of Timor-Leste
GPI: Gender Parity Index
GPP: Gas Processing Plant
HVAC: heating, ventilation, and air conditioning
ICT: Information and Communication Technology
IEAT: Industrial Estate Authority of Thailand
IMF: International Monetary Fund
INDMO: National Labour Force Development Institute
ISC: Industry Sub-Commission
JICA: Japan International Cooperation Agency
LNG: Liquefied Natural Gas
MDG: Millennium Development Goal
MIDA :   Malaysia Investment Development Authority
MMTPA: Million Metric Tonne Per Annum
MPS: Major Project Secretariat
MRA: Mutual Recognition Arrangement
NES: National Employment Strategy
NESP: National Education Strategic Plan
NGO: Nongovernmental Organization
NPISH :   nonprofit institutions serving households
NQF: National Qualification Framework
NSD: National Statistics Directorate
PDD :   Programa de Desenvolvimento Descentralizado
PDID :   Programa Desenvolvimento Integrado Distrital
PGU: Peninsula Gas Utilization
PPP: Public-Private Partnership
SAM: Social Accounting Matrix
SDP: Strategic Development Plan
SEPFOPE: Secretariat of State for Vocational Training and Employment

SNA:	System of National Accounts
SOLS 24/7:	Science of Life Studies 24/7
TVET:	Technical Vocational Education and Training
UNESCO:	United Nations Educational, Scientific and Cultural Organization
UNFPA:	United Nations Population Fund
UNMIT:	United Nations Integrated Mission in Timor-Leste
UNTL:	National University of Timor-Leste

Data Collection Survey on Pragmatic Framework Study of Labour Force Plan

Summary of Study Results

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OUTLINE OF STUDY

Objective

For successful implementation of the SDP, the Study provides <u>policy implications on labour force creation, human resource development and industrial development</u> through analysis on optimal labour demand-supply projection.

2

Components of the Study

1. Employment to Be Created by Infrastructure Fund Budget and Future Job Projection

2. Effect of Quality Improvement of Labour Force by Education and Training

3. Calculation of Economic Spillover Effect Based on Projection of Supply and Demand of Labour Market

4. Policy Implications for More Effective Public Investment and Human Resource Development extracted from the Analysis from 1 to 3.

3

Expected Outcomes

1. The actual status of labour force and human resource development in Timor-Leste is clarified.

2. The study results are utilized by the GOTL for optimal budget execution.

3. The study results are utilized by the GOTL for more effective formulation and implementation of public investment and human resource development plan.

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STUDY RESULTS

1. Employment to Be Created by Infrastructure Fund Budget and Future Job Projection

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1. Estimated Job created from Infrastructure Fund Budget and Future Job Projection
－Short Term－

- FY2014: Approximately 137,000M/M
  (Approximately 16,000 jobs)

  - 80% of Manger/Engineer, 65% of Skilled, 38% of Semi-Skilled,9% of Unskilled are occupied by Expatriates
    (41 % of Total job)

Budget (USD'000)	Persons/ Months	Nationality	Manager	Skilled	Semi-Skilled	Unskilled	Total
425,135	136,996	Timorese	324(2%)	1,812(11%)	1,392(9%)	6,007(37%)	9,536(59%)
		Foreigner	1,342(9%)	3,500(22%)	863(5%)	854(5%)	6,559(41%)

1. Estimated Job created from Infrastructure Fund Budget and Future Job Projection
－Mid-Term－

- Estimated job created (Budget 2014-2018)

Year	Budget 1,000U$	Person −months	Manager/Engineer		Skilled		Semi−skilled		Un−Skilled		Total		
			Timorese	Expatriate	Timorese	Expatriate	Timorese	Expatriate	Timorese	Expatriate	Timorese	Expatriate	Total
2014	425,135	136,966	324	1,342	1,812	3,500	1,392	863	6,007	854	9,535	6,559	16,094
2015	687,931	192,436	536	2,241	3,049	5,748	2,368	1,414	10,987	1,223	16,940	10,626	27,566
2016	762,792	268,901	669	3,586	3,006	6,701	2,957	2,028	17,912	1,202	24,544	13,517	38,061
2017	398,381	117,382	418	1,433	1,969	3,855	2,068	894	10,330	805	14,785	6,987	21,772
2018	243,863	75,398	135	737	898	1,628	1,134	391	3,675	234	5,842	2,990	8,832
Total	2,518,102	791,083	2,082	9,339	10,734	21,432	9,919	5,590	48,911	4,318	71,646	40,679	112,325
Percentage in each category			18	82	33	67	64	36	92	8	64	36	100

- Expatriates
  - Certain portion of 112,000 jobs to be created in 2014-2018 are occupied by expatriates due to the limited domestic workers.

Manager/Engineer	Skilled labour	Semi-skilled labour	Un-skilled labour
82%	67%	36%	8%
Doctor, Master, Bachelor Degree	Diploma	Certificate	

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1. Estimated Job created from Infrastructure Fund Budget and Future Job Projection
－LongTerm (based on preceding cases)－

- The study use experiences of Terengganu State in Malaysia and Rayong Province of Thailand to estimate jobs for Timor-Leste

  Job creation scenarios 2010-2030
  – Terengganu state model: 185,500 jobs
  – Rayong province model: 342,000 jobs

  ➢ The difference of job created between models is due to the difference of industrial structure (example; Agriculture is the core industry in Thailand)

  ➢ In both scenarios, manufacturing industry has the large influence to the job creation. Oil and gas industry does not create large number of jobs directly but indirectly it has a big impact to the job creation by the related sectors.

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1. Estimated Job created from Infrastructure Fund
－LongTerm (Timor-Leste Scenarios)－

Timor-Leste Scenarios were estimated based on the Malaysia Terengganu state scenarios, which has the similarity of population size and industrial structure. The job increasing rate of manufacturing sector was estimated utilizing Malaysian rate (Case 1), Thailand Rayong province rate (Case 2) and intermediate rate of both rate (Case 3).

- Result of estimation
  - Case 1 based on Malaysia rate :185,485 jobs
  - Case 2 based on Thailand rate (most optimistic case): 299,958 jobs
  - Case 3 intermediate case of Case 1 and Case 2: 242,734 jobs
- Estimated new labour force by 2030 is approximately 300,000.

1. To balance the supply and demand of labour force in 2030, Case 2 is required.
2. Manufacturing industry was the key sector for the job creation in both Thailand and Malaysia because their market , finance and/or supply chain accessibility was good.
3. For job creation, not only infrastructure provision but also, investment promotion as well as human resource development were implemented by the government in both Thailand and Malaysia. On the other hand, continuous investment by the private sectors corresponding to the government effort was available.

2. Effect of Quality Improvement of Labour Force by Education and Training

2. Effect of Quality Improvement of Labour Force by Education and Training
－Labour force structure 2010 (education)－

Labour force by educational background

(Labour force survey 2010) (unit %)

Timor-Leste

Primary not completed	Primary/ Pre. Sec.	Secondary	Polytechnich/ University
49.5	28.1	19.1	3.4

Indonesia

Primary not completed	Primary	Lower sec.	Gen. upper sec.	Voca. upper sec.	Diploma academy	University
21.4	28.9	19.1	14.7	8.2	2.8	4.8
(21.4)	(48.0)		(22.9)		(7.6)	

Malaysia

Primary not completed	Primary	Secondary	Tertiary
3.7	17.6	55.2	23.5

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2. Effect of Quality Improvement of Labour Force by Education and Training
－GDP/C and education－

Target in 2030: Upper middle income country

　　　　criteria GDP/C > $4,000

Necessary condition: GDP/C > $2,000 (excluding oil & gas)

Indonesia:　　Non oil GDP/C > 2,000 in 2008

Malaysia:　　Non oil GDP/C > 2,000 in 1990

　　　　Total　GDP/C > 4,000 in 1995, 2004

Labpur Force	Timor-Leste	Indonesia	Malaysia
Tertiary completed	3.4% (2010)	7.6% (2010)	8.8% (1990)
			11.1% (1995)
Less than primary	49.5% (2010)	21.4% (2010)	12.0% (1990)
			8.60% (1995)

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2. Effect of Quality Improvement of Labour Force by Education and Training
－Employment structure－

Question 1: Can expansion of education contribute to expand the qualified labour force?

Employment Status /age

/education (except those at school)
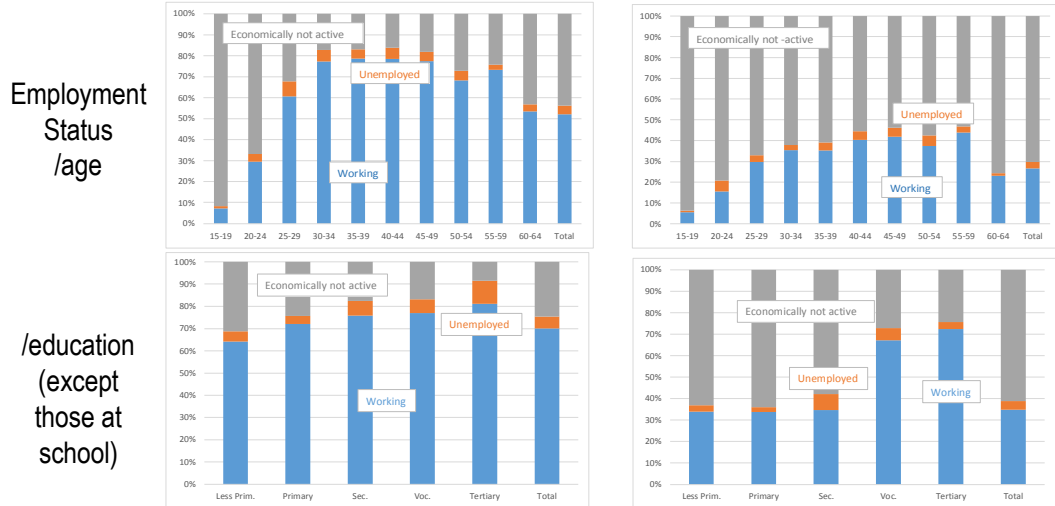
- Labour force participation rate is high for high educational backgrounds

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2. Effect of Quality Improvement of Labour Force by Education and Training
－Employment and Education－

Question 2: Do educated use their knowledge and skills in labour market?

Relationship between

Professionals: + tertiary and vocational sec. education

+ gen. secondary education (old)

- less than primary education

Service/ sales: + gen. secondary education (male)

Clerical support: + tertiary education (young female)

Managers: + tertiary education (old male)

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Question 2: Do educated use their knowledge and skills in labour market?
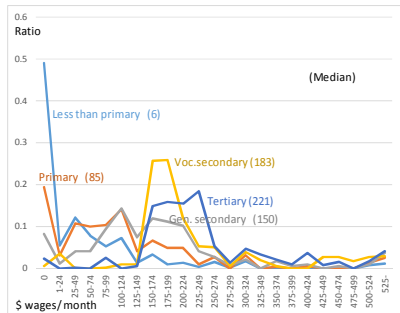
wage(male)   time(male)
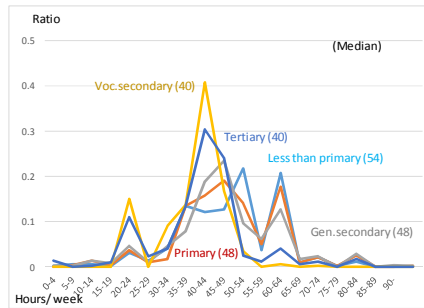
- Less educated leans to the lower side of wage distribution.
- Less educated works more hour.

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Population in 2010

Pyramid-type structure, 53% are equal to or under 15

⟹ Quality and quantity of labour force will be improved if those are educated appropriately.

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3 Parameters

1) Intake rate or promotion rate to upper education system

2) Dropout rate

3) Repetition rate

4 scenarios

1) Baseline: same as 2010

2) 20% improve every 5 year

3) Planned figures (National Education Strategic Plan))

4) 40% improve every 5 year

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2010   Male   Female

- Smaller ratios of highly educated among old.
- Larger ratios of highly educated among young.
- Educational opportunities for female are same as male currently.

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2. Effect of Quality Improvement of Labour Force by Education and Training
―Population structure in 2030 (Scenario 4)―

2030 Male / Female
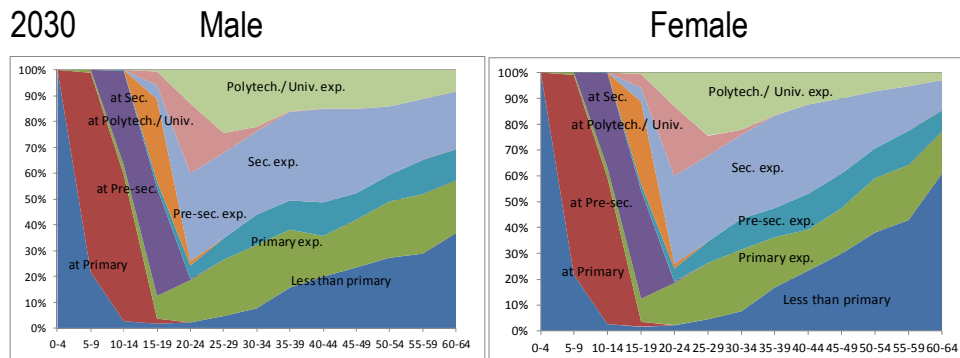
Scenario 1) Basic enhancement of labour force can be done.

Scenario 2) Labour force is enhanced more than basic scenario.

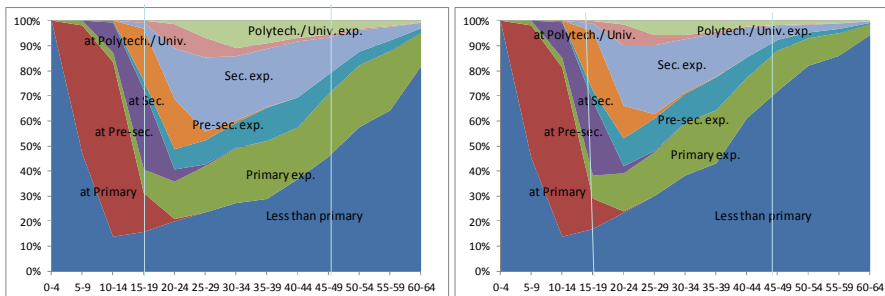Scenario 3) Limited expansion of upper secondary and tertiary.

Scenario 4) Enhancement of labour force can be done well.

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2. Effect of Quality Improvement of Labour Force by Education and Training
―Labour force structure in 2030 (ratio)―

Sex	Scenario	Less than Primary	Primary	Pre-secondary	Secondary	Tertiary
Male	Baseline	0.155	0.241	0.146	0.387	0.072
	20% improve	0.152	0.229	0.134	0.389	0.096
	Planned	0.151	0.234	0.182	0.348	0.084
	40% improve	0.149	0.217	0.123	0.394	0.117
Female	Baseline	0.189	0.241	0.153	0.356	0.060
	20% improve	0.185	0.228	0.141	0.361	0.084
	Planned	0.185	0.237	0.187	0.318	0.072
	40% improve	0.182	0.215	0.130	0.369	0.104
Both	Baseline	0.166	0.241	0.148	0.377	0.068
	20% improve	0.162	0.228	0.136	0.380	0.092
	Planned	0.162	0.235	0.184	0.339	0.080
	40% improve	0.160	0.217	0.125	0.386	0.112
2010 (employment)		0.449	0.199	0.093	0.188	0.071

Labour force structure

- Tertiary & secondary education completed among labour force will increase in any scenario.
- Scenario 4 makes labour force improved, better than Indonesia in 2010, and equal to Malaysia in 1995 when GDP/C exceeded $4,000.

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2. Effect of Quality Improvement of Labour Force by Education and Training
－Labour force structure in 2030 (number)－

		Number of labour force in 2030							Difference from 2010					
Sex	Condition	Less than Primary	Primary	Pre-secondary	Secondary	Tertiary	Total	Sex	Scenario	Less than Primary	Primary	Pre-secondary	Secondary	Tertiary	Total
Male	Baseline	60,517	94,070	57,158	151,009	27,937	390,690	Male	Baseline	△ 15,317	52,040	38,536	113,708	14,148	203,114
	20% improve	59,246	89,308	52,396	152,133	37,607	390,690		20% improve	△ 16,588	47,278	33,774	114,832	23,818	203,114
	Planned	59,189	91,370	71,228	136,020	32,883	390,690		Planned	△ 16,645	49,340	52,606	98,719	19,094	203,114
	40% improve	58,307	84,822	48,029	153,999	45,534	390,690		40% improve	△ 17,527	42,792	29,407	116,698	31,745	203,114
2010 (employment)		75,834	42,030	18,622	37,301	13,789	187,576	2010 (employment)		75,834	42,030	18,622	37,301	13,789	187,576
Female	Baseline	35,387	45,203	28,664	66,761	11,294	187,308	Female	Baseline	△ 13,721	31,952	21,468	51,709	5,445	96,852
	20% improve	34,611	42,706	26,459	67,705	15,827	187,308		20% improve	△ 14,497	29,455	19,263	52,653	9,978	96,852
	Planned	34,607	44,476	35,070	59,635	13,520	187,308		Planned	△ 14,501	31,225	27,874	44,583	7,671	96,852
	40% improve	34,607	44,476	35,070	59,635	13,520	187,308		40% improve	△ 14,501	31,225	27,874	44,583	7,671	96,852
2010 (employment)		49,108	13,251	7,196	15,052	5,849	90,456	2010 (employment)		49,108	13,251	7,196	15,052	5,849	90,456
Both	Baseline	95,904	139,273	85,821	217,770	39,231	577,998	Both	Baseline	△ 29,038	83,992	60,003	165,417	19,593	299,966
	20% improve	93,857	132,014	78,855	219,838	53,433	577,998		20% improve	△ 31,085	76,733	53,037	167,485	33,795	299,966
	Planned	93,796	135,846	106,298	195,655	46,404	577,998		Planned	△ 31,146	80,565	80,480	143,302	26,766	299,966
	40% improve	92,358	125,174	72,472	223,066	64,928	577,998		40% improve	△ 32,584	69,893	46,654	170,713	45,290	299,966
2010 (employment)		124,942	55,281	25,818	52,353	19,638	278,032	2010 (employment)		124,942	55,281	25,818	52,353	19,638	278,032

- Labour force with tertiary education completed increase remarkably, but there are still many less than primary.
- Tertiary education completed increase 2.9-4.5 times in 2030, secondary school completed increase 3.3-3.8 times.

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2. Effect of Quality Improvement of Labour Force by Education and Training
－Highly educated labour force－

Tertiary education completed
- 62,000 – 64,000 professional/ technical workers are necessary in 2030.
  (using coefficients of occupations by industry in Indonesia in 2010)
  (Among professional/ technical workers, 66.7% are tertiary education completed)
  41,000 – 43,000 workers, completed tertiary education, are necessary.

- Scenario 1 cannot meet this demand.

- UNTL

	2013	Graduate	20 years	Faculty	
Registered	9,311	→ 1,490	→ 22,280	Agriculture	24.2%
Total	17,652	Year *0.8/5		Enginerring	
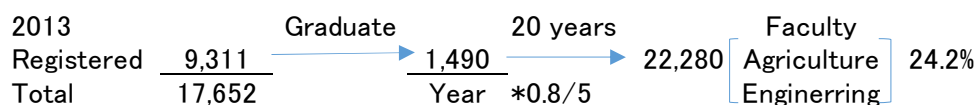
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2. Effect of Quality Improvement of Labour Force by Education and Training
— Highly educated labour force —

Secondary education completed

- 15.6% and 11.5% of professional/ technical workers are general and vocational secondary school graduates in Indonesia in 2010.
- Among secondary school graduates, 35.8% are vocational secondary graduates in Indonesia. It is 11.6% in Timor-Leste in 2012.
- It is appropriate to make a target, such as 60% of secondary school graduates will be vocational stream, in National Education Strategic Plan 2011-2030.

Quality of graduates

- Quality of professional/ technical workers should meet global standards.
- Quality of labour force is a result of accumulation of good education through primary to university level.

Although there is a great demand of highly educated labour force in the future, the post will be occupied by foreign workers if there is not enough qualified supply.

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2. Effect of Quality Improvement of Labour Force by Education and Training
—Policy implications—

- Potential is great. Necessary to expand the quantity and to improve the quality of education to meet the demand for the enough number of qualified labour force in the future.
- The current trend (Scenario 1) may not be enough.
- Necessary not only to pursue the EFA target, but also to expand the secondary and tertiary education at the same time.
- Important not only to increase the promotion rate , but also to reduce dropout rates at all stages. Improvement of the quality of education can lead the expansion of the next stage.
- In tertiary & secondary education, specialties should match to the jobs required by the forthcoming structure of industry. Vocational/ technical education should be enhanced more.

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- Transition from school to work place – training system
- Number and capacity of training providers
  - Current capacity of intake number (around 2,000) of TVET institutes is not enough. As the certified training courses increase, the number and capacity of training providers should also be increased.
- Number of certified courses
  - Certified courses for strategic sectors in the SDP should be developed and promoted.
- Functional employment placement system
  - Employment placement system for TVET graduates should be improved and widely utilized.
- Strategy for labour supply by type of occupation
  - Strategy by technical level/ occupation should be in place w/ clear demarcation between Ministry of Education (higer and secondary education) and SEFOPE (vocational training)

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3. Calculation of Economic Spillover Effect on Main Industries
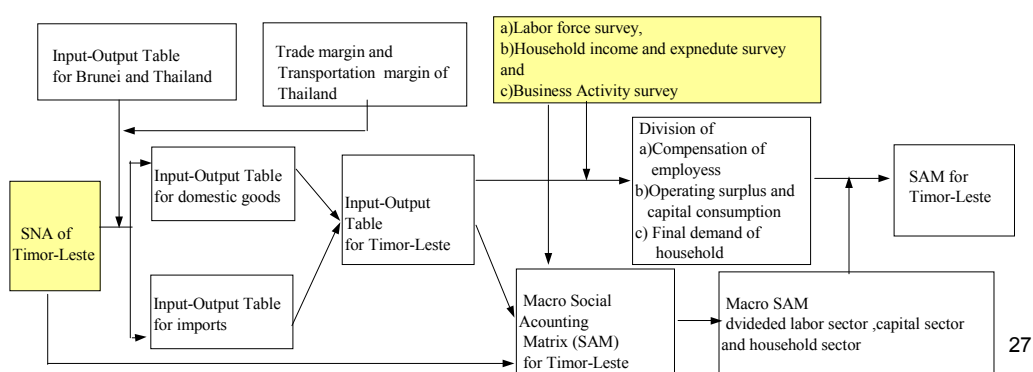# Based on Projection of Supply and Demand of Labour Market

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3. Calculation of Economic Spillover Effect on Main Industries Based on Projection of Supply and Demand of Labour Market

(1) Construction I/O Table and SAM of Timor-Leste 2010 －Process for construction (1) －

・ Making process is at first to construct I/O table by using mainly SNA and secondly to construct Macro SAM based on I/O table.

Input-Output Table for Brunei and Thailand

Trade margin and Transportation margin of Thailand

a)Labor force survey,
b)Household income and expnedute survey and
c)Business Activity survey

SNA of Timor-Leste

Input-Output Table for domestic goods

Input-Output Table for Timor-Leste

Input-Output Table for imports

Division of
a)Compensation of employess
b)Operating surplus and capital consumption
c) Final demand of household

Macro Social Acounting Matrix (SAM) for Timor-Leste

SAM for Timor-Leste

Macro SAM dvideded labor sector ,capital sector and household sector

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■Oil sector Account of Macro SAM

			Expenditure												
			Production activities		Factors of production		Institutions				Tax			Rest of the world		
Millions of US dollars			Oil sector	Non-oil sector	Labor	Capital	Household	Petroleum Company	Non-Petroleum Company	Gevernment	Dirct tax	Net indirect tax and duties	Combined capital account	Goods and Services	Current transfer	Total
Production activities		Oil sector	4.2	5.0										3,824		3,834
		Non-oil sector	31.4	503.1			531	11.7	30.8	795			341	136		2,380
Factors of production		Labor	41	166					5.8	109					151	472
		Capital	3,215	696					1.6	56					41	4,010
Income	Institutions	Household			419	321				168					0	909
		Petroleum Company			0	2,254				0			0	0	535	2,789
		Non-Petroleum Company & NPISHs			0	375				0	0		0	0	81	456
		Gevernment						1,300		0	42	52			0	1,394
Tax		Dirct tax					11	0	7	0					858	876
		Net indirect tax and duties	35	-6			6	1	0	1			16			52
Combined capital account							168	506	309	254				-2,095	1,451	592
Rest of the world		Goods and Services	507	1,017			81	13	0	12			235			1,865
		Current transfer			53	1,059	111	958	101	0	834	0	0			3,117
Total			3,834	2,380	472	4,010	909	2,789	456	1,394	876	52	592	1,865	3,117	

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■Petroleum company Account of Macro SAM

Millions of US dollars			Expenditure													
		Production activities		Factors of production		Institutions				Tax		Combine d capital account	Rest of the world		Total
		Oil sector	Non-oil sector	Labor	Capital	Household	Petroleum Company	Non-Petroleum Company	Gevernme	Dirct tax	Net indirect tax and duties		Goods and Services	Current transfer	
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	Institutions	Household			419	321				168					0	909
		Petroleum Company			0	2,254				0			0	0	535	2,789
		Non-Petroleum Company & NPISHs			0	375				0	0		0	0	81	456
		Government						1,300		0	42	52			0	1,394
	Tax	Dirct tax					11	0	7	0					858	876
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■Government Account of Macro SAM

Millions of US dollars			Expenditure													
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		Current transfer			53	1,059	111	958	101	0	834	0	0			3,117
	Total		3,834	2,380	472	4,010	909	2,789	456	1,394	876	52	592	1,865	3,117	

■Combined Capital (Saving-Investment) Account of Macro SAM

			Expenditure													
			Production activities		Factors of production		Institutions				Tax		Combined capital account	Rest of the world		
	Millions of US dollars		Oil sector	Non-oil sector	Labor	Capital	Household	Petroleum Company	Non-Petroleum Company	Gevernme	Dirct tax	Net indirect tax and duties		Goods and Services	Current transfer	Total
Income	Production activities	Oil sector	4.2	5.0										3,824		3,834
		Non-oil sector	31.4	503.1			531	11.7	30.8	795			341	136		2,380
	Factors of production	Labor	41	166					5.8	109					151	472
		Capital	3,215	696					1.6	56					41	4,010
	Institutions	Household			419	321				168					0	909
		Petroleum Company			0	2,254				0			0	0	535	2,789
		Non-Petroleum Company & NPISHs			0	375				0	0		0	0	81	456
		Gevernment						1,300		0	42	52			0	1,394
	Tax	Dirct tax					11	0	7	0					858	876
		Net indirect tax and duties	35	-6			6	1	0	1			16			52
	Combined capital account						168	506	309	254				-2,095	1,451	592
	Rest of the world	Goods and Services	507	1,017			81	13	0	12			235			1,865
		Current transfer			53	1,059	111	958	101	0	834	0	0			3,117
	Total		3,834	2,380	472	4,010	909	2,789	456	1,394	876	52	592	1,865	3,117	

■Rest of World Account of Macro SAM

			Expenditure													
			Production activities		Factors of production		Institutions				Tax		Combined capital account	Rest of the world		
	Millions of US dollars		Oil sector	Non-oil sector	Labor	Capital	Household	Petroleum Company	Non-Petroleum Company	Gevernme	Dirct tax	Net indirect tax and duties		Goods and Services	Current transfer	Total
Income	Production activities	Oil sector	4.2	5.0										3,824		3,834
		Non-oil sector	31.4	503.1			531	11.7	30.8	795			341	136		2,380
	Factors of production	Labor	41	166					5.8	109					151	472
		Capital	3,215	696					1.6	56					41	4,010
	Institutions	Household			419	321				168					0	909
		Petroleum Company			0	2,254				0			0	0	535	2,789
		Non-Petroleum Company & NPISHs			0	375				0	0		0	0	81	456
		Gevernment						1,300		0	42	52			0	1,394
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		Current transfer			53	1,059	111	958	101	0	834	0	0			3,117
	Total		3,834	2,380	472	4,010	909	2,789	456	1,394	876	52	592	1,865	3,117	

■Household Account of Macro SAM

		Production activities		Factors of production		Institutions				Tax		Combined capital account	Rest of the world		Total
Millions of US dollars		Oil sector	Non-oil sector	Labor	Capital	Household	Petroleum Company	Non-Petroleum Company	Government	Dirct tax	Net indirect tax and duties	Combined capital account	Goods and Services	Current transfer	Total
Production activities	Oil sector	4.2	5.0										3,824		3,834
	Non-oil sector	31.4	503.1			531	11.7	30.8	795			341	136		2,380
Factors of production	Labor	41	166					5.8	109					151	472
	Capital	3,215	696					1.6	56					41	4,010
Institutions	Household			419	321				168					0	909
	Petroleum Company			0	2,254				0			0	0	535	2,789
	Non-Petroleum Company & NPISHs			0	375				0	0		0	0	81	456
	Gevernment						1,300		0	42	52			0	1,394
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Combined capital account						168	506	309	254				-2,095	1,451	592
Rest of the world	Goods and Services	507	1,017			81	13	0	12			235			1,865
	Current transfer			53	1,059	111	958	101	0	834	0	0			3,117
Total		3,834	2,380	472	4,010	909	2,789	456	1,394	876	52	592	1,865	3,117	

■Urban Household and Rural Household Account of Macro SAM

Unit: Millons US Dollars		The items of an account						
Urban household of Institutions Account		Captila income from Capital acency		Wages & Salaries from Labor acency			Current transfer from Government	
	Total amount of receipt	Land owner & Own work	Non-Land owner & Own work	Skilled labor	Semi-skilled labor	Un-skilled labor		
	454.7	31.4	88.7	60.2	138.2	85.9	50.3	
	Total amount of expenditure	Goods and services		Tax		Current transfer to RoW	Savings	
		Domestic	Imports	Direct	Indirect			
	454.7	270.1	37.7	9.6	2.6	67.0	67.7	
Rural household of Institutions Account		Captila income from Capital acency		Wages & Salaries from Labor acency			Current transfer from Government	
	Total amount of receipt	Land owner & Own work	Non-Land owner & Own work	Skilled labor	Semi-skilled labor	Un-skilled labor		
	453.8	148.5	52.4	9.1	62.2	63.5	118.2	
	Total amount of expenditure	Goods and services		Tax		Current transfer to RoW	Savings	
		Domestic	Imports	Direct	Indirect			
	453.8	261.1	43.8	1.4	3.0	44.0	100.4	

3. Calculation of Economic Spillover Effect on Main Industries
Based on Projection of Supply and Demand of Labour Market

(2) Economic Structure according to Macro-SAM of Timor-Leste 2010
―Summary―

・"A resource-based monoculture type" economic structure

― Timor-Leste's economy is highly dependent on the petroleum revenue, which covers the current account and the Government budget balance.
― The economy has no other industry that petroleum related one.
― The agricultural export is represented by almost all coffee products, while rice is imported with Government subsidies.

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3. Calculation of Economic Spillover Effect on Main Industries
Based on Projection of Supply and Demand of Labour Market

(3) SAM Multiplier Analysis
―SAM Framework―

・The SAM framework can be used to calculate the effects of policy measures.

|			Endogenous accounts			Exogenous accounts				
			(i)	(ii)	(iii)	(iv)	(vi)	(vi)	(vii)	Totals
					Institutions			Rest of the world	Indirect tax	
			Production activites	Factors of Production	Hosehold & Company	Government	Captal accounts			
Endogenous accounts	(i)	Production activites	N			X				y
	(ii)	Factors of Production								
	(iii)	Institutions	Hosehold & Company							
	(iv)		Government							
Exogenous accounts	(v)	Captal accounts	L			R				z
	(vi)	Rest of the world								
	(vii)	Indirect tax								
		Totals	y'			z'				

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(3) SAM Multiplier Analysis

－Total Economic Impacts －

・Coffee and other agricultural products

  －Increase of coffee export prevails all over economic sectors' receipts.

  －Agriculture excluding coffee product would have the same magnitude
    of impacts as coffee exports.

 ⇒ We propose set-up an agriculture and food processing industry cluster.

・Industrial sectors would have a smaller economic impact than
 agricultural products.

  － Food processing, Public administration and Education & Health would
    have minimal spillover effects.

  － Other industries have the twice impact against the injected.

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Result of Total Economic Impacts
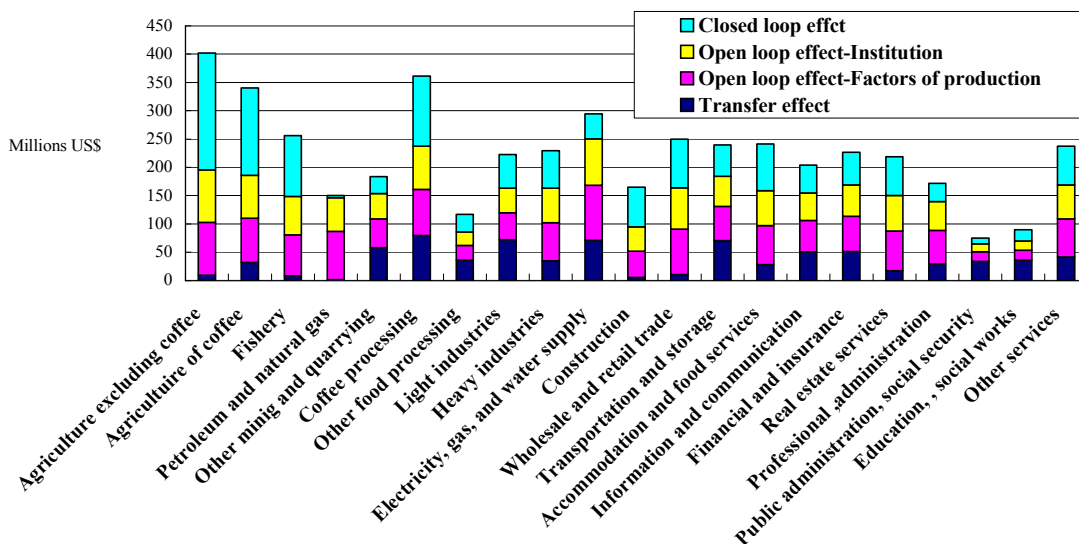
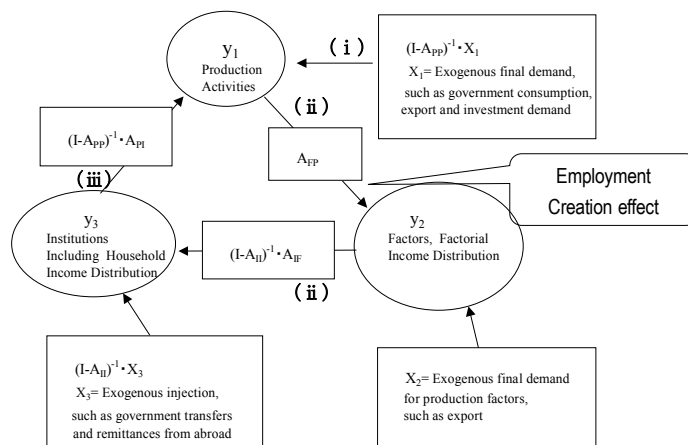Source:this table is computed from SAM multiplier based on SAM for Timor-Leste

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■ The Total economic impacts

・The matrix of multiplier M can be decomposed into three separate effects of

(i) Transfer effect: first round effect to industry, that is, I/O Multipliers.

(ii) Open loop effect : industry to production factor,then household/compnay

(iii) Closed loop effect: household/company to domestic production,

that is, income effect.

N matrix(endogenous accounts)

	Production Activity	Factors of production	Household and Company
Production Activity	A_{PP}	0	A_{PI}
Factors of production	A_{FP}	0	0
Household and Company	0	A_{IF}	A_{II}

Source:Adopted from Erik Thorbecke(2000) Figure 2a

y_1 Production Activities

（ⅰ） $(I-A_{PP})^{-1} \cdot X_1$

X_1= Exogenous final demand, such as government consumption, export and investment demand

（ⅱ）

$(I-A_{PP})^{-1} \cdot A_{PI}$

A_{FP}

（ⅲ）

Employment Creation effect

y_3 Institutions Including Household Income Distribution

$(I-A_{II})^{-1} \cdot A_{IF}$

（ⅱ）

y_2 Factors, Factorial Income Distribution

$(I-A_{II})^{-1} \cdot X_3$

X_3= Exogenous injection, such as government transfers and remittances from abroad

X_2= Exogenous final demand for production factors, such as export

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3. Calculation of Economic Spillover Effect on Main Industries
Based on Projection of Supply and Demand of Labour Market
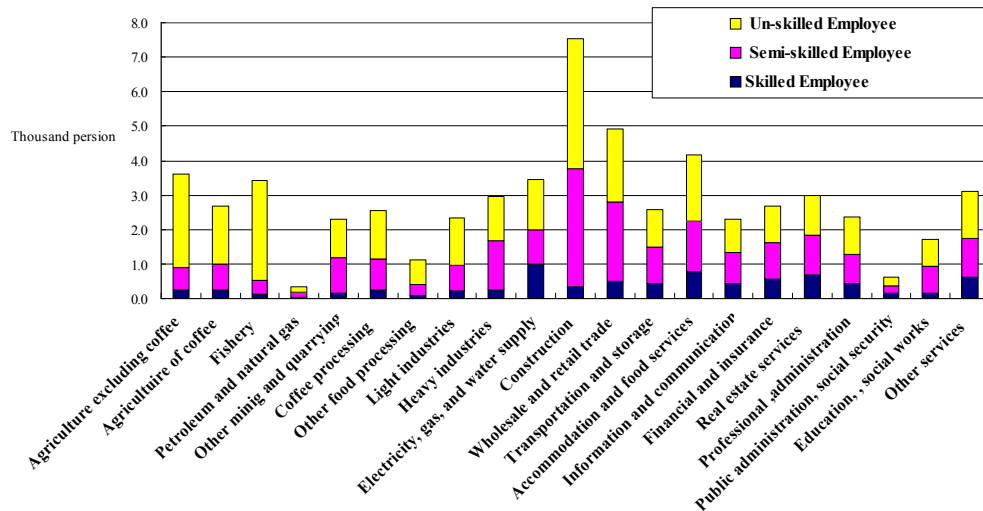
(3) SAM Multiplier Analysis

－Employment Creation Effect －

★Impacts by US100 million to employment creation :

・Construction sector creates new 7,500 jobs

・Crude petroleum-and-natural gas creates the smallest new jobs, 300 jobs.
Heavy industry, such as oil refining, creates about new 3000 jobs
⇒ We propose set-up an oil related industry cluster.

・Accommodation and food services as tourism cluster create 4,200 new jobs.

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The Number of New Employees at different Skill levels

Source:this table is computed from SAM multiplier based on SAM for Timor-Leste

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3. Calculation of Economic Spillover Effect on Main Industries
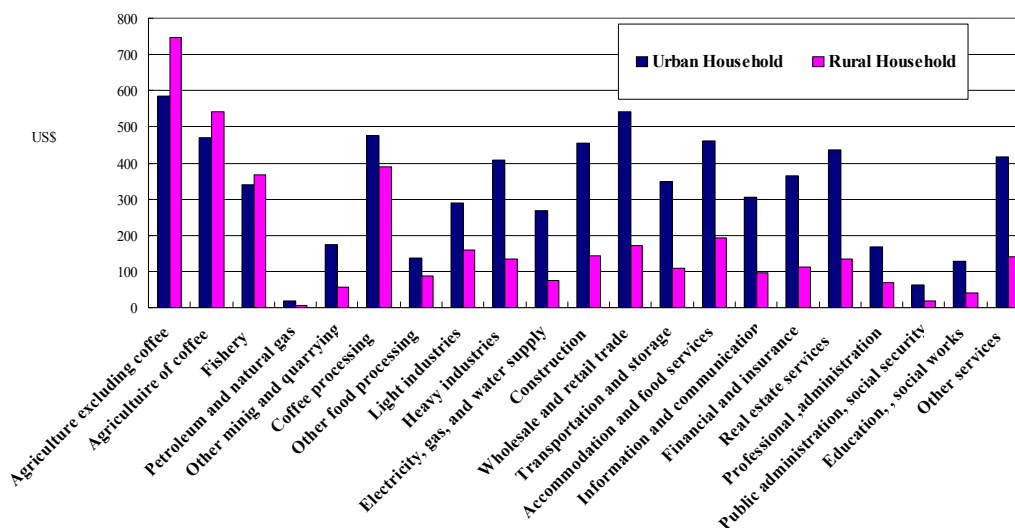Based on Projection of Supply and Demand of Labour Market

(3) SAM Multiplier Analysis

－Spillover Effects on Household Income in Urban and Rural －

・The industries which have a larger spillover effect on household income
per household in rural than that in urban are only Agriculture and Fishery.
⇒The injection of government expenditure in Agriculture and Fishery
is likely to reduce the income gap between urban and rural.
⇒ The injection of government expenditure in other industries expands
the household income gap between urban and rural.

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Result of Economic Spillover Effect on
Household income per household in Urban and Rural

Source:this table is computed from SAM multiplier based on SAM for Timor-Leste

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3. Calculation of Economic Spillover Effect on Main Industries
Based on Projection of Supply and Demand of Labour Market

(3) SAM Multiplier Analysis

－Summary (1)－

★The findings with SAM Multiplier Analysis are as follows:

・ It is the formation of Cluster that has the linkage between the oil
refinery of heavy industries and crude petroleum-and-national gas.

－ Heavy industries have economic impacts about twice the injected amount.

－While creating 3,000 jobs in absolute terms, these industries are expected
to have job creation effects on semi-skilled employees.

－ On the other hand, it will have a by-product of expanding the income gap
between urban and rural.

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■ Economic Spillover Effect of "Oil related industry Cluster"

Millions of US dollars		Oil sector	Non-oil sector	Labor	Capital	Household	Petroleum Company	Non-Petroleum Company	Government	Direct tax	Net indirect tax and duties	Combined capital account	Goods and Services	Current transfer	Total
Production activities	Oil sector	4.2	5.0										3,824		3,834
	Non-oil sector	31.4	503.1			531	11.7	30.8	795			341	136		2,380
Factors of production	Labor	41	166					5.8	109					151	472
	Capital	3,215	696					1.6	56					41	4,010
Institutions	Household			419	321				168					0	909
	Petroleum Company			0	2,254				0			0	0	535	2,789
	Non-Petroleum Company & NPISHs			0	375				0	0		0	0	81	456
	Government					1,300			0	42	52			0	1,394
Tax	Dirct tax					11	0	7	0					858	876
	Net indirect tax and duties	35	-6			6	1	0	1			16			52
Combined capital account						168	506	309	254				-2,095	1,451	592
Rest of the world	Goods and Services	507	1,017			81	13	0	12			235			1,865
	Current transfer			53	1,059	111	958	101	0	834	0	0			3,117
Total		3,834	2,380	472	4,010	909	2,789	456	1,394	876	52	592	1,865	3,117	

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3. Calculation of Economic Spillover Effect on Main Industries Based on Projection of Supply and Demand of Labour Market

(3) SAM Multiplier Analysis
－Summary (2)－

・ It is the formation of Cluster that has the linkage between agriculture and food processing industry, especially coffee product.

─ Agriculture sector and Coffee processing industry among 22 industries, have the largest economic impacts(about 3-3.5 times larger).

─ The injection of government expenditure in Agriculture has brought about the more increase in capital income for own-account workers that that in other industries.

─ It will have a job creation effect on Un-skilled employees.

─ It is expected to reduce the income gap between urban and rural.

■ Economic Effects of "Coffee Cluster"

Millions of US dollars	Oil sector	Non-oil sector	Labor	Capital	Household	Petroleum Company	Non-Petroleum Company	Government	Direct tax	Net indirect tax and duties	Combined capital account	Goods and Services	Current transfer	Total
Production activities — Oil sector	4.2	5.0										3,824		3,834
Production activities — Non-oil sector	31.4	503.1			531	11.7	30.8	795			341	136		2,380
Factors of production — Labor	41	166					5.8	109					151	472
Factors of production — Capital	3,215	696					1.6	56					41	4,010
Institutions — Household			419	321				168					0	909
Institutions — Petroleum Company			0	2,254				0			0	0	535	2,789
Institutions — Non-Petroleum Company & NPISHs			0	375				0	0		0	0	81	456
Institutions — Government					1,300		0	42	52			0		1,394
Tax — Dirct tax					11	0	7	0					858	876
Tax — Net indirect tax and duties	35	-6			6	1	0	1			16			52
Combined capital account					168	506	309	254				-2,095	1,451	592
Rest of the world — Goods and Services	507	1,017			81	13	0	12			235			1,865
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Total	3,834	2,380	472	4,010	909	2,789	456	1,394	876	52	592	1,865	3,117	

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3. Calculation of Economic Spillover Effect on Main Industries Based on Projection of Supply and Demand of Labour Market

(3) SAM Multiplier Analysis

－Summary (3)－

・ It is the improvement of social infrastructure by government's new projects.

― Construction has the economic impacts (about 1.6 times larger) smaller than Electricity,gas-and-water supply and transportation-and-storage(about 2.4-2.9 times larger).

― Construction has the largest job creation effect and is expected to create new job on Semi-skilled and Un-skilled employees in absolute terms.

― But, It will have expand the income gap between urban and rural.

■ Economic Effects of "Social infrastructure"

			Expenditure													
			Production activities		Factors of production		Institutions				Tax			Rest of the world		
	Millions of US dollars		Oil sector	Non-oil sector	Labor	Capital	Household	Petroleum Company	Non-Petroleum Company	Gevernme	Dirct tax	Net indirect tax and duties	Combine d capital account	Goods and Services	Current transfer	Total
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	Total		3,834	2,380	472	4,010	909	2,789	456	1,394	876	52	592	1,865	3,117	

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3. Calculation of Economic Spillover Effect on Main Industries
Based on Projection of Supply and Demand of Labour Market

(3) SAM Multiplier Analysis

－Summary (4)－

・ It is the improvement of the tourist industry by government's new projects.

－ Accommodation-and-food service has economic impacts of about twice the injected.

－It will have a larger job creation effect for Skilled employees than others industries.

－On the other hand, it will have a by-product of expanding the income gap between urban and rural.

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■ Economic impacts of "the tourist industry"

		Production activities		Factors of production		Institutions				Tax		Combined capital account	Rest of the world		Total
	Millions of US dollars	Oil sector	Non-oil sector	Labor	Capital	Household	Petroleum Company	Non-Petroleum Company	Government	Direct tax	Net indirect tax and duties	Combined capital account	Goods and Services	Current transfer	Total
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Total		3,834	2,380	472	4,010	909	2,789	456	1,394	876	52	592	1,865	3,117	

(Income on the left axis; Expenditure across the top.)

Conclusions

4. Policy Implications for More Effective Public Investment and Human Resource Development

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4. Policy Implications for More Effective Public Investment and Human Resource Development

(1) Replacement of foreign workers with Timorese workers

— How to improve the quality of Timorese workers

— How to increase highly-educated workers for labour participation rate

(2) Set-up of agriculture and processing industry cluster

(3) "Catalyst effect of oil & gas Industry" for other industries

— Development of other industries with oil and gas industry as the core

— Possibility of developing manufacturing industry, which has large employment creation effect

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(4) 4 scenarios on public investment – which way to follow?

— Strength & weakness in terms of: 1) economic spillover effect, 2) urban & rural income gap, 3) employment creation effect

Scenario	Strength	Weakness
A) Strategic development of primary & related industries (agriculture & food processing industry cluster)	- Largest economic spillover effect ($ 23.3 billion) - Employment creation effect (307,800) - Reduction of income gap btw. urban & rural	- Serious mismatch btw. skilled & unskilled labour Unskilled: 75,000 excess demand Skilled: 22,000 excess supply Semi-skilled: 44,000 excess supply
B) Strategic development of manufacturing industry (oil related industry cluster)	- Fairly balanced labour demand & supply	- Shortage of 21,000 skilled workers
C) Strategic development of IT, finance, tourism, service	- High demand for skilled workers	- Unemployment of semi- skilled workers
D) Combination of B & C		- Moderate imbalance of labour demand-supply for all skill types

* Assumption: The government spending of $ 8 billion is prioritized to strategic industry

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(5) Important Remarks for the Multiplier Analysis

・ SAM multiplier analysis is static one, without time consideration.

1.Supply of production always meets demand, that is, the prices remain the same due to lack of market clearing mechanism.

2.Production technology and resource endowments are given, remain the same.

3.Expenditures propensities of endogenous accounts remain constant. It means that Economic agencies behavior is unchanged.

4.Impacts by injections will be realized immediately, without considering time, within a year or within several years.

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(6) For make more solid SAM

- To have more consistent SNA, the core statistics such as Supply and Use Table and Trade and Transport margins. It can be basis for construct Input-Output tables.

- Business Activity Survey should be extended to capture necessary skill levels and its composition between domestic labour and expatriates.
  ⇒ It is recommended to make Economic Census in the near future.

- The household survey should be presented by income/consumption levels and by regions for implementing income distribution policy.

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Data Collection Survey on Pragmatic Framework Study of Labour Force Plan
Final Report

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Map of Timor-Leste (with Administrative Boundaries)
Acronyms
Summary

APPENDIX

CHAPTER 1: OUTLINE OF THE STUDY

1.1   Background

Although the Democratic Republic of Timor-Leste (hereafter, Timor-Leste) suffered some political disruption after gaining independence in 2002, it has achieved relatively steady economic growth thanks to oil revenues, especially after the establishment of the "Petroleum Fund" in 2005. Since then, public safety has greatly improved as the economy has stabilized. The election in 2012 successfully completed without serious problems.

In view of the social stability, the United Nations Integrated Mission in Timor-Leste (UNMIT), which had been stationed the country since 1999, withdrew at the end of 2012. Thus, Timor-Leste is currently at the stage of pursuing further self-sustaining development. However, the oil reserves are not inexhaustible, and therefore Timor-Leste needs to depart from excessive dependency on oil revenues within a decade or so before the existing resources are depleted.

In 2011, the Government of Timor-Leste (hereafter, the GOTL) announced the Strategic Development Plan (2011-2030) (SDP) aiming to become an "Upper Middle Income Country" by closing the income gap with neighboring countries such as Indonesia, Thailand and Malaysia. The SDP listed necessary actions to be taken for achieving the objective, such as departure from excessive dependency on oil revenues, establishment of key industries and accompanying employment creation and human resource development. The GOTL is currently developing a five-year investment plan while the line ministries are formulate mid-term plans in line with successful achievement of the SDP.

Statistics for 2010 estimate the population in Timor-Leste at 1,066,409 with an annual population growth rate of 2.4%. The population is projected to double by 2039 if the growth rate continues at this pace. With the sharp increase in the youth population, 15,000 to 16,000 people are expected to enter the labour market every year, but Timor-Leste has not developed key industries to absorb the extra workers. Implementation of the SDP is thus essential for immediately establishing key industries which can absorb the increasing in the working population.

However, execution of the planned budget in FY 2013 has not been satisfactory, delaying the progress of projects on implementing the SDP. The major reasons include 1) delays in budgetary discussions due to the appointment of a new cabinet in August 2012, 2) complicated legal procedures and approvals for various contracts, 3) tight schedule from budget requests to approvals, 4) adverse effect of strengthening supervisory and audit functions in the accounting system through the division of the budget management section and execution section, and 5) lack of a proper financial system for promoting investment and employment.

The shortage of capable human resources in Timor-Leste is another serious challenge. The low technical level of the domestic labour force compared to international standards results in the employment of expatriates and consequently the delays in the execution of public investment projects. In order to promote domestic employment through public investment promotion, there is an urgent need to promote SDP implementation and improve the technical level of the domestic labour force.

1.2   Objective

The objective of "Data Collection Survey on Pragmatic Framework Study of Labour Force Plan" (henceforth, the Study) is as follows.

For successful implementation of the SDP and other planned projects, the Study analyzes required labour force demand and labour force supply, provides an optimal labour force demand-supply projection, and extracts policy implications on labour force creation, human resource development and industrial development.

To achieve this objective, the Study covers the following analyses.

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1) To estimate the employment creation effects of ongoing and planned projects by technical level and by domestic-foreign workforce.
   <Analysis 1>

2) To conduct a simulation for future improvement in labour force quality as a result of educational expansion, based on the analysis of current situation of labour force provision.
   <Analysis 2>

3) To construct a SAM (Social Account Matrix), conduct a multiplier analysis and calculate economic spillover effects on major industries based on labour demand-supply projection.
   <Analysis 3>

4) To introduce policy implications on employment creation, human resource development and industrial development based on the results of Analysis 1 through 3.

Expected outcomes of the Study are as follows.

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1) The actual status of labour force and human resource development in Timor-Leste is clarified.

2) The study results are utilized by the GOTL for optimal budget execution.

3) The study results are utilized by the GOTL for more effective formulation and implementation of public investment plan and human resource development plan.

1.3   Period of Study

August 2013 to March 2014.

1.4   Target Area of the Study

The Study covers the entire area of Timor-Leste. However, because it has been only a decade since Timor-Leste became independent, only little chronological data for analysis and future estimation are available. Therefore, other reference data of neighboring areas and countries are useful for supplemental ones to make future forecast of Timor-Leste. Indonesia, for example, accumulates abundant data for different provinces, and is considered to be of good reference for Timor-Leste from a historical point of view. The Labor Force Plan Study Team (hereafter, the Study Team) also refers to the data of Malaysia, Thailand, Brunei Darussalam or other neighboring countries when the statistic data of these countries are found to be informative.

1.5   Counterpart Agency

The counterpart agency is the National Directorate for Economic Policy in the Ministry of Finance of Timor-Leste.

CHAPTER 2: WORK FLOW AND PROCEDURE

The following shows the work flow and procedure of the Study.

2.1   Preparatory Work in Japan (August 2013)

1) The Study Team discusses the degree of precision for SAM to be developed for Timor-Leste, referring to the statistical data accessible in Japan.
2) The Study Team selects the sample projects in the strategic four sectors (construction, agriculture, tourism and oil and gas) listed in the SDP and the Budget Book 3 (decentralization) and 6 (infrastructure fund). Around 10 major projects, which in total account for 50 to 60 % of the development budget, are selected in consideration of their representativeness.
3) The Study Team prepares an implementation plan and submits it to JICA headquarters (Southeast Asia and Pacific Department).
4) The Study Team prepares an inception report that articulates the basic policies, methods and procedure of the Study and submits it to JICA headquarters to receive comments for finalization.

2.2   First Field Work in Timor-Leste (August-September 2013)

1) The Study Team explains the implementation plan to JICA Timor-Leste Office.
2) The Study Team explains the contents of inception report to the GOTL and discusses and confirms the outline and schedule of the Study as well as the scope of work for the strategic sectors (construction, agriculture, tourism and oil and gas).

Labour Force Analysis of Completed/Ongoing Projects

3) The Study Team conducts the labour force analysis of major completed/ongoing projects (inputs, contents, technical level, source of procurement, effects on employment creation and human resource development, etc.) through interviews and data analysis.
4) Likewise, the Study Team conducts project evaluation of the completed/ongoing projects (implementation policy, project budget, work period, labour inputs, quality and effects on human resource development, etc.).
5) From the viewpoint of human resource development for core skilled labour, the Study Team collects the information on existing human resource development programs (different types of training including vocational training) and human resource development plans of the GOTL.
6) The Study Team clarifies the current situation of labour force by major sector and estimates the labour force potentials.

Analysis on the Effects of the Major Planned Projects on Employment Creation

7) Referring to the inception report, the Study Team consults with the GOTL to select representative projects planned within the next few years for analysis.

8) The Study Team estimates the labour demand for selected sample projects by confirming the project contents (design) and costs.

9) The Study Team analyzes the cases of employment creation in similar projects of other countries. At the same time, the team develops a set of scenarios for project implementation with the project periods (short-term/ long-term) and source of labour force as variables.

10) For the above mentioned scenarios, the Study Team estimates the effects on employment creation by major sector.

11) The Study Team compiles the outputs of the first field work as Progress Report 1 and shares it with the GOTL for discussion.

12) The Study Team reports to JICA Timor-Leste Office on the result of the first field work.

2.3 First Home Office Work in Japan (September-October 2013)

1) The Study Team analyzes the statistical data obtained in the first field work.

2) Based on the above mentioned analysis, the Study Team discusses and confirms the scope of second field work with JICA headquarters.

2.4 Second Field Work in Timor-Leste (October-December, 2013)

Preliminary Estimation of Economic Effects with SAM and Review of Human Resource Development Plan

1) Due to the absence of Input-Output (I/O) Table in Timor-Leste, the Study Team reviews the Five-Year Plans of four strategic sectors and collects the comparative data of reference countries selected for their similarity.

2) The Study Team conducts the classification of public investment plan by sector and technical level of labour force.

3) Based on the classification, the Study Team derives effective demand and supply patterns of labour force on a mid-term basis.

4) The Study Team draws policy implications on labour force supply based on the patterns mentioned above. At the same time, the team develops a feasible human resource development plan.

5) The Study Team compiles the outputs of the second field work as Progress Report 2 and shares it with the GOTL for discussion.

6) The Study Team reports to JICA Timor-Leste Office on the result of the second field work.

2.5   Second Home Office Work in Japan (December 2013-January 2014)

1)   Based on the outputs of second field work, the Study Team develops a draft version of policy recommendations for long-term employment creation and human resource development.

2)   The Study Team discusses and confirms the scope of third field work with JICA headquarters.

2.6   Third Field Work in Timor-Leste (February 2014)

Policy Recommendations for Employment Creation and Human Resource Development

1)   The Study Team identifies the challenges of employment creation and human resource development in the medium to long-term with regard to the achievement of SDP goals in 2030.

2)   Based on the outputs of first and second field work, the Study Team prepares policy implications for human resource development in the four strategic sectors to achieve the SDP goals. The prioritization among the four sectors is determined through the discussion with the GOTL.

3)   The Study Team formulates the recommendations on the application of SAM for the development of macroeconomic model in the future.

4)   A workshop for sharing the outputs of the Study is held with participation of the counterparts of the Study, other officials from concerned ministries and the development partners working in related sectors.

5)   The Study Team prepares a draft final report and explains the contents to the government officials.

6)   The Study Team reports to JICA Timor-Leste Office on the result of the third field work.

2.7   Finalization of the Study in Japan (February-March 2014)

1)   The Study Team reports the result of the third field work and submits the draft final report to JICA headquarters.

2)   Based on the comments from JICA headquarters, the Study Team finalizes and submits the final report.

CHAPTER 3: SURVEY RESULT

As mentioned in Chapter 1, the objectives of the Study are: 1) to analyze the labour force demand required for executing the public investment projects mentioned in national development plans as well as actual labour force supply (domestic and foreign) that can be provided; and 2) to estimate the optimal level of labour demand and supply based on the analysis. In addition, the Study introduces policy implications on employment creation, human resource development and industrial development by 2030 based on the analysis and estimation.

The Study consists of three major study components, that is, 1) Employment to Be Created by Infrastructure Fund and Future Job Projection (Analysis 1), 2) Effect of Quality Improvement on Labour Force by Education and Training (Analysis 2), and 3) Construction of SAM for Timor-Leste 2010 and Multiplier Analysis (Analysis 3). Due to the tight schedule and limited data availability in Timor-Leste, the Study referred to the cases and data of neighboring countries to overcome the limitations. The details on the use of reference data are described in each section (3.1-3.4).

First, in the analysis of 1) Employment to Be Created by Infrastructure Fund and Future Job Projection (Analysis 1), the effects on employment creation, i.e. labour demand, in the short-term (FY 2013 and 2014), mid-term (FY 2014 to 2018) and long-term (2010-2030) are projected based on the budget books for Infrastructure Fund, the SDP and reference data of neighboring countries. In the short to mid-term projections, the numbers of employment by technical level are also calculated as well as the proportions of domestic and foreign workers to be employed out of the numbers, with consideration of the available number and quality of Timorese labour force. This calculation leads to the policy implications for the process of replacing expatriates to domestic workers in the future. To project a long-term employment creation effects, the preceding cases of *Terengganu State, Malaysia* and *Rayong province, Thailand* are referred to as the data source. Both cases show similarity with and implications for Timor-Leste, for they have achieved tourism and agriculture development based on oil and gas industry. In addition, both cases suggest that the investment in infrastructure development does not automatically lead to employment promotion in other sectors and that there was an effort and clear policy formulation for attracting other industries (see Note 6 and 7 in 3.1.4.1 for details). Accordingly, the analysis shows policy implications for industrial development and employment creation of Timor-Leste (see 3.1.4.1 (1) for details).

Second, in the analysis for 2) Effect of Quality Improvement on Labour Force by Education and Training (Analysis 2), re-analysis of Labour Force Survey (2010) is

conducted with thorough understanding on the current educational level of Timor-Leste. In addition, the analysis presents four scenarios of labour structure in 2030 based on different premises (see 3.2.3.2 and 3.2.3.3 for details). In any of these scenarios, the working population is estimated to double in 2030. Especially, increase of working population among the youth is significant, suggesting the necessity of developing secondary and tertiary industries to absorb the population. Also, the proportion of technical high school graduates should be increased as the supply source of professional and technical workers next to tertiary education graduates. Based on these analyses, the following policy implications are articulated: 1) expansion in quantity and quality of education for human resource development in various industries; 2) increase in the number of graduates of high schools and universities through improvement in promotion rate and reduction of dropouts; and 3) increase in the ratio of technical high schools and higher education in science and engineering.

As for TVET (Technical Vocational Education and Training), for which formal system has been newly introduced and is at the development stage, the issues to be addressed include: 1) increased number and capacity of accredited training providers; 2) increased number of certified courses; 3) functional employment placement system; and 4) strategy for labour supply by type of occupation.

Third, in 3) Construction of SAM for Timor-Leste 2010 and Multiplier Analysis (Analysis 3), the result of Analysis 1 is examined through the construction of SAM for Timor-Leste in 2010 and its multiplier analysis. Also, it reveals the spillover effect of Infrastructure Fund to the overall economy of Timor-Leste as well as its impact on urban and rural households. In addition, the multiplier analysis provided policy implications on the effective government expenditure (sector and amount) for creating new employment in accordance with the projection of additional labour supply until 2030 conducted in Analysis 2. Thus, the SAM multiplier analysis is conducted to examine the validity of Analysis 1 and 2 and extract policy implications.

The study results were shared with the Ministry of Finance and other government ministries, development partners and other stakeholders through a series of workshops and seminars. Besides, the study team conducted the workshops on the estimation of employment creation effect and SAM multiplier analysis for the officials of the Ministry of Finance to promote their understanding. In the workshops and seminars, the participants commented that 1) the study results are important inputs for discussing the policy directions on employment creation, human resource development and industrial development, and 2) they are also useful as a reference for formulating sector studies and action plans of development partners. Also, the counterpart agency requested JICA's further cooperation based on the Study, which will be discussed for details later.

3.1 Employment to Be Created by Infrastructure Fund Budget and Future Job Projection

3.1.1 Short-term estimation of job creation

At the request of the Ministry of Finance of Timor-Leste, jobs to be created by the State Budget of 2013 and 2014 were estimated.

3.1.1.1 Estimation of jobs created by State Budget 2013 [note1]

As per the estimation based on the sample projects, the Infrastructure Fund of Budget 2013 would create work for a total of approximately 2,800,000 person-months during the project period and the number of persons given work is estimated at approximately 21,600.[note2] Due to the current quantity and quality limitations of the Timorese workforce, 77% of Manager/Engineer, 58% of Skilled, and 17% of Un-skilled jobs would be given to expatriates.

Table 3.1.1: Employment creation by State Budget 2013 Infrastructure Fund

Sector	Budget U$1,000	Person -months	Number of persons given work								
			Manager		Skilled		Unskilled		Total		
			T	E	T	E	T	E	T	E	Total
Agriculture[note3]	7,953	16,428	0	0	0	0	1,369	0	1,369	0	1,369
Water/Sanitation	10,098	1,017	0	6	0	28	126	0	126	34	160
U/R Development	6,576	755	0	8	15	0	1	0	15	8	23
Electricity	123,667	22,833	0	289	93	476	283	0	376	765	1,142
Roads	88,085	23,539	0	50	125	125	325	0	451	175	626
Bridges	18,289	5,851	0	185	108	448	185	0	293	634	926
Airports	8,467	251,015	47	127	385	59	519	0	952	186	1,137
Ports	10,975	493,918	173	182	436	240	474	0	1,083	422	1,505
ICT	10,491	59,288	9	34	59	130	46	42	114	206	320
Public Building	40,668	229,829	34	132	230	505	177	163	441	800	1,241
Education	9,135	847,093	124	486	847	1,863	651	599	1,622	2,947	4,569
MDG	46,263	317,677	0	67	1,482	1,144	1,683	0	3,165	1,211	4,377
Health	2,041	11,534	2	7	12	25	9	8	22	40	62
Security/Defense	17,599	99,458	15	57	100	219	77	70	191	346	537
Social Solidarity	1,663	9,398	1	5	9	21	7	7	18	33	51
Tasi Mane Project	139,402	397,245	174	335	823	1,283	470	413	1,467	2,031	3,498
New Project Plan	19,418	2,204	0	23	42	0	3	0	45	23	68
Total	560,790	2,789,082	579	1993	4,766	6,566	6,405	1,302	11,750	9,861	21,611
Percentage of each category			23	77	42	58	83	17	59	46	100
Percentage of total			3	9	22	30	30	6	59	46	100

Note: T: Timorese, E: Expatriate. The "Manager" column includes Engineer.

3.1.1.2 Estimation of jobs created by State Budget 2014 [note4]

The Study Team assumed that the programs to be funded by the Infrastructure Fund of State Budget 2014 have the potential to create, overall, an estimated 16,000 jobs directly, equivalent to 137,000 person-months. The top three programs, which have the potential to create large numbers of jobs, are the Tasi Mane Project (South coast oil and gas development), Roads and Electricity. These programs also have the highest budget allocation. The 16, 000 jobs are categorized into: Manager/Engineer 1,700, Skilled 6,000, Semi-skilled 1,500 and Un-skilled 6,800 persons. Due to the current quantity and quality limitations of Timorese workforce, 78% of Manager/Engineer, 58 % of Skilled and Semi-Skilled and 12% of Un-skilled jobs would be given to expatriates. Road programs have the potential to create the largest number of jobs for Timorese.

Table 3.1.2: Employment creation by State Budget 2014 Infrastructure Fund

No.	Program	Budget million U$	Manager/Engineer		Skilled		Semi Skilled		Unskilled		Total		
			Timorese	Expatriate	Timorese	Expatriate	Timorese	Expatriate	Timorese	Expatriate	Timorese	Expatriate	Total
1	Agriculture and Fisheries	6,965	35	0	35	0	460	0	2,442	0	2,973	0	2,973
			41	0	41	0	533	0	2,828	0	3,443	0	3,443
2	Water and sanitation	7,800	4	2	8	2	7	3	199	0	217	7	224
			41	21	83	21	72	31	2,065	0	2,261	72	2,333
3	Urban and Rural Development	7,250	7	25	35	77	12	16	34	29	87	147	233
			50	194	267	593	89	124	263	225	670	1,135	1,805
4	Public building	21,536	19	74	103	227	34	48	101	86	257	435	693
			150	575	794	1,760	265	368	782	667	1,990	3,371	5,361
5	Financing to support infrastructure	19,820	18	68	94	209	31	44	93	79	237	401	637
			138	529	731	1,620	244	339	720	614	1,832	3,102	4,934
6	Youth and Sports	1,800	2	6	9	19	3	4	8	7	21	36	58
			12	48	66	147	22	31	65	56	166	282	448
7	Education	9,489	9	33	45	100	15	21	45	38	113	192	305
			66	253	350	775	117	162	345	294	877	1,485	2,362
8	Electricity	56,350	51	194	268	595	89	124	264	226	673	1,139	1,812
			391	1,505	2,077	4,605	692	963	2,047	1,746	5,207	8,819	14,027
9	Information technology	4,200	4	14	20	44	7	9	20	17	50	85	135
			29	112	155	343	52	72	153	130	388	657	1,045
10	MDG	27,000	0	49	357	195	0	81	405	0	762	324	1,086
			0	272	1,998	1,090	0	454	2,270	0	4,268	1,816	6,084
11	Health	5,042	5	17	24	53	8	11	24	20	60	102	162
			35	135	186	412	62	86	183	156	466	789	1,255
12	Defence & security	20,431	18	70	97	216	32	45	96	82	244	413	657
			142	546	753	1,670	251	349	742	633	1,888	3,198	5,086
13	Social Solidarity	767	1	3	4	8	1	2	4	3	9	16	25
			5	20	28	63	9	13	28	24	71	120	191
14	Tasi Mane Project	46,300	68	261	361	800	120	167	658	0	1,207	1,229	2,436
			856	3,294	4,545	10,079	1,515	2,108	8,293	0	15,210	15,481	30,691
15	Roads	57,011	11	22	26	0	366	15	624	0	1,027	37	1,064
			246	492	574	0	8,204	328	13,988	0	23,013	820	23,834
16	Bridge	19,859	0	36	9	63	11	23	36	0	57	122	179
			0	229	57	400	71	143	229	0	357	771	1,129
17	Airport	12,017	0	30	0	15	89	5	152	0	241	51	292
			0	438	0	219	1,279	73	2,192	0	3,471	731	4,202
18	Ports	13,225	15	205	0	171	0	98	488	0	503	474	976
			182	2,547	0	2,122	0	1,213	6,063	0	6,245	5,881	12,127
19	Oecusi development	19,369	17	67	92	205	31	43	91	78	231	392	623
			135	517	714	1,583	238	331	704	600	1,790	3,031	4,821
20	Tourism	2,850	3	10	14	30	5	6	13	11	34	58	92
			20	76	105	233	35	49	104	88	263	446	709
21	New project preparation	15,007	13	52	71	158	24	33	70	60	179	303	483
			104	401	553	1,226	184	257	545	465	1,387	2,349	3,736
22	Loans project	51,049	46	176	243	539	81	113	240	204	609	1,032	1,642
			354	1,363	1,882	4,172	627	873	1,854	1,582	4,717	7,990	12,707
	Total	425,135	324	1,342	1,812	3,500	1,392	863	6,007	854	9,536	6,559	16,094
			2,849	12,993	15,164	31,373	14,297	7,998	45,680	6,612	77,990	58,976	136,966

(Above; Jobs, Below; Person-months)

3.1.2   Mid-term estimation of job creation

3.1.2.1   Estimation of jobs created by State Budget 2014-2018

According to the State Budget 2014 Book 6, from 2014 to 2018, a total of USD 2,518,102,000 will be allocated to the Infrastructure Fund programs. These programs have the potential to create an estimated 16,000 jobs in 2014, 27,000 jobs in 2015, 38,000 jobs in 2016, 21,800 jobs in 2017 and 9,000 jobs in 2018.

Table 3.1.3: Employment creation by Infrastructure Fund from 2014 to 2018

Year	Budget 1,000U$	Person -months	Manager/Engineer		Skilled		Semi-skilled		Un-Skilled		Total		
			Timorese	Expatriate	Timorese	Expatriate	Timorese	Expatriate	Timorese	Expatriate	Timorese	Expatriate	Total
2014	425,135	136,966	324	1,342	1,812	3,500	1,392	863	6,007	854	9,535	6,559	16,094
2015	687,931	192,436	536	2,241	3,049	5,748	2,368	1,414	10,987	1,223	16,940	10,626	27,566
2016	762,792	268,901	669	3,586	3,006	6,701	2,957	2,028	17,912	1,202	24,544	13,517	38,061
2017	398,381	117,382	418	1,433	1,969	3,855	2,068	894	10,330	805	14,785	6,987	21,772
2018	243,863	75,398	135	737	898	1,628	1,134	391	3,675	234	5,842	2,990	8,832
Total	2,518,102	791,083	2,082	9,339	10,734	21,432	9,919	5,590	48,911	4,318	71,646	40,679	112,325
Percentage in each category			18	82	33	67	64	36	92	8	64	36	100

3.1.2.2   Brief evaluation of Infrastructure Fund programs from 2014 to 2018

Regarding the potential for job creation, the Study Team conducted a brief evaluation of programs funded by the Infrastructure Fund from 2014 to 2018 as follows.

Table 3.1.4: Evaluation of Programs Funded by Infrastructure Fund (2014-2018)

Name of Project	2014-2018 Budget	Evaluation
Agriculture and Fisheries	66,801.80	Majority of projects are the irrigation projects which create jobs mainly in rural areas. Most of the jobs are for semi-skilled and unskilled workers, and they do not require expatriates. The job quantity of employee depends on the length of the irrigation canal, but in almost all the cases, the project period is short.
Water and Sanitation	81,774.70	Drinking water system development has been almost completed in both Dili and rural areas. Provision of drinking water in 10 district is planned by Public Private Partnership (PPP) scheme. Sewage system construction and rehabilitation project in Dili is the major project in next 5 years. Water and sanitation project requires engineers and skilled workers specialized in water and sanitation. Some of these jobs will be given to expatriates while most of the jobs will be given to Timorese because there is certain number of engineers. Skilled workers who have job experience are available since the development of drinking water system and sanitation system in Timor-Leste has been implemented for long years.
Urban and Rural development	19,750.01	The major project is to make a map of whole territory with GIS.

Name of Project	2014-2018 Budget	Evaluation
Public building	176,859.89	After the independence, most of the ministries have faced the shortage of office space and currently accommodate their staff in temporary office called "KOBE house". Thus, the construction of new buildings of ministries are planned to solve the problem. Also, major building in the districts require rehabilitation and construction. Since there was no tall building that has more than 4 stories in Timor-Leste, it is difficult to find civil engineer, architect, steel structure fabricator, welder, HVAC specialist among Timorese. Therefore, most of the position will be given to expatriates. Meanwhile, through on-the-job training, many skilled workers and semi-skilled workers are currently trained.
Financing to support infrastructure	54,596.64	The majority of the budget is allocated for the purchase of facilities related to public building projects.
Youth and Sports	22,990.00	The majority of the projects are design and construction of stadium and gymnasium.
Education	146,346.73	The majority of the projects are design, supervision and construction of schools. From 2014 to 2017, the majority of the fund will be utilized for the new campus of the UNTL. The second biggest project is the construction of Polytechnics in Lospalos and Suai.
Electricity	139,220.66	Since the construction project of Hera and Betano power plants as well as main distribution lines was completed, the Infrastructure Fund in the electricity sector will be used for the maintenance of distribution lines. The oil jetty and tank farm will be constructed for Hera power plant. Master planning will be funded for Dili-Atauro Island submarine cable project. The solar power plant and wind power plant projects are still not on the list.
Information Technology	4,900.00	Fund is allocated for Fiber optical cabling and upgrading of satellite internet connectivity.
MDG	171,080.00	The fund is utilized to construct 5 houses per aldeia (11,145 houses in total) and also for the water and sanitation projects. Due to the urgency of the house construction to achieve one of the indicators of Millennium Development Goals by 2015, the prefabrication construction method was selected. Since it is difficult to find the skilled workers who have job experience of constructing prefabricated house, most of the jobs were given to expatriates. In 2014, new houses will be constructed by traditional construction method because the prefabrication houses are not fit to the climate condition in some areas. In such areas, more local jobs are expected to be given to semi-skilled and unskilled Timorese workers with local procurement of traditional materials, such as bricks.
Healthcare	9,356.77	The fund is allocated for the construction of Baucau hospital and other construction projects.
Defence & security	45,011.83	The fund is allocated for the construction of military camp and buildings of police department.
Social solidarity	8,666.88	The major portion of the fund is utilized to construct monument and memorial gardens.
Tasi mane	365,229.00	The phase1 of expansion of Suai Airport and construction of port project will be started from 2014. The majority of the fund is allocated to both projects. Since the construction of passenger terminal building, control tower and supply base requires engineer and skilled worker who have the skills and knowledge in the airport and/or port construction field, majority of these jobs will be given to expatriates. Apart from Suai project, Betano Refinery project is scheduled to start in 2014. Refinery construction requires several workers with special skills, who are not available in Timor-Leste at present, namely, welder, piping fitter, mechanics of fire-fighting facility and insulation, large scale compressor/boiler/motors mechanics, crane operator of 1,200 ton crane, electrician, etc. Those works will be given to expatriates. Immediate preparation to train Timorese workers is necessary because Beaco LNG project is scheduled after Betano Refinery project.

Name of Project	2014-2018 Budget	Evaluation
Roads	119,438.35	One of the largest portions of the Infrastructure Fund is allocated to the road sector. Since there was a large number of road construction projects in Timor-Leste in the past, and therefore several Timorese skilled workers as well as semi-skilled workers have been created already, almost all of those jobs will be given to Timorese except some Manager/Engineer positions, which will be given to expatriates.
Bridge	31,754.63	Due to the difficulty to find engineers and skilled workers who have the technology and skills to construct bridge in Timor-Leste, most of the engineer and skilled worker positions will be given to expatriates. Also by the same reason, two-third of semi-skilled workers job will be given to expatriates.
Airport	268,941.85	The major project in the airport sector is the upgrading project of Dili Airport. This project will be implemented by PPP. Since the airport construction requires engineers and skilled workers who are specialized in the airport construction, most of these jobs will be given to expatriates.
Ports	157,424.97	The largest project is the construction of Tibar port. This project will be implemented by PPP. Port construction requires the engineers, skilled workers and semi-skilled workers who have the marine construction technology and job experience. Thus, these positions will be given to expatriates. Unskilled work will be given to Timorese workers.
Oecusi Development	69,691.57	The major projects include construction of power plant, immigration office in Tono and schools.
Tourism	7,850.00	Major projects are the construction of hot spring center in Marobo and Atauro and the Maubara lake development project.
New Project preparation	47,434.50	This fund is for the planning of new projects.
Loans project	502,970.00	Almost all the loan projects are road construction projects. Also construction projects of Nicolau Lobato International Airport and Dili drainage are included.
Total	2,518,090.78	
Total excluding loans project	2,015,120.78	

3.1.3   Replacement of expatriates by Timorese

As mentioned in Section 3.1.2.1 above, as per the result of the estimation, a total of 112,000 jobs would be potentially created by the Infrastructure Fund of State Budget 2014-2018. However, certain number of jobs would be given to expatriates, i.e. within the estimated total of 112,000 potential jobs (note that this is not cumulative jobs for 5 years) to be created from 2014 to 2018, 82% are Manger/Engineer jobs, 67% are Skilled, 36% are Semi-skilled jobs and 8% are Unskilled jobs.

The expatriates' jobs to be replaced by Timorese in the future are identified as follows.

Category	Job description	Requirement
Manager/Engineer	Manager(Project, Administration, Finance), Engineer (Process, Mechanical, Electrical, Civil, Cost control, Environment, Safety, Quality Control), Architect,	Doctor/Master/Bachelor Degree
Skilled worker	Technician, Supervisor, Surveyor, Accountant	Diploma
Semi-skilled worker	Operator, Carpenter, Clerk, Foreman, Mason, Mechanics	Certificate

The replacement of expatriates' jobs by Timorese shall be planned considering how to maintain the quality of the jobs. Expatriate Manager/Engineer jobs shall be replaced by Timorese graduates of the University of Timor-Leste and then by graduates of other universities in Timor-Leste through the enhancement of the domestic higher education system to meet the demand of industry. Until the quality and technology level of graduates of Timorese universities reach those required by industry, as an alternative idea is for expatriate Manager/Engineer positions to be replaced by Timorese graduates of universities abroad.

The replacement of expatriate Skilled Workers as well as Semi-skilled Workers by Timorese workers could be achieved through skill development training by effective Technical and Vocational Education and Training (TVET) institutes. For specific jobs which currently do not exist in Timor-Leste, e.g. jobs for constructing oil refineries and/or LNG terminals, training courses for such jobs shall be designed and implemented in the TVET system. Also, training by TVET institutes in neighboring countries, such as Indonesia, Thailand and Malaysia could be an alternative until the domestic TVET institutes are ready to create Skilled and Semi-skilled Workers.

In addition, it is advisable to include a clause in contracts for purchasing large infrastructure and/or plants stating that "it is the obligation of the contractor to give training to a certain number of Timorese semi-skilled and/or unskilled workers prior to the start of construction."

3.1.4 Long-term estimation of job creation

3.1.4.1 Estimation of jobs created utilizing other countries' models

Although there is a list of projects to be implemented toward 2030[note5] in the SDP of Timor-Leste, the SDP does not mention the amount of budget for them. Therefore, the Study estimates the jobs to be created toward the year 2030 by using the figures of Terengganu State, Malaysia and Thailand as model cases. Terengganu State of Malaysia[note6] was selected because of its similarity to Timor-Leste; for example, its population is approximately 1,000,000 and its major industries are agriculture, tourism and oil and gas. Rayong Province of Thailand[note7] was selected for the same reason.

The estimation of jobs created from 2010 to 2030 in Timor-Leste was calculated by referring to the historical figures of labour population in respective industry categories for twenty years in Malaysia and Thailand as models and applying them to the labour population of same industry categories of Timor-Leste in 2010. Note that the term "model" is used here in a limited sense to clarify the source of reference data on labour force trends and the ways of applying them for each estimation. "The models" do not include detailed analysis of the process and preconditions for industrial development in Malaysia and Thailand.

(1) Future job projection utilizing the Malaysian model

Future job projection utilizing the Malaysian model indicates an increase in the number of jobs created at approximately 185,500: agriculture 9,600, mining -100, manufacturing 2,000, electricity/gas/water 7,400, construction 23,000, wholesale and retail 14,000, transport and communication 2,000, finance/insurance 8,900, other services 118,000, public administration 700.

Table 3.1.5: Estimation of job creation toward 2030 utilizing the Malaysian model

Year	Total	Agriculture Fisheries	Mining and quarring	Manufacturing	Electricity,gas and water	Construction	Wholesale and retail trade, restaurants and hotels	Transport, storage and commnication	Finance, Insurance, real estate	Other Services	Public Administration
2010	250,000	127,000	1,000	8,000	2,000	13,000	44,000	12,000	2,000	34,000	7,000
2011	284,237	122,897	900	8,561	3,333	18,381	57,209	15,643	2,038	50,660	4,614
2012	279,461	124,333	860	8,486	2,810	18,381	49,163	13,607	2,057	54,775	4,989
2013	274,685	125,769	820	8,411	2,286	18,381	41,116	11,571	2,075	58,891	5,364
2014	312,178	148,338	800	8,561	2,381	19,712	53,023	12,214	3,094	58,708	5,347
2015	280,527	115,921	1,020	7,869	2,952	24,005	48,093	13,286	2,528	59,439	5,414
2016	300,016	134,796	780	8,336	2,571	23,944	51,907	11,571	2,453	58,342	5,314
2017	321,066	152,851	1,400	6,897	2,190	22,191	52,558	11,357	2,377	63,463	5,780
2018	306,139	126,384	760	8,336	1,524	26,967	51,907	15,107	2,717	66,389	6,047
2019	294,398	110,176	580	8,168	2,286	26,000	44,279	12,964	4,566	79,332	6,047
2020	281,685	93,557	600	6,467	2,190	26,060	43,814	12,107	3,623	88,011	5,255
2021	347,472	123,512	680	8,953	2,857	29,265	49,116	14,036	4,906	107,349	6,798
2022	346,723	124,333	760	8,617	1,714	26,726	50,047	13,286	5,396	110,090	5,755
2023	344,004	114,690	860	8,430	2,571	28,600	50,977	13,286	4,830	112,983	6,777
2024	351,774	114,074	820	8,953	1,810	28,721	46,140	13,821	6,566	123,946	6,923
2025	362,927	119,614	1,060	8,411	3,333	31,563	53,395	12,000	6,113	120,140	7,298
2026	378,508	114,074	1,220	7,869	2,952	36,340	50,233	13,286	6,528	139,021	6,985
2027	382,027	105,457	1,400	8,841	3,524	38,577	54,233	14,143	7,321	141,610	6,923
2028	364,309	105,047	1,280	7,664	7,524	32,893	46,419	13,500	8,830	134,605	6,547
2029	377,736	108,330	1,080	8,579	6,000	32,409	54,233	11,143	10,943	137,346	7,673
2030	435,485	136,643	900	9,794	9,429	35,916	57,767	14,036	10,906	152,421	7,673
Balance	185,485	9,643	−100	1,794	7,429	22,916	13,767	2,036	8,906	118,421	673

(2) Future job projection utilizing the Thailand model

Future job projection utilizing the Thailand model indicates an increase in the number of jobs created at approximately 342,000 in total: agriculture 35,000, mining 600, manufacturing 17,800, electricity/gas/water 6,000, construction 103,500, wholesale and retail 86,700, transport and communication 19,000, finance/insurance and other services 61,500 and public administration 12,000.

Table 3.1.6: Estimation of job creation toward 2030 utilizing the Thailand model

Year	Total	Agriculture Fisheries	Mining and quarring	Manufacturing	Electricity,gas and water	Construction	Wholesale and retail trade, restaurants and hotels	Transport, storage and commnication	Finance, Insurance, realestate and business services	Public Administration
2010	250,000	127,000	1,000	8,000	2,000	13,000	44,000	12,000	36,000	7,000
2015	323,595	152,582	1,276	10,555	2,810	27,515	61,179	14,362	44,629	8,688
2020	386,727	169,158	2,379	12,195	4,810	36,728	75,866	16,724	57,644	11,222
2025	483,830	188,787	1,862	18,484	5,190	64,748	95,025	23,087	72,529	14,120
2030	592,196	162,018	1,586	25,817	8,000	116,495	130,723	31,055	97,517	18,984
Balance	342,196	35,018	586	17,817	6,000	103,495	86,723	19,055	61,517	11,984

The differences in the projected numbers between the Terengganu State of Malaysia model and the Thailand model are analyzed to derive the difference in the development stage of the manufacturing industry and the structure of industries. One of the clear conclusions of this analysis is that it is important to promote the manufacturing industry in order to create jobs.

According to officials of labour department in Rayong Province in Thailand as well as Terengganu State of Malaysia, the oil and gas industry itself does not create large

numbers of jobs[note8]. Instead, (1) related industries, such as machinery, construction, restaurants, hotels, schools, public and public services have created employment for the oil and gas industry, and (2) well-prepared infrastructure (for example, port, airports, roads and power) have attracted other industries besides oil and gas, such as the automotive industry and electrical apparatus industry. They called this the "catalyst effect of the oil and gas industry." It could be assumed from their experience that it will be important to utilize improved infrastructure to create jobs in Timor-Leste in the future. However, job creation could be achieved not only by improving infrastructure but also by investment promotion activities. Organizations to promote investment have been established as one-stop agencies for investors, for example, the Board of Investment in Thailand, the Industrial Estate Authority of Thailand, the Malaysian Investment Development Authority, and Terengganu State Development Corporation. Investment promotion seminars were organized both at home and abroad, and advertisements were broadcast widely through television, internet, newspapers and business magazines abroad. Policies to promote investment by giving privileges including tax exemptions and/or reduction, as well as lifting of restrictions were implemented. In addition, efforts were made to develop human resources in both cases: a Skill Training and Development Centre was established in Rayong Province of Thailand, and the MARA Institute of Technology was set up in Terengganu State of Malaysia. These institutes have effectively trained local human resources especially in the oil and gas sector, which previously had not created local employment opportunities.

3.1.4.2   Future job projection for Timor-Leste by 2030

The future job projection for Timor-Leste by 2030 was implemented based on the Malaysian model because the country's past economic development status was similar to the current status of Timor-Leste, and also by utilizing future job projection based on the Thailand model for the manufacturing industry assuming that development of the manufacturing industry is the key issue in employment creation. The sensitive analysis of Timor-Leste job creation by 2030 was implemented utilizing the manufacturing sector as the parameter to emphasize the influence of manufacturing industry development. Case 1 is the base case utilizing the Malaysian model, Case 3 is the most optimistic case utilizing the Thailand model for the manufacturing sector and Case 2 is the medium case. The result of Case 3 shows that 300,000 jobs will be created by 2030 with the manufacturing industry playing the main role. As explained later in Section 3.3, approximately 300,000 new workers are estimated to join the labour market by 2030, and so Case 3 is the only case where labour supply and demand will be balanced in 2030. Thus, the result of this estimation shows the importance of promoting the manufacturing

industry in considering the industrial policy of Timor-Leste to balance the supply and demand of the labour force in 2030. The employment creation effect of strategic development of the manufacturing industry will also be analyzed in Section 3.4.
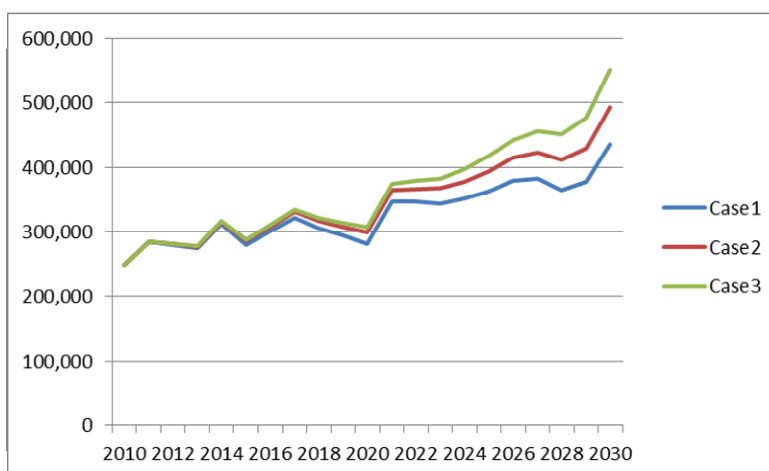
Figure 3.1.1: Future projection for job creation (2010-2030) in Timor-Leste

As per the future projection, almost all cases show that: (1) the number of jobs in the agriculture and fisheries industry remains the same after twenty years, but the percentage in the total employment declines from 50% to around 30%; (2) as the number of jobs in the manufacturing industry increases, the numbers of jobs in commerce, transportation and storage, telecommunications, finance, and insurance increase accordingly, while the number of jobs in the service industry increases more than in any other industries; (3) the number of jobs in construction will double; and (4) the number of jobs in the mining industry as well as public administration remains the same.

Table 3.1.7: Case 1: Base Case

Year	Total	Agriculture Fisheries	Mining and quarring	Manufacturing	Electricity,gas and water	Construction	Wholesale and retail trade, restaurants and hotels	Transport, storage and commnication	Finance, Insurance, real estate	Other Services	Public Administration
2010	250,000	127,000	1,000	8,000	2,000	13,000	44,000	12,000	2,000	34,000	7,000
2011	284,237	122,897	900	8,561	3,333	18,381	57,209	15,643	2,038	50,660	4,614
2012	279,461	124,333	860	8,486	2,810	18,381	49,163	13,607	2,057	54,775	4,989
2013	274,685	125,769	820	8,411	2,286	18,381	41,116	11,571	2,075	58,891	5,364
2014	312,178	148,338	800	8,561	2,381	19,712	53,023	12,214	3,094	58,708	5,347
2015	280,527	115,921	1,020	7,869	2,952	24,005	48,093	13,286	2,528	59,439	5,414
2016	300,016	134,796	780	8,336	2,571	23,944	51,907	11,571	2,453	58,342	5,314
2017	321,066	152,851	1,400	6,897	2,190	22,191	52,558	11,357	2,377	63,463	5,780
2018	306,139	126,384	760	8,336	1,524	26,967	51,907	15,107	2,717	66,389	6,047
2019	294,398	110,176	580	8,168	2,286	26,000	44,279	12,964	4,566	79,332	6,047
2020	281,685	93,557	600	6,467	2,190	26,060	43,814	12,107	3,623	88,011	5,255
2021	347,472	123,512	680	8,953	2,857	29,265	49,116	14,036	4,906	107,349	6,798
2022	346,723	124,333	760	8,617	1,714	26,726	50,047	13,286	5,396	110,090	5,755
2023	344,004	114,690	860	8,430	2,571	28,600	50,977	13,286	4,830	112,983	6,777
2024	351,774	114,074	820	8,953	1,810	28,721	46,140	13,821	6,566	123,946	6,923
2025	362,927	119,614	1,060	8,411	3,333	31,563	53,395	12,000	6,113	120,140	7,298
2026	378,508	114,074	1,220	7,869	2,952	36,340	50,233	13,286	6,528	139,021	6,985
2027	382,027	105,457	1,400	8,841	3,524	38,577	54,233	14,143	7,321	141,610	6,923
2028	364,309	105,047	1,280	7,664	7,524	32,893	46,419	13,500	8,830	134,605	6,547
2029	377,736	108,330	1,080	8,579	6,000	32,409	54,233	11,143	10,943	137,346	7,673
2030	435,485	136,643	900	9,794	9,429	35,916	57,767	14,036	10,906	152,421	7,673
Balance	185,485	9,643	−100	1,794	7,429	22,916	13,767	2,036	8,906	118,421	673

Table 3.1.8: Case 2: Medium Case

Year	Total	Agriculture Fisheries	Mining and quarring	Manufacturing	Electricity,gas and water	Construction	Wholesale and retail trade, restaurants and hotels	Transport, storage and commnication	Finance, Insurance, real estate	Other Services	Public Administration
2010	250,000	127,000	1,000	8,000	2,000	13,000	44,000	12,000	2,000	34,000	7,000
2011	284,573	122,897	900	8,897	3,333	18,381	57,209	15,643	2,038	50,660	4,614
2012	280,870	124,333	860	9,895	2,810	18,381	49,163	13,607	2,057	54,775	4,989
2013	277,278	125,769	820	11,005	2,286	18,381	41,116	11,571	2,075	58,891	5,364
2014	315,856	148,338	800	12,239	2,381	19,712	53,023	12,214	3,094	58,708	5,347
2015	286,270	115,921	1,020	13,612	2,952	24,005	48,093	13,286	2,528	59,439	5,414
2016	306,817	134,796	780	15,138	2,571	23,944	51,907	11,571	2,453	58,342	5,314
2017	331,004	152,851	1,400	16,836	2,190	22,191	52,558	11,357	2,377	63,463	5,780
2018	316,527	126,384	760	18,724	1,524	26,967	51,907	15,107	2,717	66,389	6,047
2019	307,054	110,176	580	20,824	2,286	26,000	44,279	12,964	4,566	79,332	6,047
2020	298,377	93,557	600	23,159	2,190	26,060	43,814	12,107	3,623	88,011	5,255
2021	364,275	123,512	680	25,757	2,857	29,265	49,116	14,036	4,906	107,349	6,798
2022	366,751	124,333	760	28,645	1,714	26,726	50,047	13,286	5,396	110,090	5,755
2023	367,431	114,690	860	31,858	2,571	28,600	50,977	13,286	4,830	112,983	6,777
2024	378,251	114,074	820	35,430	1,810	28,721	46,140	13,821	6,566	123,946	6,923
2025	393,920	119,614	1,060	39,404	3,333	31,563	53,395	12,000	6,113	120,140	7,298
2026	414,462	114,074	1,220	43,823	2,952	36,340	50,233	13,286	6,528	139,021	6,985
2027	421,924	105,457	1,400	48,738	3,524	38,577	54,233	14,143	7,321	141,610	6,923
2028	410,849	105,047	1,280	54,204	7,524	32,893	46,419	13,500	8,830	134,605	6,547
2029	429,440	108,330	1,080	60,283	6,000	32,409	54,233	11,143	10,943	137,346	7,673
2030	492,734	136,643	900	67,044	9,429	35,916	57,767	14,036	10,906	152,421	7,673
Balance	242,734	9,643	−100	59,044	7,429	22,916	13,767	2,036	8,906	118,421	673

Table 3.1.9: Case 3: Optimistic Case

Year	Total	Agriculture Fisheries	Mining and quarring	Manufacturing	Electricity,gas and water	Construction	Wholesale and retail trade, restaurants and hotels	Transport, storage and commnication	Finance, Insurance, real estate	Other Services	Public Administration
2010	250,000	127,000	1,000	8,000	2,000	13,000	44,000	12,000	2,000	34,000	7,000
2011	284,852	122,897	900	9,176	3,333	18,381	57,209	15,643	2,038	50,660	4,614
2012	281,500	124,333	860	10,525	2,810	18,381	49,163	13,607	2,057	54,775	4,989
2013	278,346	125,769	820	12,072	2,286	18,381	41,116	11,571	2,075	58,891	5,364
2014	317,464	148,338	800	13,847	2,381	19,712	53,023	12,214	3,094	58,708	5,347
2015	288,540	115,921	1,020	15,882	2,952	24,005	48,093	13,286	2,528	59,439	5,414
2016	309,896	134,796	780	18,217	2,571	23,944	51,907	11,571	2,453	58,342	5,314
2017	335,063	152,851	1,400	20,895	2,190	22,191	52,558	11,357	2,377	63,463	5,780
2018	321,769	126,384	760	23,966	1,524	26,967	51,907	15,107	2,717	66,389	6,047
2019	313,719	110,176	580	27,489	2,286	26,000	44,279	12,964	4,566	79,332	6,047
2020	306,748	93,557	600	31,530	2,190	26,060	43,814	12,107	3,623	88,011	5,255
2021	374,684	123,512	680	36,165	2,857	29,265	49,116	14,036	4,906	107,349	6,798
2022	379,587	124,333	760	41,481	1,714	26,726	50,047	13,286	5,396	110,090	5,755
2023	383,153	114,690	860	47,579	2,571	28,600	50,977	13,286	4,830	112,983	6,777
2024	397,394	114,074	820	54,573	1,810	28,721	46,140	13,821	6,566	123,946	6,923
2025	417,112	119,614	1,060	62,595	3,333	31,563	53,395	12,000	6,113	120,140	7,298
2026	442,436	114,074	1,220	71,797	2,952	36,340	50,233	13,286	6,528	139,021	6,985
2027	455,537	105,457	1,400	82,351	3,524	38,577	54,233	14,143	7,321	141,610	6,923
2028	451,101	105,047	1,280	94,456	7,524	32,893	46,419	13,500	8,830	134,605	6,547
2029	477,499	108,330	1,080	108,342	6,000	32,409	54,233	11,143	10,943	137,346	7,673
2030	549,958	136,643	900	124,268	9,429	35,916	57,767	14,036	10,906	152,421	7,673
Balance	299,958	9,643	−100	116,268	7,429	22,916	13,767	2,036	8,906	118,421	673

Notes of Section 3.1

Note 1

For job creation, not only Infrastructure Fund but also Human Capital Development Fund and PDD1, 2 and PDID are effective. Followings are the result of estimated job creation by Human Capital Development Fund and PDD1, 2 and PDID by State Budget 2013.

(1) Human Capital Development Fund

By Human Capital Development Fund, 2,500 persons are given training, and 3,256 persons received scholarship in 2012.

Table 1: Beneficially by Human Capital Development Fund

Program	Budget 2013 (USD 1,000)	Number of person given training or scholarship
Training	19,188	2,500
Scholarship	23,260	3,256
Total	42,448	5,756

For the estimation of job creation by the Human Capital Development Fund, following project was selected as the sample project.

Table 2: Beneficiary by sample Human Capital Development Fund

Sector	Project	Budget USD 1,000	Number of person given training
Other training	Training of health and medicine	4,541	500

(2) Districts

PDD1, PDD2 and PDID projects would create approximately 15,000 persons-months and the number of the persons given work would be approximately 3,155 in 2013. Due to the nature of project, almost all the work is for Unskilled. The majority of the work such as 68% of Skilled, 97% of Unskilled and 94% of Total work will be given to Timorese. It is evaluated that PDD1, PDD2 and PDID projects have a positive impact in creating employment for Timorese in rural areas.

Table 3: Employment creation by PDD1, 2 and PDID

Sector	Budget U$1,000	Persons-months	Manager		Skilled		Unskilled		Total		
			T	E	T	E	T	E	T	E	total
PDD1,2 and PDID	152,500	15,239	0	61	277	130	2,688	69	2,965	190	3,155
Percentage in each category			0	100	68	32	97	3	94	6	100
Percentage in total			0	3	9	4	85	2	94	6	100

Note: T; Timorese, E; Expatriate "Manager" includes Engineer

Considering the main objective of the program to create the employment in districts, Baucau District and Ermera District were selected as samples to represent the entire 13 districts in terms of budget allocation: the second biggest budget is allocated to Baucau District, and the sixth biggest budget to Ermera District. Budget allocated for Baucau and Ermera Districts is USD 2,758,000, which is 1.8%.of the total budget of USD 152,500,000.

1) Baucau District

The total budget of selected five projects (PDD1, PDD2 and PDID) is USD 1,606,000, 15.2% of the budget allocated for Baucau District as a whole (USD 10,541,000). The budget allocated to Baucau District is 11.1% of total budget allocated to all districts (USD 94,900,000), which is the second largest next to that of Dili District (USD 12,779,999). The population of Baucau District is the third largest population of 111,694 in Timor-Leste.

Table 4: Employment creation by PDD1, PDD2 and PDID sample project in Baucau District

Sector	Budget U$1,000	Persons-months to be created	Manager/ Engineer		Skilled		Unskilled		Total		
			T	E	T	E	T	E	T	E	total
Basic school rehabilitation	149	39	0	0	0	0	8	0	8	0	8
Uatulari-Ossoala road	268	46	0	0	0	0	10	0	10	0	10
District convention center	425	126	0	0	1	5	20	0	21	5	26
Community health center	500	48	0	0	0	0	10	0	10	0	10
Irrigation 6km	264	48	0	0	0	0	10	0	10	0	10
Total	1606	307	0	0	1	5	58	0	59	5	64

Note: T: Timorese, E: Expatriate.

2) Ermera District

Selected five projects (worth USD 1,152,000) account for 5.2% of total budget allocated to Ermera District (USD 7,102,000). Budget allocated to Ermera District is 7.5% of the budget allocated to all districts. The population of Ermera District is the second largest (117,064 people) in Timor-Leste.

Table 5: Employment creation by PDD1,PDD2 & PDID sample project in Ermera District

Sector	Budget U$1,000	Persons-months to be created	Number of Persons given work								
			Manager /Engineer		Skilled		Unskilled		Total		
			T	E	T	E	T	E	T	E	total
Berrier Fatukeru 450m	371	450	0	3	10	0	80	0	90	3	93
Construction of Garden	101	460	0	3	20	0	72	0	92	3	95
Irrigation Canal 2,500m	107	406	0	0	0	0	84	0	84	0	84
Land office construction	343	53	0	0	1	0	10	0	11	0	11
Junior High School	230	87	0	1	0	10	7	8	7	11	18
Total	1152	1456	0	7	31	10	253	8	284	17	301

Note: T: Timorese; E: Expatriate

Note 2

(1) Estimation of the job created by sample projects in Infrastructure Fund

The estimation of the jobs created by Infrastructure Fund in State Budget 2013 was implemented, utilizing the method to apply the job creation ratio of sample projects. Each sample project was the biggest project in budget allocation in each sector shown in the Book6 of Budget 2013. Total sum of selected 10 sectors (USD 495,049,000) is 88.3% of total Infrastructure Fund budget, and the total budget of the selected projects (USD 265,128,000) account for 47.3% of the above figure for 10 sectors.

Table 6: Employment creation by 10 sample projects of Budget 2013 Infrastructure Fund

Sector	Budget U$1,000	Persons-months	Manager		Skilled		Unskilled		Total		
			T	E	T	E	T	E	T	E	Total
Sewer in Dili	7,858	662	0	4	0	18	82	0	82	22	103
Power plant & line	90,343	16,880	0	211	68	348	207	0	275	559	834
Urban roads	17,595	4,701	0	10	25	25	65	0	90	34	124
Tono Bridge360m	3,060	979	0	31	18	75	31	0	49	106	155
Dili Airport（PPP）	4,467	132,429	25	67	203	31	274	0	502	98	600
Tibar Bay port（PPP）	3,800	171,014	60	63	151	83	164	0	375	146	520
New MOF building	14,490	86,334	12	47	82	180	63	58	157	285	466
UNTL building	2,653	259,373	36	141	246	541	189	174	472	856	1,400
MDG Resident housing	39,333	257,625	0	57	1,260	973	1,431	0	2,691	1,145	3,550
Suai Supply base	83,996	190,712	105	202	496	773	283	249	884	1,223	2,210
Total	267,595	1,120,709	238	833	2,549	3,047	2,789	481	5,577	4,474	9,962

Note: T: Timorese, E; Expatriate. "Manager" includes Engineer.

The outlines of the sample projects are as follows.

1) Construction and supervision of Sewer in Dili

The Government is implementing the Dili Sanitation and Drainage Master Plan in order to reduce health risks and encourage economic development. The plan seeks to achieve staged improvements of sanitation by rehabilitating existing sewers and separating sewage from storm water drainage by building intercepting sewers. The Government will target the areas containing medium to higher population densities, together with commercial, industrial and institutional areas as the priority for sanitation improvement. The Government is undertaking necessary engineering survey to be able to provide local communities with local solutions to drainage problems. Maintenance of existing drains will be a key part of these solutions. Also, this project is to address flooding problems in Dili. Over the next five years, it will include the cleaning of debris from drains, channel re-grading, construction of retardation basins and improvement of road drainage. The budget allocated for this project is USD 7,858.000 in Budget 2013 Infrastructure Fund.

2) Hera Power plant and transmission lines

This is the project to construct nationwide electrical power grid and power plant and its facilities. It consists of construction of 120MW power plant in Hera, 136MW power plant in Betano, 150KV high voltage outdoor switchyard and transformers annexed to

Hera and Betano power plant, 715Km 150KV transmission line, 9 substations, 120Km 20KV distribution line, operation and maintenance of Hera and Betano power plants , 24MW Diesel Generating power plant in Comoro and other related works. This project started 2008. In 2013, Hera and Betano power plants construction work was completed and started operation. 150KV national grid transmission line was completed, and some portion of 20KV distribution line construction is going on. The consultant of this project is Electroconsult and bonifica SpA (Joint Venture) of Italy. The contractor of Hera and Betano power plant is Puriakraya Engineering Limited. The supplier of power plant is Wartsila while that of substation is ABB. Construction of transmission lines and 9 substations is implemented by CNI22 of China. The contractor of Comoro Diesel Generating power plant is CSI Company lda of Timor-Leste. The total budget of this project is USD 501,207,708. In 2013, USD 90,343,000 is allocated from the Infrastructure Fund. The budget allocated to the project from the Budget 2013 is for the operation and maintenance because the construction work of power plant and the transmission and distribution lines was completed.

3) Rehabilitation and construction of urban roads

Timor-Leste needs a decent road network to connect its communities, promote rural development, industry and tourism and to provide public services. Timor-Leste is embarking on a long-term investment in roads which will include a major program of national and regional road rehabilitation, repair and improvement. This project is for rehabilitation and construction of urban roads, such as Dili. USD 17,595,000 was allocated through the Infrastructure fund of Budget 2013.

4) Construction of Tono Bridge 360m

This is the project to construct a bridge at Tono River in Oeccusi District. Altough USD 3,060,000 was allocated by Budget 2013 Infrastructure Fund, this project has not yet started because there is a discussion about the priority of the bridge construction among the MPS, ADN and Ministry of Public Works. Therefore, the figure of the employment created by this project was estimated from the completed Comoro Bridge project in Dili (188.3m), which has the same construction method, i.e. PC Guilder and Pillar Bridge by the ratio of 360m/183m.

5) Dili Airport development (PPP)

This is the airport modernization project, including the expansion of runway in terms of length from 1,850m to 2,050m (in Phase 1, then to 2,500m in Phase 2), width from 30m to 45m to be an airport of ICAO code 4D, which can accommodate A-320-200 and Boeing 737-400/500, new passenger terminal building construction and other related works to meet the international standards of airport and increase the efficiency of airport operations. This project is planned to be implemented by Public Private Partnership (PPP) scheme. IFC is playing a role of assisting the GOTL for the cost of the project and structuring PPP arrangements. Total cost of this project is estimated at USD 27,000,000. The amount allocated by Budget 2013, USD 4,467,000, is only for the budget of consultant. However, the number of the employment to be created is calculated based on the estimated figure by the MPS obtained in an interview. This project is expected to start its engineering, procurement, construction work from 2016. The budget for the Dili airport project was the total of both PPP and non-PPP projects. It creates 500 employment during construction period and 100 when it starts operation.

6) Construction of Tibar Bay port (PPP)

This is the construction of Tibar Bay port to replace the function of Dili port. This project utilizes the PPP scheme. IFC is providing a financial advisory service. The total cost of the project is estimated to be USD 442,000,000. The amount allocated by the Budget 2013 (USD 3,800,000) is only for the budget of consultancy work. However, the number of the employment to be created is calculated based on the estimated figure by the MPS obtained in an interview. The public notice of the request for the expression of the interest was issued on 28th August 2013. This project is expected to start its engineering, procurement and construction work from 2015. Although the budget allocation for the rehabilitation project of Dili port is bigger than that for the Tibor Bay port project, Tibor Bay port PPP project was selected because the majority work of Dili port is dredging work. This project creates 300 employment during construction period and 220 when it starts operation.

7) Construction of building of Ministry of Finance

This is the project to construct new building of Ministry of Finance in Dili. Floor space is 20,000 square meter. New building has one business building of 10 stories with one basement and one conference building of two stories to accommodate all the diversified functions of Ministry of Finance, resolving the inconveniences caused by the

scattered and temporary offices. As a result of the international tender, PtPP (Perkesa) was selected as the Engineering, Procurement and Construction (EPC) contractor. The EPC work of this project started in September 2012 and expected to be completed by December 2013. Total contract price for this project is USD 21,795,000. USD 14,490,000 was allocated by the Budget 2013 Infrastructure Fund.

8) Construction of building of National University

This is the project named City University project to expand existing UNTL Hera campus for Agriculture and Engineering Faculty to accommodate other five (5) Faculties in one campus. As of August 2013, total number of UNTL students is 9,311. The number of students in Agriculture Faculty and Engineering Faculty is 2,256. The master plan of this project was completed by a consultant and now is under consideration by the MPS. According to the master plan, total area for City University Project is approximately 3,670,000 ㎡ and total floor space is approximately 50,000 ㎡. If this project would be approved in the master plan, the construction work will start from 2015. Total cost of this project is USD 748,530,000 according to the master plan. Budget 2013 Infrastructure Fund allocated USD 2,653,000 for consulting work. The number of persons given work by construction of building of the UNTL was estimated from the number of persons given work by construction of new Ministry of Finance building, utilizing the ratio 20,000 ㎡ : 50,000 ㎡; hence, 466 X 50,000/20,000 = 1,165 persons

9) Resident housing of MDG

As the part of Millennium Development Goals (MDGs), "MDG Suko program" supplies resident housing which is equipped with electricity, drinking water, sanitation facility and related infrastructure to the resident in rural areas. The project plans to build 5 houses per one Aldeia, constructing 55,000 houses in total (5 houses X 2,228 Aldeias) from 2011 to 2015. Total budget for 5 years is USD 247,653,000. In 2013, the Budget 2013 allocated USD 39,333,000, and 11,140 houses will be constructed. The specification of the houses is prefabricated construction which is easy to assemble. Therefore, not many workers are required to install the prefabricated houses, comparing to ordinary house construction project. As a result of the tender, Carya Tior Leste and Joinize Construction were selected as the contractors. The housing construction project was selected because it has the biggest budget of MDG sector. The number of persons given work by Baucau MDG residence project (200 houses) was used for the estimation for the residence project of the entire country (11,140 houses). The number of persons given work is the figure from 2013-2015 for three years.

10) Suai Supply base

Suai Supply base project is one of three cluster projects of Tasi Mane project. The purpose of the project is to build supply base to support offshore oil and gas base for transporting the crew of the oil and gas base as well as to supply equipment, material, water, food and so on, which is required for the operation of offshore oil and gas base. Suai supply base project consists of port and airport upgrading and new town development of 213ha (sub project). Environmental impact Assessment was completed in 2012. The Suai airport project will be implemented from February 2014. The estimated total budget of this project is USD 350,000,000. The Budget 2013 allocates 83,996,000 for consulting work.

Note 3

The economic impact analysis of MTOP & MTIP estimats if the total budget of USD 269,690,000 is allocated, the budget would create 11,467 employment in 2014-2018. The estimated number of persons given work is calculated utilizing the same calculation ratio with some amendments by comparing the Budget 2013 allocated to Ministry of Agriculture (USD 25,164,000) and that to MTOP & MTIP (USD 42,284,000); i.e. 11,467 * 0.695 = 6,846./5=1,369 persons

Note 4

The employment created by the budget was estimated utilizing the employment number and person-months of the nine existing or on-going projects as the reference projects. The nine reference projects were selected from different sectors, such as Agriculture (Irrigation), Water and Sanitation, Road, Bridge, MDG, Port, Public Building, Airport and Tasi Mane projects.

Note 5

The list of future project in the Strategic Development Plan is as follows.

Sector	Project	Description
Road	Road development is essential for the agriculture sector promotion, tourism industry development as well as the north-south logistics development.	
	Dili-Aileu-Maubisse road rehabilitation	World Bank loan
	Dili-Manatuto-Natarbora road rehabilitation	81 km (ADB loan)
	Pante Makassar-Oesilo/ Pante Makassar-Citrana/Oesil-Tumin road	812km
	National Ring Road	
Water and sanitation	Rural water and sanitation projects shall be implemented following the projects for Dili City	
	Water supply for school	
	Dili city sewer and drainage	
Electricity	250MW will be supplied by newly constructed Hela and Betano power plant. The central power distribution and transmission line was completed. Renewable energy projects will be promoted.	
	Lariguto Wind power project	
	Dili City Solar Center	
Port	Following major ports rehabilitation including Tibar bay, rural port rehabilitation projects are scheduled for the fishery industry promotion and south-north logistic improvement.	
	Kairabel port	
	South rural ports	
Airport	Rural airport will be developed for the tourism industry	
	Rural airport construction/rehabilitation	Mailiana, Baucau, Oecusse Ameno, Suai, Lospalos, Viqueque, Ataro, Same
Agriculture Fishery	Rice and maiz product will be increased by irrigation projects. Cash crop is promoted.	
	Rice field increase by irrigation system	From 50,000ha to 70,000ha.
	Coffee production increased to double.	Regeneration of plantation of 40,000ha
Oil & Gas	Following supply base, refinery, petrochemical, LNG project will be implemented.	
	Oil refinery	Betano 30,000BPD→100,000BPD
	Petrochemical	Betano
	LNG	Beaco 5MMTPA→20MMTPA
Tourism	Private sector investment. Tourist Information Centers will be established.	

Malaysia Terengganu State Development

Terengganu State is located in the north-east cost of Malay Peninsula. Before the oil and gas development projects started, the main industries of Terengganu State were Agriculture, Fisheries and Forestry.

In 1974, commercially feasible natural gas field was found in the offshore Terengganu, and oil and gas development was started by the National Oil and Gas Company, PETRONAS, which was established in the same year, 1974. In 1983, Oil refinery was constructed in Kertih, southern town of Terengganu State, and in 1984, Peninsula Gas Utilization (PGU) project was started. PGU project had three phases. The first phase, completed in 1984, consisted of constructing the first Gas Processing Plant (GPP) and 32km gas pipeline to supply natural gas to power plant and steel company. The second phase, PGU2 project, completed in 1991, consisted of construction of GPP2, 3 and 4 and laying of 645 km gas pipeline to supply natural gas to Kuala Lumpur as well as to Singapore. The third phase, PGU3 project, completed in 1998, consisted of construction of GPP5 and 6 and 450km gas pipeline to supply gas to the west coast of Malay Peninsula and to connect to Thai-Malaysia gas pipeline to supply gas to the southern part of Thailand. In 1990's, PETRONAS started petrochemical projects in Kertih and in

Gebeng in Pahang State, which is in the south of Terengganu State. Petrochemical plant construction projects were implemented for Ethylene, Polyethylene, Polypropylene, Polyethylene Terephthalate Acid, Poly Vinyl Chloride and many varieties.

From 1982 to 2012, the population of Terengganu state increased by 415,000, from 525,255 to 1,040,606 while employment increased by 212,700, from 221,100 to 433,800. From 1992 to 2012, there were 588 investments in Terengganu which brought 74,368 jobs while the employment number increased by 180,900, from 252,900 to 433,800 in the same period. That means 106,532 jobs were additionally created other than those by the investment projects. The employment number of agriculture and fisheries in 1982 was 78,900, and it became 66,600 in 2012; the balance is -12,300. Thus, the employment in Agriculture and Fisheries sector experienced only 15% decrease in the 30 years.

| Year | Project | Investment(RM) | Employment | | | | | | | | | | | | Population |
			Created	Total	Agriculture Fisheries	Mining and quarring	Manufacturing	Electricity,gas and water	Construction	Wholesale and retail trade, restaurants and hotels	Transport, storage and commnication	Finance, Insurance, realestate and business services	Other Services	Public Administration	
1992	15	2,188,160,000	2,009	252,900	61,900	5,000	42,800	2,100	21,500	47,300	11,200	5,300	33,571	22,329	766,244
1993	17	4,042,700,000	3,905	280,900	59,900	4,500	45,800	3,500	30,400	61,500	14,600	5,400	33,271	22,129	
1994	36	3,882,506,000	9,430	–	–	–									
1995	19	1,763,100,000	4,693	268,000	61,300	4,100	45,000	2,400	30,400	44,200	10,800	5,500	38,675	25,725	922,100
1996	12	2,338,800,000	1,386	298,000	72,300	4,000	45,800	2,500	32,600	57,000	11,400	8,200	38,555	25,645	
1997	31	3,246,375,000	5,460	282,300	56,500	5,100	42,100	3,100	39,700	51,700	12,400	6,700	39,036	25,964	975,800
1998	33	7,170,405,142	4,693	293,500	65,700	3,900	44,600	2,700	39,600	55,800	10,800	6,500	38,315	25,485	
1999	15	1,327,439,906	1,453	300,100	74,500	7,000	36,900	2,300	36,700	56,500	10,600	6,300	41,678	27,722	1,033,500
2000	30	215,830,000	3,496	306,000	61,600	3,800	44,600	1,600	44,600	55,800	14,100	7,200	43,600	29,000	880,273
2001	21	58,109,381	1,185	298,600	53,700	2,900	43,700	2,400	43,000	47,600	12,100	12,100	52,100	29,000	922,100
2002	16	52,854,000	863	279,600	45,600	3,000	34,600	2,300	43,100	47,100	11,300	9,600	57,800	25,200	943,200
2003	20	526,559,000	1,231	344,900	60,200	3,400	47,900	3,000	48,400	52,800	13,100	13,000	70,500	32,600	966,100
2004	5	138,400,000	659	336,900	60,600	3,800	46,100	1,800	44,200	53,800	12,400	14,300	72,300	27,600	
2005	27	514,730,464	2,519	342,000	55,900	4,300	45,100	2,700	47,300	54,800	12,400	12,800	74,200	32,500	1,055,943
2006	34	3,181,726,000	3,503	351,500	55,600	4,100	47,900	1,900	47,500	49,600	12,900	17,400	81,400	33,200	1,087,286
2007	48	6,497,044,000	6,612	363,000	58,300	5,300	45,000	3,500	52,200	57,400	11,200	16,200	78,900	35,000	
2008	27	1,065,400,000	1,768	375,500	55,600	6,100	42,100	3,100	60,100	54,000	12,400	17,300	91,300	33,500	1,094,300
2009	33	397,929,000	2,181	390,300	51,400	7,000	47,300	3,700	63,800	58,300	13,200	19,400	93,000	33,200	1,121,100
2010	44	2,860,570,000	7,966	366,600	51,200	6,400	41,000	7,900	54,400	49,900	12,600	23,400	88,400	31,400	1,011,363
2011	39	1,945,360,000	5,038	388,700	52,800	5,400	45,900	6,300	53,600	58,300	10,400	29,000	90,200	36,800	1,025,875
2012	66	2,842,540,000	4,318	433,800	66,600	4,500	52,400	9,900	59,400	62,100	13,100	28,900	100,100	36,800	1,040,606
Total	588	46,256,537,893	74,368	180,900	← Increase from 1992 to 2012											–
	USD	14,339,527	1USd=0.31MYR													

Industrial development was concentrated in the southern half of Terengganu state while the northern half of Terengganu is engaged in traditional Agriculture and Fisheries

industry. The northern half of Terengganu is given natural resources for tourism industries. Some of the islands, for an example, Redang Island, were developed as tourist destinations to attract tourists from both home and abroad. The number of tourist arrived in Terengganu in 1990 was 276,328 while it increased 12 times to 3,376,275 in 2012. The number of foreign tourists within the number above mentioned for 1990 was 79,371, and 607,399 in 2012, increasing 7.7 times.

Resources	Domestic Tourist	Foreign Tourist	Total
1990	196,957	79,371	276,328
1991	228,153	121,948	350,101
1992	201,073	90,898	291,971
1993	277,724	97,572	375,296
1994	410,327	107,598	517,925
1995	730,020	127,124	857,144
1996	1,065,327	166,951	1,232,278
1997	1,626,392	227,646	1,854,038
1998	981,263	112,714	1,093,977
1999	1,002,324	146,713	1,149,037
2000	1,170,552	159,993	1,330,545
2001	1,248,607	142,041	1,390,648
2002	1,276,671	125,148	1,401,819
2003	1,284,761	97,743	1,382,504
2004	1,418,141	162,826	1,580,967
2005	1,624,726	197,952	1,822,678
2006	2,061,486	238,893	2,300,379
2007	2,572,299	295,084	2,867,383
2008	3,147,873	380,281	3,528,154
2009	2,963,250	341,526	3,304,776
2010	2,528,000	287,149	2,815,149
2011	2,587,735	578,476	3,166,211
2012	2,768,876	607,399	3,376,275

Note 7

Thailand Eastern Seaboard Development

Map Ta Phud is located in Rayong Province 200km from Bangkok, in the eastern part of Thailand, and it was developed as the base for major heavy industries with natural gas related industries.

Map Ta Phud complex is the core of Eastern Seaboard Development Area.

Description	Number of Industrial Estates	Number of Factories	Number of workers	Investment capital USD
Eastern Seaboard Development Area	22	1,480	246,000	53,333,000
Map Ta Phud Complex	5	151	30,000	30,333,000

Eastern Seaboard Development Area

Map Ta Phud Complex

The Eastern Seaboard Development project included 5 sectors as follows.

Sector	Sub Sector	Investment capital (million$)
Map Ta Phud	Industrial estate	18.2
	Industrial port	142.7
	Gas Separation Plant	85.5
Laem Chabang	Port	67.4
	Industrial estate	33.7
Water Resource		116.6
Railway	Industrial railway	69.4
Road	Highway network	407.1
Total		940.6

Note: USD 1 =175.5; average rate of 238 in 1984 and 113 in 1998.

In 1973, the commercially feasible gas reserve was found in the offshore Thailand, and 425km pipeline was laid from the gas well to Map Ta Phud. The Eastern Seaboard Development project became the main project of five year economic development plan from 1982-1986 as well as 1987-1991.

It generated 242,000 jobs from 1977 to 1997 in Eastern Seaboard Development Area. Even though employment created by the oil and gas industry was rather small, related industries such as construction, machinery, transport, storage, communication, public service industries created employment as the development of oil and gas industry advanced.

Furthermore, well equipped infrastructure prepared for the oil and gaas industry together with incentives for investments attracted other industries, for example, automotive industries investing in the Eastern Seaboard Development Area.

At the initial stage of the project, most of the manager/engineer, skilled worker's jobs were given to expatriates in construction as well as operation the oil and gas industry. Therefore, Thai government emphasized human resource development and established several training centers, higher engineering education schools to supply human resources for rapidly developing industries. As a result, for example, currently only 50 expatriates are given work by 14 oil and gas companies which have 17,625 employees in Rayong Province only.

The Eastern Seaboard Development Area is also famous for its globally well-known beach resorts featured by Pattaya. Tourism industry was well developed and expanded. For example, Samet Island, Jomtien beach resort, etc. have been developed following the development of industrial areas, and they are now attracting a large number of tourists of both foreigners as well as Thai.

<u>Note 8</u>

FORTUNE500 2013 ranked Walmart Stores as the second biggest company which has turnover of USD 469,162 million, and ExxonMobil as the third biggest with the revenue of USD 44,988 million. The number of employees of Walmart Stores is 2,200,000 persons which is raked as number one while ExxonMobil employs only 155,000.

3.2   Effect of Quality Improvement of Labour Force by Education and Training

3.2.1   Analysis on labour force structure

The current quality of the working population in terms of educational background in Timor-Leste is very low as shown in Table 3.2.1 based on the *"2010 Labour Force Survey"*.

Table 3.2.1: Working population by educational background (1)

Educaion Completed / Occupation	Less than primary	Primary, pre-sec.	Secondary	Polytech., University	Total	Number
Managers	15.4	25.0	45.0	14.5	100.0	7,000
Professionals	2.6	13.5	59.0	25.0	100.0	22,000
Technicians	36.5	33.3	26.1	4.1	100.0	19,000
Clerical	10.7	10.8	59.2	19.3	100.0	2,000
Service & Sales	23.3	38.4	37.8	0.5	100.0	20,000
Skilled agricultural workers	72.0	22.0	5.8	0.2	100.0	39,000
Craft and related traders	49.3	36.8	13.3	0.5	100.0	14,000
Machine operators	15.2	46.2	37.7	0.7	100.0	8,000
Elementary occupations	62.5	28.3	8.9	0.3	100.0	118,000
Total (%)	49.5	28.1	19.1	3.4	100.0	
Total number	123,000	70,000	48,000	8,000		249,000

Note: Unit is % except for the column of "Number" (number of workers).
Source: NSD & SEFOPE, 2010

The results of the *"2010 Timor-Leste Population and Housing Census"* show slightly different figures from those of the *"2010 Labour Force Survey"*; however, the general conclusion is the same: nearly half of workers have not completed even primary education.

Table 3.2.2: Working population by educational background (2)

Education Completed / Occupation	Less than Primary	Primary	Pre-secondary	Secondary	Polytech./ Univ.	Total	Number
Armed Forces	9.18	9.5	6.8	58.8	15.8	100.0	708
Managers	10.69	10.7	7.9	39.9	30.8	100.0	6,924
Professionals	0.00	0.0	0.0	0.0	100.0	100.0	5,914
Technicians	0.02	0.4	0.1	67.5	32.0	100.0	4,541
Clerrical	3.03	8.8	5.9	53.4	28.9	100.0	15,683
Service and sales	25.14	18.3	11.8	38.2	6.5	100.0	34,332
Skilled agricultural workers	59.22	21.9	8.9	9.1	0.9	100.0	175,392
Craft and related traders	36.39	25.4	12.3	22.3	3.6	100.0	12,328
Machine operators	17.71	27.8	18.3	31.9	4.2	100.0	7,783
Elementary Occupations	37.62	24.1	11.8	22.2	4.3	100.0	11,488
Not stated	33.04	13.5	9.7	27.5	16.3	100.0	2,939
Total	44.94	19.9	9.3	18.8	7.1	100.0	278,032

Note: Unit is % except for the column of "Number" (number of workers).
Source: NSD & UNFPA, 2010a

As economic development requires a change of labour force structure and highly-educated workers, higher quality workers will be needed in 2030, the target year

of the SDP.　Here, a comparison with the situation of advanced countries may be useful to consider the labour force structure in the future.

In Timor-Leste, GDP/C was USD 610 (excluding oil & gas), and GNI/C was USD 2,560 (including oil & gas) in 2010 (GOTL, 2011, p.197). Another source shows that GDP/C was USD 2,969（including oil & gas）(IMF, 2013).　Thus, the contribution of the oil & gas sector to GDP/C is more than USD 2,000.

GDP/C should be more than USD 4,000 to be classified as an upper middle income country.　Therefore, if the oil & gas sector are excluded, GDP/C should be more than USD 2,000.
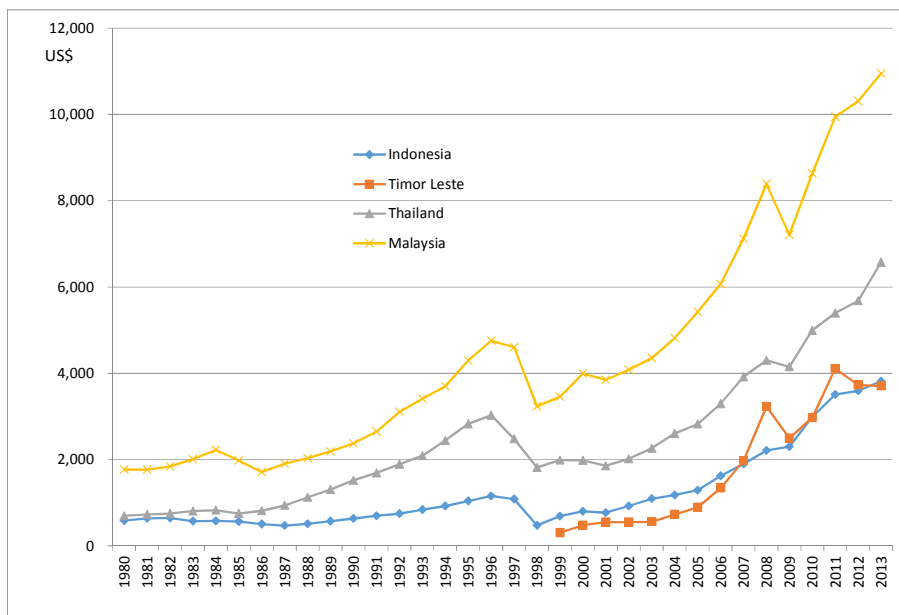
Figure 3.2.1: Trend of GDP/C

In Indonesia, GDP/C (excluding oil & gas) exceeded USD 2,000 in 2008.　In Malaysia, GDP/C (excluding oil & gas) exceeded USD 2,000 in 1990, while GDP/C (including oil & gas) exceeded USD 4,000 in 1995 (before the economic crisis) and 2004 (after the economic crisis).

Table 3.2.3: Labour Force Situation in Indonesia, 2010

Education Completed / Occupation	No schooling	Primary not completed	Primary	Lower sec	General upper sec.	Vocational upper sec.	Diploma, Academy	University	Total	Number
Administrative, managerial	0.0	0.2	7.2	9.6	28.4	10.6	6.4	37.6	100.0	962,881
Professional, Technical	0.5	0.9	2.0	2.8	15.6	11.5	22.2	44.5	100.0	6,764,399
Clerical workers	0.0	0.1	3.0	16.2	34.3	18.0	11.6	16.7	100.0	5,408,984
Sales workers	2.7	13.1	26.5	22.7	20.7	10.0	2.0	2.3	100.0	19,218,363
Services workers	2.1	12.5	23.5	23.6	22.3	11.3	1.8	2.9	100.0	5,819,286
Agriculture, fishermen	9.5	26.8	38.6	16.1	6.2	2.2	0.2	0.3	100.0	40,977,934
Production, transport	2.2	13.1	30.4	24.8	16.0	12.0	0.8	0.8	100.0	28,417,590
Others	0.0	0.4	1.1	13.0	56.7	20.2	2.5	6.2	100.0	638,330
Total	4.8	16.6	28.9	19.1	14.7	8.2	2.8	4.8	100.0	108,207,767
Number	5,186,199	18,007,866	31,318,804	20,634,591	15,914,285	8,876,113	3,023,727	5,246,182		108,207,767

Note: Unit is % except for the "Number" column (number of workers).
Source: Indonesia BPS, 2011

Table 3.2.4: Labour Force Situation in Malaysia1982-2012

Year	No formal education	Primary	Secondary	Tertiary	Total	GDP/C US$
1982	15.4%	41.9%	36.5%	6.1%	100.0%	1,842.3
1983	14.6%	41.0%	38.3%	6.0%	100.0%	2,010.3
1984	14.5%	38.9%	40.1%	6.5%	100.0%	2,221.5
1985	13.6%	38.8%	40.7%	6.9%	100.0%	1,978.1
1986	12.5%	37.8%	42.2%	7.5%	100.0%	1,711.5
1987	12.0%	36.2%	44.0%	7.8%	100.0%	1,900.6
1988	11.2%	36.0%	44.8%	7.9%	100.0%	2,032.7
1989	10.8%	34.5%	46.5%	8.2%	100.0%	2,185.7
1990	9.6%	33.8%	47.8%	8.8%	100.0%	2,374.2
1991	–	–	–	–	–	2,649.1
1992	9.0%	30.3%	50.7%	10.1%	100.0%	3,102.3
1993	8.1%	30.4%	51.4%	10.1%	100.0%	3,412.7
1994	–	–	–	–	–	3,697.9
1995	8.6%	27.6%	52.7%	11.1%	100.0%	4,295.2
1996	7.8%	28.2%	52.0%	11.9%	100.0%	4,752.1
1997	7.2%	27.6%	52.4%	12.8%	100.0%	4,601.4
1998	6.9%	27.1%	52.9%	13.1%	100.0%	3,231.7
1999	6.5%	26.0%	54.3%	13.2%	100.0%	3,454.8
2000	5.6%	24.9%	55.1%	14.5%	100.0%	3,991.9
2001	5.1%	24.1%	55.4%	15.4%	100.0%	3,846.2
2002	5.3%	23.5%	54.5%	16.7%	100.0%	4,078.4
2003	4.8%	22.4%	55.3%	17.5%	100.0%	4,352.4
2004	4.7%	21.7%	55.1%	18.4%	100.0%	4,815.7
2005	4.6%	20.6%	55.7%	19.2%	100.0%	5,421.3
2006	3.8%	20.4%	56.4%	19.4%	100.0%	6,065.6
2007	4.0%	19.3%	56.3%	20.3%	100.0%	7,121.8
2008	4.4%	18.3%	56.1%	21.2%	100.0%	8,390.3
2009	3.9%	17.4%	55.3%	23.4%	100.0%	7,203.3
2010	3.7%	17.6%	55.2%	23.5%	100.0%	8,633.8
2011	3.2%	16.9%	55.5%	24.5%	100.0%	9,941.3
2012	3.1%	16.8%	55.8%	24.4%	100.0%	10,304.2

Note: Unit is % except for "Year" and "GDP/C".
Source: Malaysia Department of Statistics, 2012

The educational background of the labour force in Timor-Leste is very low. Only 3.4% (Labour Force Survey 2010) to 7.1% (Census 2010) of the total working population have completed more than secondary level education. Meanwhile, the rate was 7.6% in Indonesia in 2010, and 8.8% in Malaysia in 1990 and 11.1% in 1995. On the other hand, 44.9-49.5% of the working population have not completed primary education in

Timor-Leste; however, the figure was 21.4% in Indonesia in 2010, 12.0% in Malaysia in 1990 and 8.6% in 1995. Thus, it is crucial to improve the quality of the labour force in Timor-Leste.

A comparative study of labour force structure shows clearly that Timor-Leste needs to make a great effort to enrich the quality of its labour force to join the ranks of upper-middle income countries in 2030.

3.2.2 Re-analysis of 2010 Labour Force Survey

A Labour Force Survey was conducted in 2010. The sample of 4,665 households contained 24,088 individuals. The purpose of re-analyzing this data is to clarify the following two research questions, which are not described well in the published report (NSD & SEFOPE, 2010).

1) Can expansion of education really contribute to the improvement in quality and expansion in quantity of the labour force? The labour force participation should be analyzed from different perspectives.

2) Do educated people use their knowledge and skills properly in the labour market? The relationship between occupation and educational background should be analyzed.

3.2.2.1 Relationship between age/ educational background and employment

The employment rate is calculated by dividing the number in employment by the population aged between 15 and 64. Figure 3.2.2 shows the employment rate by sex and age.
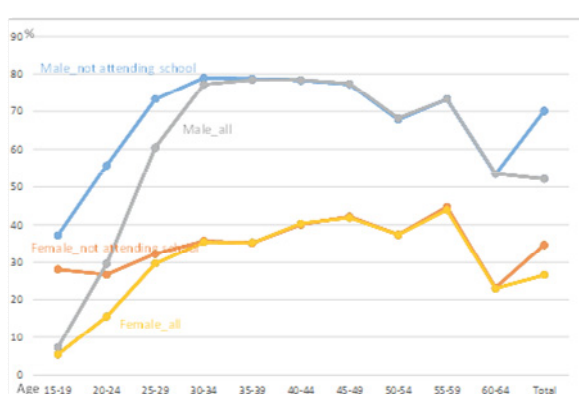
Figure 3.2.2: Employment rate by sex and age
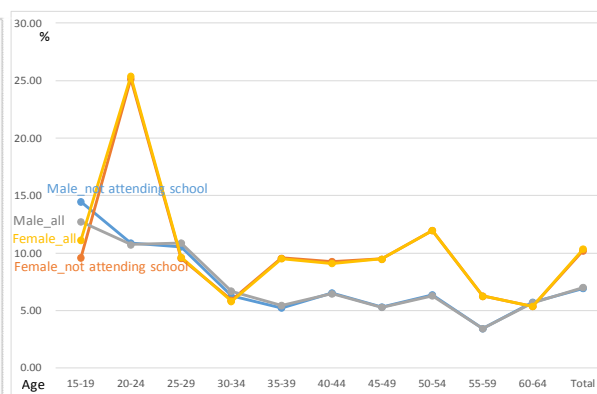
Figure 3.2.3: Unemployment rate by sex and age

As "attending school" is the major reason for not workng in general, the employment rate is calculated for all those aged between 15 and 64, and those not attending school aged between 15 and 64, too.   It is clear from the figure that the employment rate is low before 25 even if "attending school" is considered.   Furthermore, the employment rate is rather low among women in general; it is not more than 50% for any age bracket.

Figure 3.2.3 shows the unemployment rate by sex and age.   The rate is defined as follows:

Unemployment rate = Unemployed / Labour force (Economically active population)

The unemployment rate is high among young people for both men and women, and is especially high among the 20-24 age bracket for women. The reason is not clear but it may result from the small sample size in this age bracket.

Figures 3.2.4 and 3.2.5 are useful to understand the overall employment picture. Even though the number of unemployed is not so large, the unemployment rate becomes large by definition if the working population is relatively small.
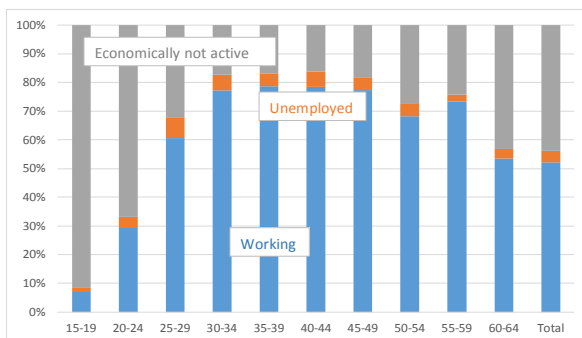
Figure 3.2.4: Employment situation (Male)   **Figure 3.2.5 Employment situation (Female)**
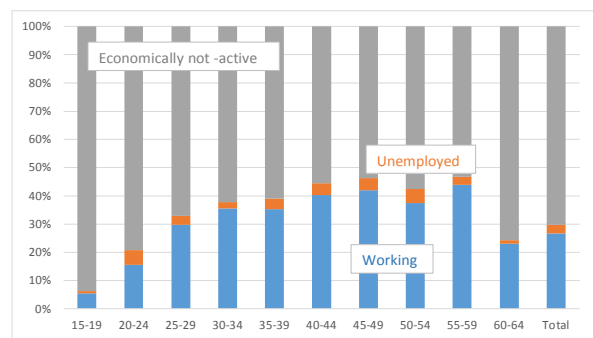
The relationship between educational background and employment is shown in Figures 3.2.6 to 3.2.9.   From Figure 3.2.6, it is clear that educated people tend to work more than less-educated people if attending school is considered.   Note that the employment rate among educated women is relatively high, although there is a huge gap between men and women.   The unemployment rates of men and women are 7.02 and 10.36, respectively.

Figure 3.2.7 shows that the unemployment rate of educated men is higher than that of less-educated men in general.   The unemployment rate of women who graduated from secondary schools is rather high, but the reason is not so clear; it may be due to the small sample size.
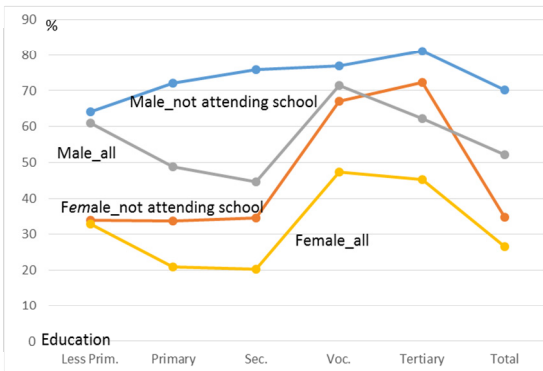
Figure 3.2.6: Employment rate by educational background
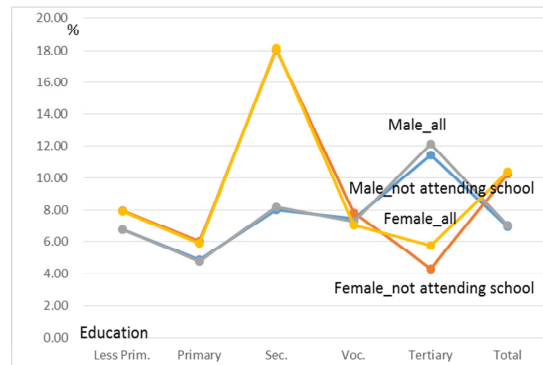
Figure 3.2.7: Unemployment rate by educational background

Figure 3.2.8 and Figure 3.2.9 show the employment status by educational background. The labour force participation rate is high among educated men although the unemployment rate is high. It is also clear that educated women are economically rather active. There is a tendency that the more educated, the more economically active for both men and women.
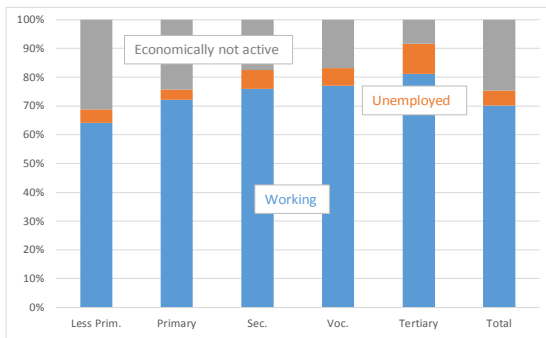
Figure 3.2.8: Employment status by educational background (Male)
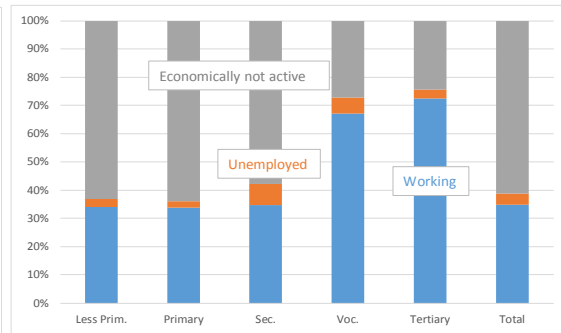
Figure 3.2.9: Employment status by educational background (Female)

The employment rate in Timor-Leste is rather low compared with neighboring countries. The reason is not high unemployment, but the low labour force participation rate. As the major reason for not working is "attending school," Table 3.2.5 and Table 3.2.6 do not include those attending school.

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Table 3.2.5: Reasons for not working by age (Male)

Reason \ Age	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	Total
In school or training	1,226	1,635	538	73	170	0	0	54	0	71	3,767
	32.55	43.40	14.28	1.94	4.51	0.00	0.00	1.43	0.00	1.88	100.00
	21.76	20.56	13.31	2.07	3.11	0.00	0.00	1.16	0.00	0.86	7.31
Family responsibility or housework	643	1,137	1,244	1,043	1,544	1,422	1,648	1,838	915	1,464	12,898
	4.99	8.82	9.64	8.09	11.97	11.02	12.78	14.25	7.09	11.35	100.00
	11.41	14.30	30.78	29.59	28.24	30.50	40.24	39.37	28.79	17.70	25.05
Pregnancy, illness or disability	605	1,088	414	265	690	641	322	753	618	877	6,273
	9.64	17.34	6.60	4.22	11.00	10.22	5.13	12.00	9.85	13.98	100.00
	10.74	13.68	10.24	7.52	12.62	13.75	7.86	16.13	19.45	10.60	12.18
Retired or too old for work	0	0	0	0	0	73	159	307	315	3,738	4,592
	0.00	0.00	0.00	0.00	0.00	1.59	3.46	6.69	6.86	81.40	100.00
	0.00	0.00	0.00	0.00	0.00	1.57	3.88	6.58	9.91	45.19	8.92
Too young to work	628	680	73	0	0	0	0	0	0	0	1,381
	45.47	49.24	5.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
	11.14	8.55	1.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.68
No desire to work	1,428	1,582	317	292	56	94	120	105	27	73	4,094
	34.88	38.64	7.74	7.13	1.37	2.30	2.93	2.56	0.66	1.78	100.00
	25.34	19.89	7.84	8.28	1.02	2.02	2.93	2.25	0.85	0.88	7.95
Off season	310	319	526	238	198	95	187	353	152	0	2,378
	13.04	13.41	22.12	10.01	8.33	3.99	7.86	14.84	6.39	0.00	100.00
	5.50	4.01	13.01	6.75	3.62	2.04	4.57	7.56	4.78	0.00	4.62
Others	795	1,512	930	1,614	2,810	2,338	1,659	1,259	1,151	2,048	16,116
	4.93	9.38	5.77	10.01	17.44	14.51	10.29	7.81	7.14	12.71	100.00
	14.11	19.01	23.01	45.79	51.39	50.14	40.51	26.97	36.22	24.76	31.29
Total	5,635	7,953	4,042	3,525	5,468	4,663	4,095	4,669	3,178	8,271	51,499
	10.94	15.44	7.85	6.84	10.62	9.05	7.95	9.07	6.17	16.06	100.00
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table 3.2.6: Reasons for not working by age (Female)

| Reason \ Age	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	Total
In school or training	798	1,200	379	145	78	61	12	69	69	0	2,811
	28.39	42.69	13.48	5.16	2.77	2.17	0.43	2.45	2.45	0.00	100.00
	14.11	9.03	2.01	0.87	0.42	0.41	0.10	0.67	1.12	0.00	2.15
Family responsibility or housework	2,589	8,285	15,750	13,523	16,908	12,217	9,883	7,485	4,374	5,764	96,778
	2.68	8.56	16.27	13.97	17.47	12.62	10.21	7.73	4.52	5.96	100.00
	45.79	62.32	83.71	81.38	91.00	82.50	83.41	72.54	71.09	39.00	73.95
Pregnancy, illness or disability	574	1,445	1,612	1,757	706	1,391	199	1,062	265	802	9,813
	5.85	14.73	16.43	17.90	7.19	14.18	2.03	10.82	2.70	8.17	100.00
	10.15	10.87	8.57	10.57	3.80	9.39	1.68	10.29	4.31	5.43	7.50
Retired or too old for work	0	0	0	0	0	13	230	461	921	7,083	8,708
	0.00	0.00	0.00	0.00	0.00	0.15	2.64	5.29	10.58	81.34	100.00
	0.00	0.00	0.00	0.00	0.00	0.09	1.94	4.47	14.97	47.93	6.65
Too young to work	557	593	78	0	0	0	0	0	0	0	1,228
	45.36	48.29	6.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
	9.85	4.46	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.94
No desire to work	582	704	238	223	151	71	123	0	0	13	2,105
	27.65	33.44	11.31	10.59	7.17	3.37	5.84	0.00	0.00	0.62	100.00
	10.29	5.30	1.26	1.34	0.81	0.48	1.04	0.00	0.00	0.09	1.61
Off season	0	123	0	6	10	73	4	0	8	0	224
	0.00	54.91	0.00	2.68	4.46	32.59	1.79	0.00	3.57	0.00	100.00
	0.00	0.93	0.00	0.04	0.05	0.49	0.03	0.00	0.13	0.00	0.17
Others	554	944	759	964	728	983	1,398	1,241	516	1,117	9,204
	6.02	10.26	8.25	10.47	7.91	10.68	15.19	13.48	5.61	12.14	100.00
	9.80	7.10	4.03	5.80	3.92	6.64	11.80	12.03	8.39	7.56	7.03
Total	5,654	13,294	18,816	16,618	18,581	14,809	11,849	10,318	6,153	14,779	130,871
	4.32	10.16	14.38	12.70	14.20	11.32	9.05	7.88	4.70	11.29	100.00
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Especially for men, "no desire to work" and "too young to work" are relatively high among those under 25 years old. For men, "family responsibility or housework" is high for those aged between 25 and 59 years old. For women, "family responsibility or housework" is very high in all age brackets, especially for the aged between 25 and 59 years old. This may be the result of large family sizes in Timor-Leste where women have to take care of many household members. According to the samples of the 2010 Labour Force Survey, there were 5.2 members in a household on average. For men and women, "retired or too old to work" is high after 59 years old.

Figure 3.2.10 shows the laour force participation rate by number of household members. It is clear that the employment rate is small if the family size is large, especially for women.
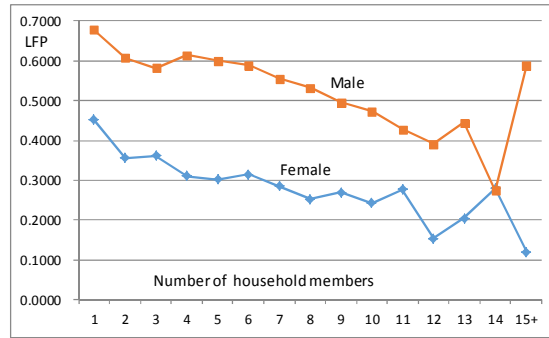
**Figure 3.2.10: Labour force participation rate
by number of household members**

Table 3.2.7 and Table 3.2.8 show the results of logit analysis to explain factors affecting economically active behavior. Not only personal factors, but also household environments are considered.　For men, an intention for study or training has a negative effect on labour force participation.　Household income has a postiive effect on labour force participation.　Age of less than 20 has a negative effect on labour force participation.　A large number of household members affects negatively to labour force participation.　For women, the tendency is similar; however, educational background has a significant effect on labour force participation.

**Table 3.2.7: Factors contributing to
economically active (Male)**

Factors	Coef.	Std. Err.	z	P>z
# person in household	−0.0403	0.0202	−2.00	*
Schooling	−3.6044	0.1795	−20.09	**
Urban	0.1356	0.1078	1.26	
No cash income	−3.2706	0.2847	−11.49	**
Income < 50$	−1.2506	0.2698	−4.64	**
Income 50−99$	−0.5661	0.2709	−2.09	*
Income 100−199$	−0.2307	0.2576	−0.90	
Income 200−299$	0.0418	0.2741	0.15	
Income 300−499$	−0.0326	0.2913	−0.11	
Income 500$ or more	0.0000		omitted	
Less than primary	0.0000		omitted	
Primary	0.0173	0.1256	0.14	
Gen. secondary	0.0014	0.1273	0.01	
Vocational Sec.	−0.3627	0.4934	−0.73	
Tertiary	0.6270	0.3884	1.61	
age15−19	−0.8056	0.2217	−3.63	**
age20−24	0.0094	0.1931	0.05	
age25−29	1.0281	0.2109	4.88	**
age30−34	1.7848	0.2246	7.95	**
age35−39	1.8394	0.2157	8.53	**
age40−44	1.6911	0.2161	7.82	**
age45−49	1.6621	0.2274	7.31	**
age50−54	0.9161	0.2291	4.00	**
age55−59	1.1784	0.2546	4.63	**
age60−64	0		omitted	
Constant	1.1310	0.3449	3.28	**
Number of observation	=	6,455		** 1%
Wald chi2(22)	=	1297.46		* 5%
Prob > chi2	=	0.00		
Log likelihood	=	−103,039.41		
Pseudo R2	=	0.4843		

**Table 3.2.8: Factors contributing to
economically active (female)**

Factors	Coef.	Std. Err.	z	P>z
# person in household	−0.0629	0.0160	−3.93	**
Schooling	−2.7387	0.2286	−11.98	**
Urban	0.0781	0.0856	0.91	
No cash income	−2.1351	0.2351	−9.08	**
Income < 50$	−0.8504	0.2096	−4.06	**
Income 50−99$	−0.4943	0.2037	−2.43	*
Income 100−199$	−0.3198	0.1936	−1.65	**
Income 200−299$	0.0315	0.2061	0.15	
Income 300−499$	0.0156	0.2150	0.07	
Income 500$ or more	0.0000		omitted	
Less than primary	0.0000		omitted	
Primary	−0.1941	0.1113	−1.74	**
Gen. secondary	0.0009	0.1073	0.01	
Vocational Sec.	1.1457	0.6584	1.74	**
Tertiary	1.1171	0.3089	3.62	**
age15−19	0.3068	0.2273	1.35	
age20−24	0.5468	0.1837	2.98	**
age25−29	0.5692	0.1736	3.28	**
age30−34	0.7396	0.1793	4.12	**
age35−39	0.7905	0.1709	4.63	**
age40−44	1.0524	0.1712	6.15	**
age45−49	1.1444	0.1748	6.55	**
age50−54	0.9478	0.1820	5.21	**
age55−59	1.0984	0.2011	5.46	**
age60−64	0.0000		omitted	
Constant	−0.3903	0.2791	−1.40	
Number of observation	=	6,379		** 1%
Wald chi2(22)	=	562.26		* 5%
Prob > chi2	=	0.00		
Log pseudo likelihood	=	−141,865.52		
Pseudo R2	=	0.1885		

Note: Logit analysis attempts to determine the magnitude of factors and translates that into a measure of actual behavior, in this case, economically active behavior. Logit analysis defines the functional relationship between factors and the probability of economically active behaviors.

3.2.2.2 Relationship between educational background and occupation

Regarding the second research question, an analysis of the relationship between educational background and occupation is important. In the following tables, age range is divided into two groups, less than 40, and 40 or older, because of the limited sample size.

From these tables, it is clear that the relationship between occupation and educational background is very strong. The job category of "Professionals" has a strong association with "tertiary and vocational education" graduates for men and women. "Professionals" has a negative association with "Less than primary education" background for men and women. "Professionals" has a strong association with "Secondary education" graduates for older people, but this is not the case for younger men and women. "Service or sales workers" has a strong association with young "Secondary education" graduates for men. "Clerical support workers" has a strong association with young "Tertiary education" graduates for women. "Managers" has a strong association with older "Tertiary education" graduates for men.

Table 3.2.9: Educational background and occupation (Male, less than 40 years old)

Male, Less than 40

occupation	Less Prim.	Prim	Sec.	Voc.	Tertiary	Total
Managers	220	327	1,278	143	271	2,239
	0.89	0.35	0.55	1.04	0.86	3.69
	9.83	14.60	57.08	6.39	12.10	100.00
	1.03	1.70	4.24	11.64	7.60	2.96
Professionals	198	241	3,842	585	2,502	7,368
	5.66	4.74	0.92	6.00	44.32	61.64
	2.69	3.27	52.14	7.94	33.96	100.00
	0.93	1.25	12.75	47.60	70.14	9.75
Technicians/ associate professionals	1,138	1,347	1,939	112	306	4,842
	0.13	0.03	0.00	0.05	0.09	0.30
	23.50	27.82	40.05	2.31	6.32	100.00
	5.32	6.98	6.43	9.11	8.58	6.40
Clerical support worker	70	0	265	0	42	377
	0.04	0.32	0.29	0.02	0.11	0.78
	18.57	0.00	70.29	0.00	11.14	100.00
	0.33	0.00	0.88	0.00	1.18	0.50
Service/ sales workers	859	1,911	5,895	30	20	8,715
	3.47	0.15	5.60	0.29	1.24	10.74
	9.86	21.93	67.64	0.34	0.23	100.00
	4.02	9.91	19.56	2.44	0.56	11.53
Skilled agricultural forestry fishery	3,908	2,383	1,849	77	63	8,280
	3.48	0.11	2.12	0.08	0.91	6.71
	47.20	28.78	22.33	0.93	0.76	100.00
	18.28	12.35	6.13	6.27	1.77	10.95
Craft/ related trades workers	1,327	1,590	2,097	85	73	5,172
	0.04	0.18	0.00	0.00	0.40	0.63
	25.66	30.74	40.55	1.64	1.41	100.00
	6.21	8.24	6.96	6.92	2.05	6.84
Plant/ machine operators/ assemblers	766	1,631	3,000	34	53	5,484
	1.32	0.13	1.01	0.11	0.54	3.11
	13.97	29.74	54.70	0.62	0.97	100.00
	3.58	8.45	9.95	2.77	1.49	7.25
Elementary occupations	12,890	9,861	9,975	163	237	33,126
	4.40	0.78	2.62	0.87	3.73	12.41
	38.91	29.77	30.11	0.49	0.72	100.00
	60.30	51.12	33.10	13.26	6.64	43.82
Total	21,376	19,291	30,140	1,229	3,567	75,603
	19.44	6.79	13.12	8.46	52.19	100.00
	28.27	25.52	39.87	1.63	4.72	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

frequency
chi2 contribution   chi2=   30128.1
row percentage
column percentage

Table 3.2.10: Educational background and occupation (Male, 40 or older)

Male, Equal or more than 40

occupation	Less Prim.	Prim	Sec.	Voc.	Tertiary	Total
Managers	780	758	1,447	312	687	3,984
	2.43	0.01	1.05	1.86	6.81	12.16
	19.58	19.03	36.32	7.83	17.24	100.00
	2.12	5.19	9.02	20.42	28.02	5.58
Professionals	396	1,014	4,308	893	1,128	7,739
	9.96	0.63	11.69	9.84	8.61	40.72
	5.12	13.10	55.67	11.54	14.58	100.00
	1.08	6.95	26.85	58.44	46.00	10.84
Technicians/ associate professionals	1,458	1,362	1,257	87	441	4,605
	1.09	0.58	0.15	0.00	1.56	3.37
	31.66	29.58	27.30	1.89	9.58	100.00
	3.96	9.33	7.84	5.69	17.99	6.45
Clerical support worker	55	91	291	45	78	560
	0.58	0.01	0.67	0.28	0.55	2.10
	9.82	16.25	51.96	8.04	13.93	100.00
	0.15	0.62	1.81	2.95	3.18	0.78
Service/ sales workers	899	1,023	1,871	13	52	3,858
	1.84	0.21	3.58	0.18	0.15	5.96
	23.30	26.52	48.50	0.34	1.35	100.00
	2.44	7.01	11.66	0.85	2.12	5.40
Skilled agricultural forestry fishery	7,948	1,318	1,208	16	0	10,490
	3.68	0.98	1.72	0.60	1.11	8.09
	75.77	12.56	11.52	0.15	0.00	100.00
	21.60	9.03	7.53	1.05	0.00	14.69
Craft/ related trades workers	1,513	897	1,075	0	0	3,485
	0.14	0.15	0.34	0.23	0.37	1.22
	43.41	25.74	30.85	0.00	0.00	100.00
	4.11	6.15	6.70	0.00	0.00	4.88
Plant/ machine operators/ assemblers	318	530	1,444	76	0	2,368
	2.05	0.01	4.81	0.04	0.25	7.17
	13.43	22.38	60.98	3.21	0.00	100.00
	0.86	3.63	9.00	4.97	0.00	3.32
Elementary occupations	23,430	7,604	3,142	86	66	34,328
	5.74	0.15	8.33	1.76	3.23	19.22
	68.25	22.15	9.15	0.25	0.19	100.00
	63.67	52.09	19.58	5.63	2.69	48.07
Total	36,797	14,597	16,043	1,528	2,452	71,417
	27.50	2.74	32.34	14.78	22.64	100.00
	51.52	20.44	22.46	2.14	3.43	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

frequency
chi2 contribution   chi2=   32492.8
row percentage
column percentage

Table 3.2.11: Educational background and occupation (Female, less than 40 years old)

Male, Less than 40

occupation	Less Prim.	Prim	Sec.	Voc.	Tertiary	Total
Managers	220	327	1,278	143	271	2,239
	0.89	0.35	0.55	1.04	0.86	3.69
	9.83	14.60	57.08	6.39	12.10	100.00
	1.03	1.70	4.24	11.64	7.60	2.96
Professionals	198	241	3,842	585	2,502	7,368
	5.66	4.74	0.92	6.00	44.32	61.64
	2.69	3.27	52.14	7.94	33.96	100.00
	0.93	1.25	12.75	47.60	70.14	9.75
Technicians/ associate professionals	1,138	1,347	1,939	112	306	4,842
	0.13	0.03	0.00	0.05	0.09	0.30
	23.50	27.82	40.05	2.31	6.32	100.00
	5.32	6.98	6.43	9.11	8.58	6.40
Clerical support worker	70	0	265	0	42	377
	0.04	0.32	0.29	0.02	0.11	0.78
	18.57	0.00	70.29	0.00	11.14	100.00
	0.33	0.00	0.88	0.00	1.18	0.50
Service/ sales workers	859	1,911	5,895	30	20	8,715
	3.47	0.15	5.60	0.29	1.24	10.74
	9.86	21.93	67.64	0.34	0.23	100.00
	4.02	9.91	19.56	2.44	0.56	11.53
Skilled agricultural forestory fishery	3,908	2,383	1,849	77	63	8,280
	3.48	0.11	2.12	0.08	0.91	6.71
	47.20	28.78	22.33	0.93	0.76	100.00
	18.28	12.35	6.13	6.27	1.77	10.95
Craft/ related trades workers	1,327	1,590	2,097	85	73	5,172
	0.04	0.18	0.00	0.00	0.40	0.63
	25.66	30.74	40.55	1.64	1.41	100.00
	6.21	8.24	6.96	6.92	2.05	6.84
Plant/ machine operators/ assemblers	766	1,631	3,000	34	53	5,484
	1.32	0.13	1.01	0.11	0.54	3.11
	13.97	29.74	54.70	0.62	0.97	100.00
	3.58	8.45	9.95	2.77	1.49	7.25
Elementary occupations	12,890	9,861	9,975	163	237	33,126
	4.40	0.78	2.62	0.87	3.73	12.41
	38.91	29.77	30.11	0.49	0.72	100.00
	60.30	51.12	33.10	13.26	6.64	43.82
Total	21,376	19,291	30,140	1,229	3,567	75,603
	19.44	6.79	13.12	8.46	52.19	100.00
	28.27	25.52	39.87	1.63	4.72	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

frequency
chi2 contribution   chi2=   30128.1
row percentage
column percentage

Table 3.2.12: Educational background and occupation (Female, 40 or older)

Male, Equal or more than 40

occupation	Less Prim.	Prim	Sec.	Voc.	Tertiary	Total
Managers	780	758	1,447	312	687	3,984
	2.43	0.01	1.05	1.86	6.81	12.16
	19.58	19.03	36.32	7.83	17.24	100.00
	2.12	5.19	9.02	20.42	28.02	5.58
Professionals	396	1,014	4,308	893	1,128	7,739
	9.96	0.63	11.69	9.84	8.61	40.72
	5.12	13.10	55.67	11.54	14.58	100.00
	1.08	6.95	26.85	58.44	46.00	10.84
Technicians/ associate professionals	1,458	1,362	1,257	87	441	4,605
	1.09	0.58	0.15	0.00	1.56	3.37
	31.66	29.58	27.30	1.89	9.58	100.00
	3.96	9.33	7.84	5.69	17.99	6.45
Clerical support worker	55	91	291	45	78	560
	0.58	0.01	0.67	0.28	0.55	2.10
	9.82	16.25	51.96	8.04	13.93	100.00
	0.15	0.62	1.81	2.95	3.18	0.78
Service/ sales workers	899	1,023	1,871	13	52	3,858
	1.84	0.21	3.58	0.18	0.15	5.96
	23.30	26.52	48.50	0.34	1.35	100.00
	2.44	7.01	11.66	0.85	2.12	5.40
Skilled agricultural forestory fishery	7,948	1,318	1,208	16	0	10,490
	3.68	0.98	1.72	0.60	1.11	8.09
	75.77	12.56	11.52	0.15	0.00	100.00
	21.60	9.03	7.53	1.05	0.00	14.69
Craft/ related trades workers	1,513	897	1,075	0	0	3,485
	0.14	0.15	0.34	0.23	0.37	1.22
	43.41	25.74	30.85	0.00	0.00	100.00
	4.11	6.15	6.70	0.00	0.00	4.88
Plant/ machine operators/ assemblers	318	530	1,444	76	0	2,368
	2.05	0.01	4.81	0.04	0.25	7.17
	13.43	22.38	60.98	3.21	0.00	100.00
	0.86	3.63	9.00	4.97	0.00	3.32
Elementary occupations	23,430	7,604	3,142	86	66	34,328
	5.74	0.15	8.33	1.76	3.23	19.22
	68.25	22.15	9.15	0.25	0.19	100.00
	63.67	52.09	19.58	5.63	2.69	48.07
Total	36,797	14,597	16,043	1,528	2,452	71,417
	27.50	2.74	32.34	14.78	22.64	100.00
	51.52	20.44	22.46	2.14	3.43	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

frequency
chi2 contribution   chi2=   32492.8
row percentage
column percentage

3.2.2.3   Effects of education

The effects of education can be observed from monthly wage and weekly working hours.   Figure 3.2.11 and Figure 3.2.12 show the distribution of monthly wages of workers by educational background.   The pattern is similar between men and women. The variance is large for the entire educational background category.   Less-educated workers lean to the lower side of the distribution.   Thus, the returns to education are clear.
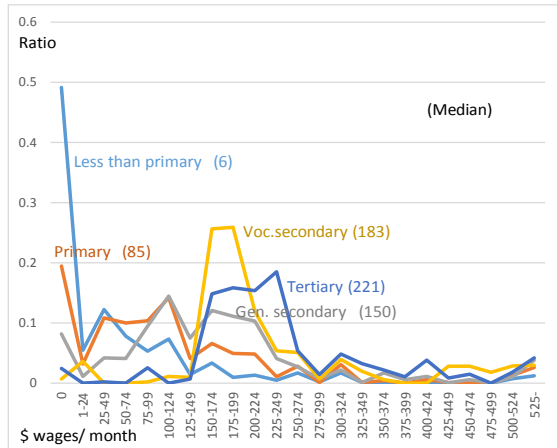
Figure 3.2.11: Distribution of wages by educational background (Male)
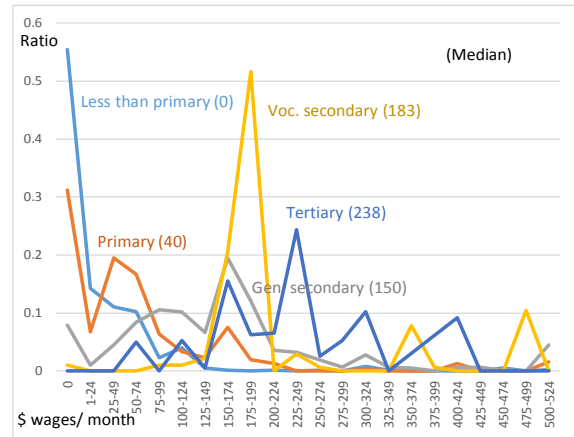
Figure 3.2.12: Distribution of wages by educational background (Female)

Figure 3.2.13 and Figure 3.2.14 show the distribution of weekly working hours of workers by educational background.
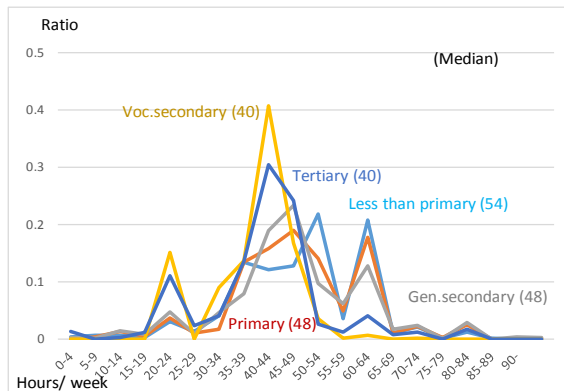
Figure 3.2.13: Distribution of working hours by educational background (Male)
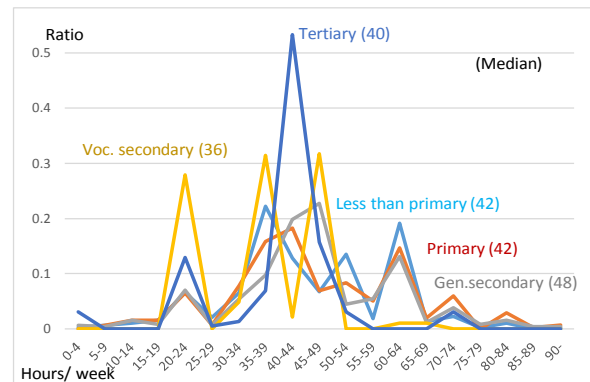
Figure 3.2.14: Distribution of working hours by educational background (Female)

For men, the less educated tend to work more hours. More than 44% of tertiary or vocational secondary education graduates work appropriate hours (35-44), but less than 30% of others do so.   For women, the less educated tend to work more hours also; 60% of tertiary education graduates work appropriate hours (35-44), but less than 36% of others do so. Thus, the effects of education are clear from the viewpoints of both wage and working hours.

As already mentioned, a high educational background correlates with a high rate of labour force participation.   Therefore, it is useful to calculate labour force participation rates by age and educational background.   Table 3.2.13 shows labour force participation rates by educational background and age among those not attending schools.   As Table 3.2.13 shows, the labour force participation rate is higher among those with higher

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educational background for most age brackets.   As the educational background becomes higher for most age brackets in the future, the labour force participation rate will also become higher for most age brackets; this is an important point to note when estimating the labour force provision in the future.

Table 3.2.13: Labour force participation rate by educational background and age

Male	Less than Primary	Primary	Pre-secondary	Second-ary	Tertiary	Total
15-19	43.81	48.80	48.80	54.39	54.39	43.59
20-24	65.52	56.63	71.37	60.30	82.64	62.52
25-29	78.26	80.74	81.59	84.87	82.64	81.88
30-34	72.81	88.02	84.27	92.54	95.19	84.25
35-39	73.56	84.59	81.98	93.46	94.85	83.18
40-44	78.77	80.06	87.37	92.08	91.39	83.74
45-49	79.09	76.84	77.21	95.59	91.39	81.60
50-54	71.79	74.39	91.00	92.46	91.39	72.51
55-59	71.79	81.02	81.89	92.46	91.39	75.83
60-64	56.51	55.61	49.85	72.68	72.68	56.72
Total	68.87	75.78	77.83	84.90	91.64	75.33

Female	Less than Primary	Primary	Pre-secondary	Second-ary	Tertiary	Total
15-19	31.90	25.35	32.31	37.87	37.87	31.11
20-24	26.18	34.89	39.58	39.58	60.27	35.74
25-29	27.77	30.68	28.79	49.33	60.27	35.72
30-34	39.71	34.14	37.24	37.40	55.47	38.05
35-39	35.06	36.61	35.60	49.02	55.47	38.97
40-44	42.27	39.68	38.60	63.62	97.87	44.27
45-49	46.35	45.99	31.99	62.26	97.87	46.63
50-54	40.47	44.50	33.79	76.42	97.87	42.55
55-59	46.46	31.31	33.79	60.37	97.87	47.74
60-64	23.54	48.78	33.79	60.37	60.37	24.55
Total	36.84	35.98	35.60	46.76	75.66	38.71

Note: When a figure in a cell is too small or too large perhaps because of the sample size, an appropriate figure is adopted from a neighboring cell (colored).

All of these useful results come from the re-analysis of the Labour Force Survey 2010, which means that the calculated figures cannot overcome the limitations of the survey itself.   The first limitation is the sample size.   Although the total sample size aged between 15 and 64 is 12,846, it is still not enough to decompose the data into many cells. For example, some cells may consist of small number of samples, and then the result may lose its stability, such as the case of "secondary" and "20-24" for women.   The second limitation is the questionnaire itself.   The questionnaire is well structured, but the actual data does not match the design.   The questionnaire is rather complicated and not only the respondents but also researchers may have been confused about the intentions of the questions.   As a result, there are some inconsistencies in the data.   The problem could be reduced to some extent by cleaning the data, which is why some tables are calculated using selected samples, such as "not attending school."

3.2.3   Simulation on improving the quality of labour force by education until 2030

As the structure of the population is a pyramid shape, the population as a whole is dominated by young people who have the potential to be educated in the future.   In fact, 62% of the total population was 20 years old or younger in 2010.
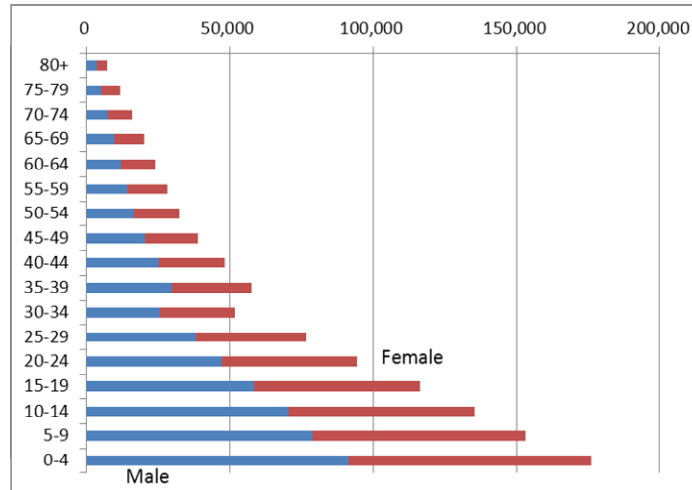
Figure 3.2.15: Age structure of population 2010 (adjusted moderate estimate)

After analyzing the population by age, education level and sex, multiplying the population by the labour force participation rates gives the size of the labour force.

3.2.3.1   Estimation of labour force structure in 2030

By making several assumptions, simulations on the population and labour force by educational background in the future are possible.   The basic population figures in 2010 by age and educational background are already available.   As the original data on population has some problems such as low counts of very young children and those in their 50s, and high counts of those in their 60s because they expect to receive pension benefits (NSD & UNFPA, 2012b), the adjusted moderate estimate figures are used in the following analyses.   The population figures by educational background in the future are calculated by multiplying them by a transition rates matrix, which is constructed under appropriate assumptions.

The basic concept of transition of age "X" from year "Y" to year "Y+1" is shown in Figure 3.2.16.   If someone is registered at some level of school, he/she will either stay at the same level of school, move to a higher level school, or leave from school in the next

year.　Leaving school means dropping out or graduating.　It is assumed that once a student leaves school and enters society, they do not return to school again.
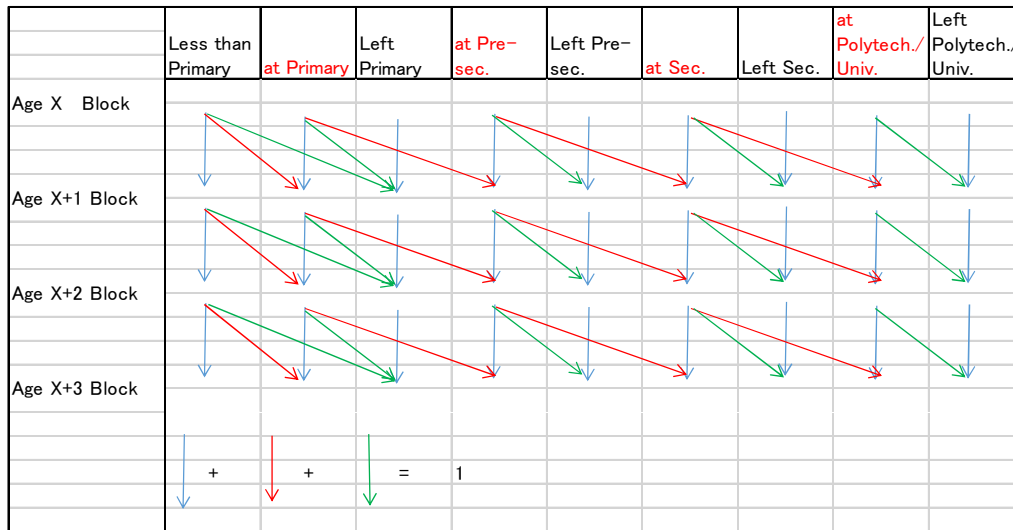
Figure 3.2.16: Transition from one stage to the next

Some parameters must be defined in order to construct the transition rates matrix. There are three parameters which affect the transition rates.

1) Intake rate or promotion rate:　In the case of primary school, this rate shows the percentage of the enrolling age population who go to school.　In the case of pre-secondary and later, the rate shows the percentage of graduates from the previous school who go on to the next school.

2) Dropout rate: This rate shows the percentage of students who drop out from a certain level of school.

3) Repetition rate: This rate shows the percentage of students who repeat the same grade at a certain level of school.

The current and future indicators are synthesized from several data sources.　As the 5-year age group and lustral period are applied, a transition rates matrix is created.　The transition rates matrix changes depending on the change of parameters, and the change of matrix changes the results of simulation.

The estimated numbers in each 5-year age bracket in each 5 years from 2010 until 2030 are already published (NSD & UNFPA, 2012b), and form the basis of the following simulation.　As the labour force participation rates are different between men and women, the simulations are conducted separately for men and women.　Because of data limitations, the same transition rates matrix is used for both men and women.　In fact, the difference of educational indicators between men and women is becoming very small. For example, Gender Parity Index (GPI) of gross enrollment of primary, pre-secondary,

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and secondary school students in 2010 are 0.96, 1.03, and 0.98 respectively (UNESCO Institute for Statistics, 2012).

3.2.3.2 Four scenarios

The following four scenarios are considered.

1) Baseline scenario: basic parameters will not change for 20 years.   Even in this case, the number of schools and students increase because the population itself increases. Many resources are required even to keep the parameters the same.

Table 3.2.14: Baseline scenario

Level	2010	2015	2020	2025	2030	Parameter	Source
Primary	0.060	0.060	0.060	0.060	0.060	Dropout rate	USAID
	0.168	0.168	0.168	0.168	0.168	Repetition rate	UNESCO
	0.904	0.904	0.904	0.904	0.904	Intake rate	UNESCO
Pre-sec.	0.042	0.042	0.042	0.042	0.042	Dropout rate	USAID
	0.025	0.025	0.025	0.025	0.025	Repetition rate	UNESCO
	0.820	0.820	0.820	0.820	0.820	Promotion rate	USAID
Secondary	0.036	0.036	0.036	0.036	0.036	Dropout rate	USAID
	0.025	0.025	0.025	0.025	0.025	Repetition rate	UNESCO
	0.874	0.874	0.874	0.874	0.874	Promotion rate	NESP
Tertiary	0.473	0.473	0.473	0.473	0.473	(1-Registration rate)	UNTL
	0.323	0.323	0.323	0.323	0.323	Promotion rate	CENSUS

Note:
USAID: USAID, 2013 related figures.
UNESCO: UNESCO Institute for Statistics in EdStats.
NESP: Ministry of Education, 2011 Table A4.5.
UNTL: UNTL, 2013.
CENSUS: NSD, 2012.

According to the "Timor-Leste Census 2010," 41.37% of the 19-year-old population have received secondary school education, and 13.37% of the 24-year-old population have received tertiary education.   The ratio of the two figures is considered to be an estimate of the rate of continuing from secondary to tertiary education.

According to the "Estatistíca Dos Estudantes Do Segundo Semestre (II) Ano Académico 2013", there were 9,311 registered students, accounting for 52.75% of the total enrollment at the UNTL. This figure is considered to be an estimate of the graduation rate.

These parameters are used to calculate transition rates matrixes from 2010 to 2015; from 2015 to 2020; from 2020 to 2025; and from 2025 to 2030.

Basic formulas are as follows;

(educational structure 2010) *(Transition rates matrix from 2010 to 2015)
   → (educational structure 2015),

(educational structure 2015) *(Transition rates matrix from 2015 to 2020)
   → (educational structure 2020),

(educational structure 2020) *(Transition rates matrix from 2020 to 2025)
   → (educational structure 2025),

(educational structure 2025) *(Transition rates matrix from 2025 to 2030)
   → (educational structure 2030).

2) 20% improvement scenario: basic parameters will improve by 20% every 5 years.

The difference between the current figure and target figure will be reduced by 20% every 5 years. The target figures for the dropout rate, repetition rate, intake rate, promotion rate from primary to pre-secondary, from pre-secondary to secondary, and from secondary to tertiary education are considered to be 0, 0, 1, 1, 1, and 0.6.

Table 3.2.15: 20% improvement scenario

Level	2010	2015	2020	2025	2030	Parameter
Primary	0.060	0.048	0.038	0.031	0.025	Dropout rate
	0.168	0.134	0.108	0.086	0.069	Repetition rate
	0.904	0.923	0.939	0.951	0.961	Intake rate
Pre-sec.	0.042	0.034	0.027	0.022	0.017	Dropout rate
	0.025	0.020	0.016	0.013	0.010	Repetition rate
	0.820	0.856	0.885	0.908	0.926	Promotion rate
Secondary	0.036	0.029	0.023	0.018	0.015	Dropout rate
	0.025	0.020	0.016	0.013	0.010	Repetition rate
	0.874	0.899	0.919	0.935	0.948	Promotion rate
Tertiary	0.473	0.378	0.302	0.242	0.194	(1−Registration rate)
	0.323	0.379	0.423	0.458	0.487	Promotion rate

3) Planned scenario: important parameters are borrowed from a policy paper of the Ministry of Education.

The intake rates and the promotion rates from primary to pre-secondary school in 2015 and thereafter are assumed to be the same as the NER projection/targets of Table A4.5 of National Education Strategic Plan 2011-2030 (Ministry of Education, 2011). The promotion rates from pre-secondary to secondary school are supposed to be the same as "transition rates Gr9 => Secondary" of Table A4.5 in the same document. Other parameters are set to be the same as those of Table 3.2.15.

Table 3.2.16: Planned scenario

Level	2010	2015	2020	2025	2030	Parameter
Primary	0.060	0.048	0.038	0.031	0.025	Dropout rate
	0.168	0.134	0.108	0.086	0.069	Repetition rate
	0.904	0.930	0.910	0.970	1.000	Intake rate
Pre-sec.	0.042	0.034	0.027	0.022	0.017	Dropout rate
	0.025	0.020	0.016	0.013	0.010	Repetition rate
	0.820	0.930	0.910	0.970	1.000	Promotion rate
Secondary	0.036	0.029	0.023	0.018	0.015	Dropout rate
	0.025	0.020	0.016	0.013	0.010	Repetition rate
	0.874	0.793	0.535	0.883	1.000	Promotion rate
Tertiary	0.473	0.378	0.302	0.242	0.194	(1-Registration rate)
	0.323	0.379	0.423	0.458	0.487	Promotion rate

4) 40% improvement scenario: basic parameters will be improved 40% in every 5 years.

The difference between the current figure and target figure will be reduced by 40% every 5 years.   The target figures for the dropout rate, repetition rate, intake rate, and promotion rate are the same as in the 20% improvement scenario.

Table 3.2.17: 40% improvement scenario

Level	2010	2015	2020	2025	2030	Parameter
Primary	0.060	0.036	0.022	0.013	0.008	Dropout rate
	0.168	0.101	0.060	0.036	0.022	Repetition rate
	0.904	0.942	0.965	0.979	0.988	Intake rate
Pre-sec.	0.042	0.025	0.015	0.009	0.005	Dropout rate
	0.025	0.015	0.009	0.005	0.003	Repetition rate
	0.820	0.892	0.935	0.961	0.977	Promotion rate
Secondary	0.036	0.022	0.013	0.008	0.005	Dropout rate
	0.025	0.015	0.009	0.005	0.003	Repetition rate
	0.874	0.924	0.955	0.973	0.984	Promotion rate
Tertiary	0.473	0.284	0.170	0.102	0.061	(1-Registration rate)
	0.323	0.434	0.500	0.540	0.564	Promotion rate

3.2.3.3 Results of simulation

1) Total population by educational background, male 2010

Figure 3.2.17: Population structure by educational background (Male, 2010)
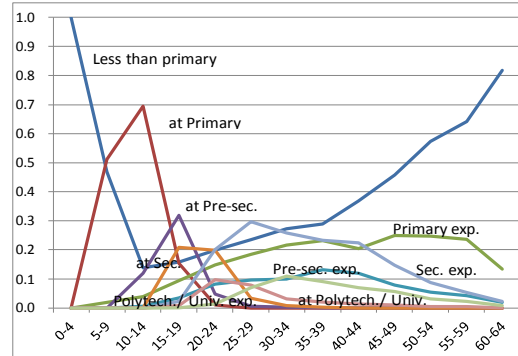
Figure 3.2.18: Population distribution by educational background (Male, 2010)

Among the aged population, there are few educated people and a large number of non-educated people; however, it is clear that those aged 45 years old or more will no longer be potential labour population by 2030, and that young and educated people will join the potential labour population.

2) Total population by educational background, male 2030

Even if the current tendency continues to 2030, the momentum of educational expansion will continue. As the population itself is increasing, the number of educated is increasing under the same parameters. If the parameters are improved, educational expansion will accelerate.
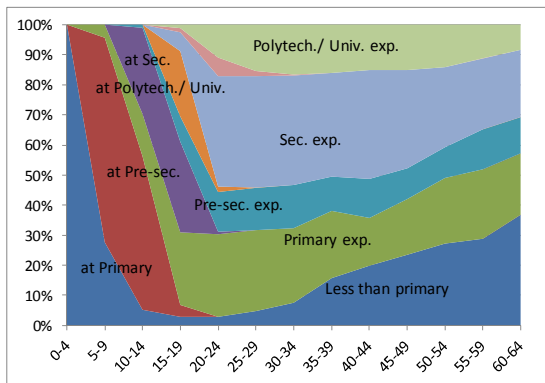
Figure 3.2.19: Population structure by educational background (Male, 2030) (Baseline)
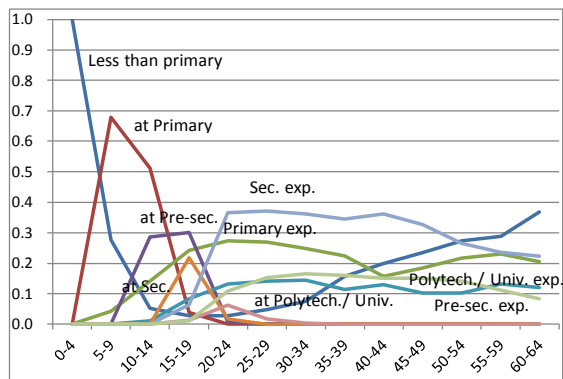
Figure 3.2.20: Population distribution by educational background (Male, 2030) (Baseline)

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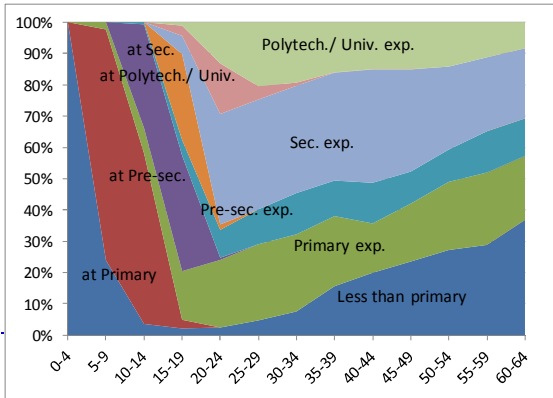
Figure 3.2.21: Population structure by educational background (Male, 2030) (20% improvement)
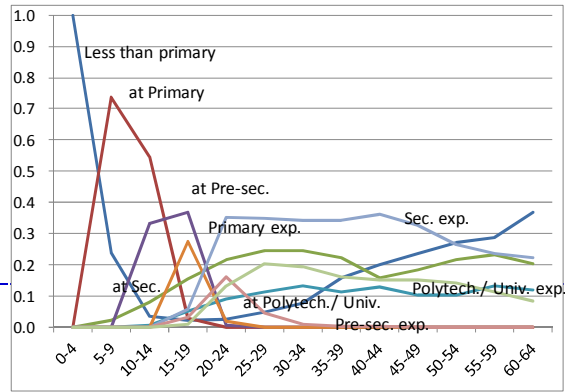
Figure 3.2.22: Population distribution by educational background (Male, 2030) (20% improvement)
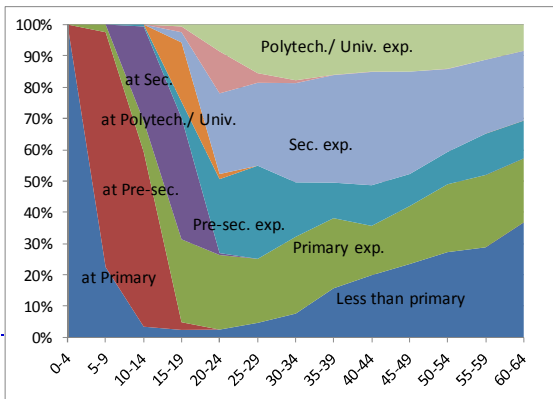
Figure 3.2.23: Population structure by educational background (Male, 2030) (Planned)
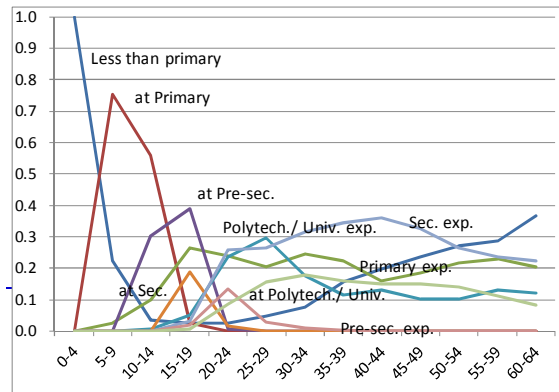
Figure 3.2.24: Population distribution by educational background (Male, 2030) (Planned)
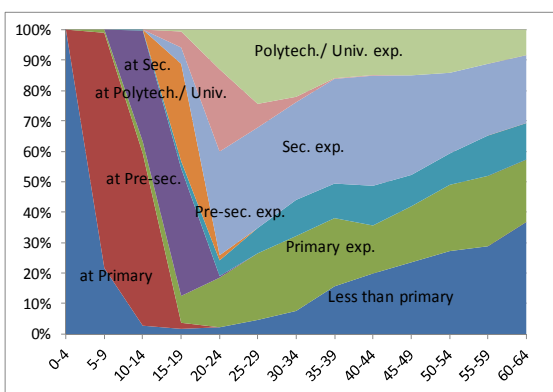
Figure 3.2.25: Population structure by educational background (Male, 2030) (40% improvement)
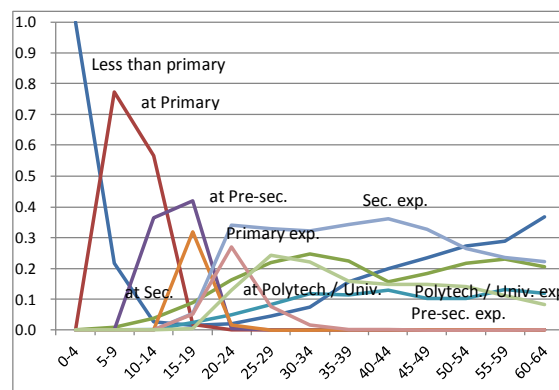
Figure 3.2.26: Population distribution by educational background (Male, 2030) (40% improvement)

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3) Total population by educational background, female 2010

The relationship between age and educational background is the same as the case of men. Although the educational background of women is clearly lower than that of men at present, because of the government policy on equal education opportunities for men and women, the trend of educational expansion will be the same as for men.
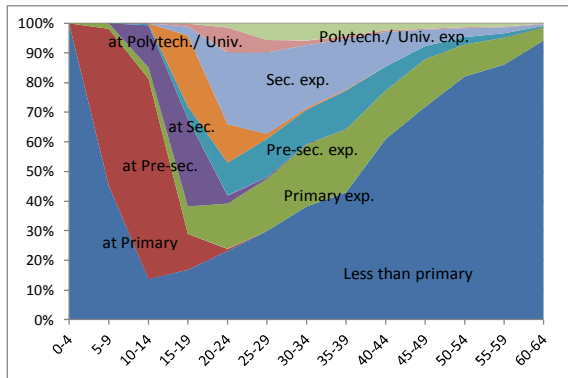
Figure 3.2.27: Population structure by educational background. Female, 2010
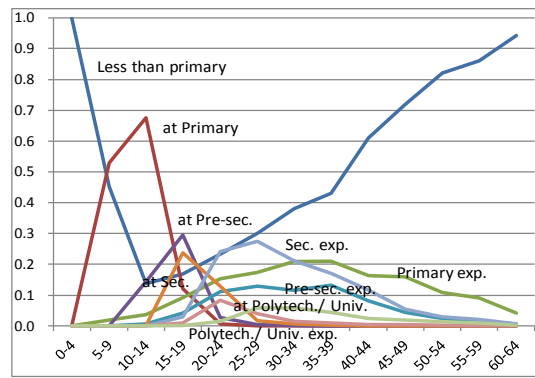
Figure 3.2.28: Population distribution by educational background. Female, 2010

4) Total population by educational background, female 2030

As the current education level is low, the expansion of education is more rapid than for men. On the other hand, if the education does not expand as expected, many people may stay at a lower level.
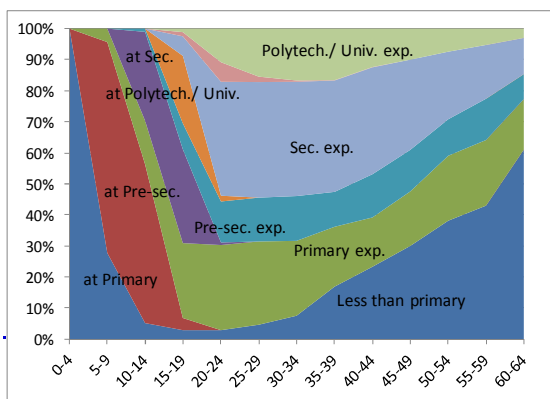
Figure 3.2.29: Population structure by educational background (Female, 2030) (Baseline)
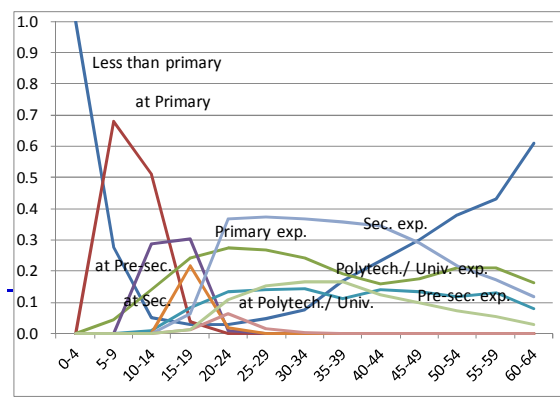
Figure 3.2.30: Population distribution by educational background (Female, 2030) (Baseline)

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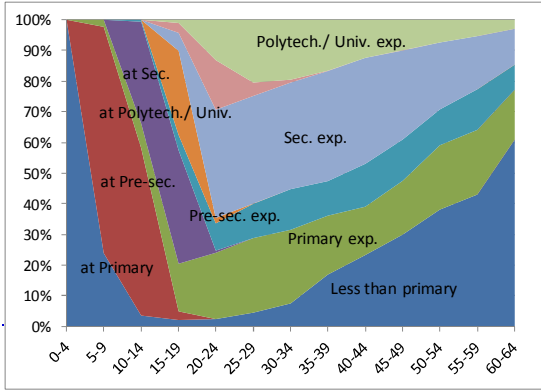
Figure 3.2.31: Population structure by educational background (Female, 2030) (20% improvement)
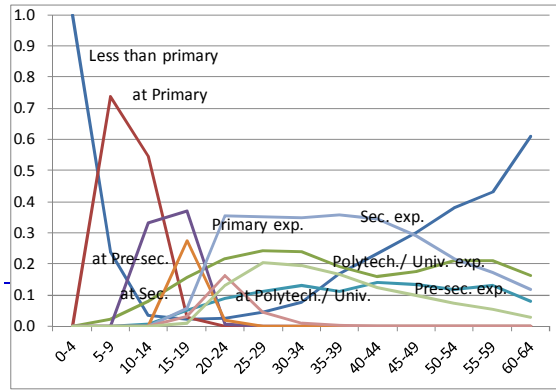
Figure 3.2.32: Population distribution by educational background (Female, 2030) (20% improvement)

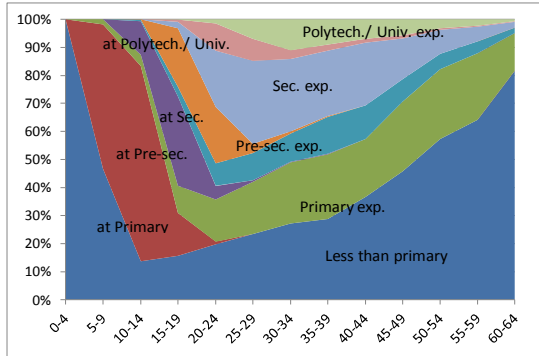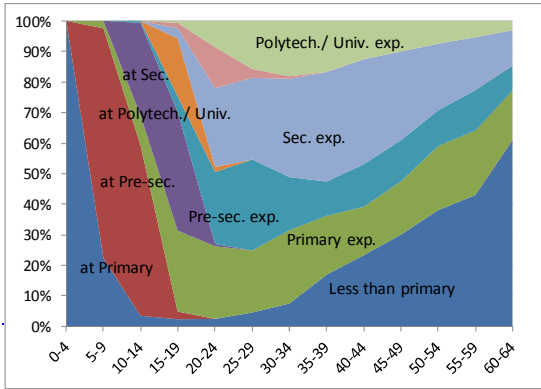**Figure 3.2.33: Population structure by educational background (Female, 2030) (Planned)**
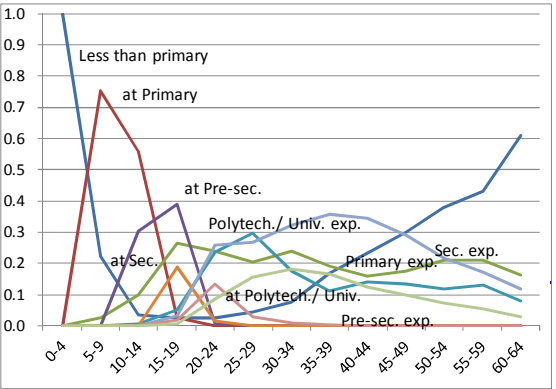
Figure 3.2.34: Population distribution by educational background (Female, 2030) (Planned)
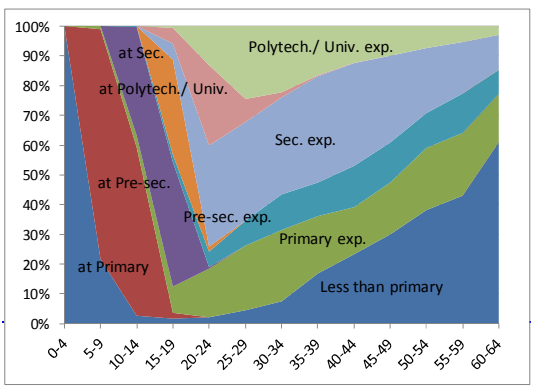
Figure 3.2.35: Population structure by educational background (Female, 2030) (40% improvement)
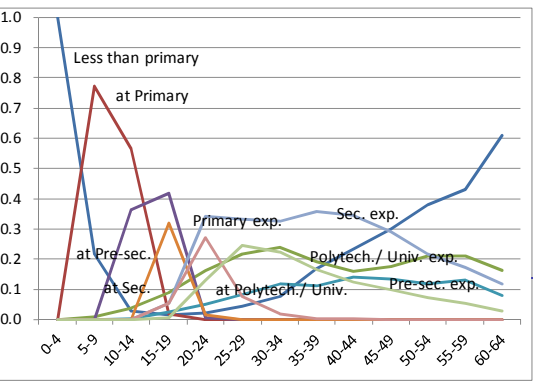
Figure 3.2.36: Population distribution by educational background (Female, 2030) (40% improvement)

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3.2.3.4 Estimation of labour force structure in 2030

The composition of educational background for each 5-year age bracket has been calculated so far. As the population of each 5-year age bracket in 2030 has already been estimated using Census 2010 data, we can calculate the population of each 5-year age bracket by educational background.   Then, if the labour force participation rate of each 5-year age bracket in 2030 is assumed to be the same as in 2010, we can estimate the number of labour force of each 5-year age bracket by educational background.

Usually, the category of educational background in labour force statistics is defined as "completed", and those who have dropped out or are currently studying are not included in the same category.   Because of the limitation of the original Census 2010 data used here, the category of educational background includes those who have dropped out (Figures 3.2.17 to 3.2.36).   As the dropout rate is known, those who have dropped out are included in a lower category of educational background hereafter.

Table 3.2.18 shows the structure of labour force by educational background in 2030 using the methodology as explained above.   Figure 3.2.37 is a visualized image of the table.   The result shows a clear improvement in education level of population and labour force in 2030.   Especially, the number of those who have not completed primary education will decrease drastically because primary education has been a priority area based on the EFA[1] policy of the government and development partners, and current educational indicators on primary education are already reasonably high.

The difference between the four scenarios is clearly shown at the level of tertiary education which is the final stage of the educational ladder.   In the case of the "40% improvement" scenario, the labour force situation seems to be better than that of Indonesia in 2010, and is close to the situation of Malaysia in the mid-1990's when GDP/C exceeded USD 4,000.

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[1] Education for All (EFA) is an international initiative first launched in Jomtien, Thailand, in 1990 to bring the benefits of education to "every citizen in every society." In order to realize this aim, a broad coalition of national governments, civil society groups, and development agencies such as UNESCO and the World Bank committed to achieving the goals. The EFA goals also contribute to the global pursuit of the eight Millennium Development Goals (MDGs), especially MDG 2 on universal primary education and MDG 3 on gender equality in education, by 2015.

Table 3.2.18: Estimation of labour force structure by educational background based on 2010 Population and Housing Census

Sex	Scenario	Less than Primary	Primary	Pre-secondary	Secondary	Tertiary
Male	Baseline	0.155	0.241	0.146	0.387	0.072
	20% improve	0.152	0.229	0.134	0.389	0.096
	Planned	0.151	0.234	0.182	0.348	0.084
	40% improve	0.149	0.217	0.123	0.394	0.117
Female	Baseline	0.189	0.241	0.153	0.356	0.060
	20% improve	0.185	0.228	0.141	0.361	0.084
	Planned	0.185	0.237	0.187	0.318	0.072
	40% improve	0.182	0.215	0.130	0.369	0.104
Both	Baseline	0.166	0.241	0.148	0.377	0.068
	20% improve	0.162	0.228	0.136	0.380	0.092
	Planned	0.162	0.235	0.184	0.339	0.080
	40% improve	0.160	0.217	0.125	0.386	0.112
2010 (employment)		0.449	0.199	0.093	0.188	0.071

Figure 3.2.37: Labour force structure of different scenarios by educational background

The calculation so far has been conducted based on the labour force participation rates by 5-year age bracket in 2030 because of the data limitation. As explained previously, the labour force participation rate is expected to be higher among the highly educated. There may be larger number of highly educated than shown in Table 3.2.18 because the information that labour force participation rate is higher among the highly educated is not used.

It might be more realistic to consider the number of labour force by educational background. If we multiply Table 3.2.18 by the total number of labour force which is

already fixed, the number of labour force by educational background can be calculated as shown in Table 3.2.19.   We can then calculate the difference between the labour force in 2030 by educational background and the number of employment in 2010.   Table 3.2.20 shows the result.

Table 3.2.19: Estimation of the number of labour force by educational background based on 2010 Labour Force Survey

Sex	Scenario	Less than Primary	Primary	Pre-secondary	Secondary	Tertiary	Total
Male	Baseline	60,517	94,070	57,158	151,009	27,937	390,690
	20% improve	59,246	89,308	52,396	152,133	37,607	390,690
	Planned	59,189	91,370	71,228	136,020	32,883	390,690
	40% improve	58,307	84,822	48,029	153,999	45,534	390,690
2010 (employment)		75,834	42,030	18,622	37,301	13,789	187,576
Female	Baseline	35,387	45,203	28,664	66,761	11,294	187,308
	20% improve	34,611	42,706	26,459	67,705	15,827	187,308
	Planned	34,607	44,476	35,070	59,635	13,520	187,308
	40% improve	34,607	44,476	35,070	59,635	13,520	187,308
2010 (employment)		49,108	13,251	7,196	15,052	5,849	90,456
Both	Baseline	95,904	139,273	85,821	217,770	39,231	577,998
	20% improve	93,857	132,014	78,855	219,838	53,433	577,998
	Planned	93,796	135,846	106,298	195,655	46,404	577,998
	40% improve	92,358	125,174	72,472	223,066	64,928	577,998
2010 (employment)		124,942	55,281	25,818	52,353	19,638	278,032

Table 3.2.20: Increase and decrease in the number of labour force by educational background

Sex	Scenario	Less than Primary	Primary	Pre-secondary	Secondary	Tertiary	Total
Male	Baseline	△ 15,317	52,040	38,536	113,708	14,148	203,114
	20% improve	△ 16,588	47,278	33,774	114,832	23,818	203,114
	Planned	△ 16,645	49,340	52,606	98,719	19,094	203,114
	40% improve	△ 17,527	42,792	29,407	116,698	31,745	203,114
2010 (employment)		75,834	42,030	18,622	37,301	13,789	187,576
Female	Baseline	△ 13,721	31,952	21,468	51,709	5,445	96,852
	20% improve	△ 14,497	29,455	19,263	52,653	9,978	96,852
	Planned	△ 14,501	31,225	27,874	44,583	7,671	96,852
	40% improve	△ 14,501	31,225	27,874	44,583	7,671	96,852
2010 (employment)		49,108	13,251	7,196	15,052	5,849	90,456
Both	Baseline	△ 29,038	83,992	60,003	165,417	19,593	299,966
	20% improve	△ 31,085	76,733	53,037	167,485	33,795	299,966
	Planned	△ 31,146	80,565	80,480	143,302	26,766	299,966
	40% improve	△ 32,584	69,893	46,654	170,713	45,290	299,966
2010 (employment)		124,942	55,281	25,818	52,353	19,638	278,032

The increase in the number of highly educated labour force is remarkable, yet there is still a large number of low-education labour force although the number itself is decreasing.   There is also a disparity between the young educated labour force and the

old low-education labour force.   The labour force with tertiary education will increase 2.0-3.3 times in the next 20 years, and the labour force with secondary education will increase 3.7-4.3 times depending on the scenario.   This highly educated labour force is expected to be absorbed into secondary or tertiary industries. Although there is a shortage of highly educated labour force at present, the number may be enough in 2030, though the quality of the labour force should be discussed separately.

The reason why the numbers of secondary school and tertiary education graduates are small in the "Planned scenario" compared with the numbers in the "20% improvement" scenario is a tentative decrease in the promotion rate from pre-secondary to secondary school level as shown in Table 3.2.16.   It is necessary to expand not only primary school and pre-school levels, but also to expand the secondary school level and above at the same time if the government is to enrich the labour force structure.

3.2.3.5   Validity of the estimates

The validity of the estimated figures should be examined.   There were 17,652 students enrolled at the UNTL in the second semester of 2013 (UNTL, 2013), of which 9,311 are registered.   According to previous statistics, it takes about 5 years to graduate from the institution.   Assuming that 80% of registered students will graduate in 5 years, the number of annual graduates is calculated at 1,490.   Accordingly, the number is calculated to be 29,800 over 20 years.   On the other hand, about 1,950 tertiary education graduates will retire from the potential labour population because of age by 2030, so the net increment of tertiary education graduates will be 27,850.   As the labour force participation rate is high among these people, 22,280 will become labour force assuming that the labour force participation rate is 80%.   This number is more than the figure projected in the "Baseline scenario" in Table 3.2.20.

There are other sources of tertiary education graduates.   According to an interview with the Dili Institute of Technology, they produce more than 300 graduates a year recently.   Based on the UNESCO statistics in 2012, there are 3,699 Timor-Leste students at tertiary education institutions abroad, mostly in Indonesia (UNESCO, 2012).   If we assume that the duration for completing studies is the same as in the UNTL, there will be 592 graduates annually from foreign tertiary education institutions.   According to Table3.2.20, there is an increase of 45,290 tertiary education graduates when the "40% improvement" scenario is adopted.   As there are other tertiary education institutions, the number can be met.

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3.2.3.6 Quality of the highly educated labour force

For the purpose of policy making, not only the number of highly educated labour force, but also information on the specialties of the labour force may be useful to examine if the labour force structure will match the needs of industry in the future. Some more calculations are possible under several assumptions.

According to EMIS2012, there are 5,488 vocational secondary school students and 41,904 general secondary school students, accounting for 11.6% and 88.4%, respectively. If we assume that the ratio remains the same in the future, we can calculate the number of vocational secondary school graduates in 2030 from Table 3.2.19. Accordingly, there will be 23,842 - 26,768 vocational secondary school graduates depending on the scenario.

24.2% of registered students of the UNTL belonged to Faculty of Agriculture or Engineering, and are considered to be a source of engineers in the future. Based on the figures in Table 3.2.19, it is estimated that 9,505 – 15,732 workers will have a background of the Faculty of Agriculture or Engineering if the ratio does not change.

Tables 3.1.7 to 3.1.9 show the estimations of labour force creation until 2030. A different industry requires a different occupational structure; the structure is given by an industry and job matrix. Table 3.2.21 shows the occupational structure by industry in the 2010 Census. As the structure may change in 2030, Table 3.2.22 is also considered. Table 3.2.22 shows the occupational structure by industry in Indonesia (2010), and can be referred to as a proxy structure of Timor-Leste in the future.

The number of professional or technical workers which will be created in 2030 is 45,904 – 47,027 based on Table 3.2.21, and 61,959 – 64,320 based on Table 3.2.22. According to Table 3.2.19, the number of tertiary education graduates is estimated to be 39,231 – 64,928. As tertiary education graduates are also a major source of managers, it seems difficult to provide all of the necessary professional or technical workers from tertiary education graduates. In fact, tertiary education graduates accounted for 66.7% of total professional or technical workers in 2010 in Indonesia. Even if this rate is applied, 41,327 – 42,901 professional or technical workers should be provided by tertiary education graduates. The baseline scenario does not meet this condition. If Timor-Leste cannot provide enough qualified workers, the shortfall should be filled by foreign workers.

Table 3.2.21: Occupational structure by industry (Timor-Leste 2010)

Occupation / Industry	Armed Forces	Managers	Profes-sionals	Techni-cians	Clerical	Service and sales	Skilled agricultural workers	Craft and related trades	Machine operators	Elementary Occupa-tions	Not Stated	Total
Total	0.0025	0.0249	0.0213	0.0163	0.0564	0.1235	0.6308	0.0443	0.0280	0.0413	0.0106	1.0000
Agriculture Fisheries	0.0000	0.0006	0.0000	0.0013	0.0002	0.0141	0.9473	0.0072	0.0014	0.0251	0.0027	1.0000
Mining and Quarring	0.0000	0.0081	0.0063	0.0181	0.0163	0.0678	0.0000	0.7136	0.0614	0.0985	0.0099	1.0000
Manufacturing	0.0000	0.0274	0.0058	0.0040	0.0455	0.0528	0.0002	0.7995	0.0241	0.0287	0.0121	1.0000
Electricity,gas and water	0.0000	0.0241	0.0175	0.0877	0.1140	0.0351	0.0000	0.1974	0.3026	0.1974	0.0241	1.0000
Construction	0.0000	0.0795	0.0023	0.0153	0.0105	0.0161	0.0000	0.4782	0.0105	0.3821	0.0053	1.0000
Wholesale,Retail,Trade, Restaurants and hotels	0.0000	0.0219	0.0005	0.0256	0.0177	0.8013	0.0002	0.0616	0.0097	0.0512	0.0103	1.0000
Transport, storage and communication	0.0000	0.0486	0.0252	0.0413	0.0339	0.0781	0.0000	0.0123	0.7088	0.0433	0.0085	1.0000
Finance, Insurance, Real estates	0.0000	0.1007	0.0963	0.0656	0.4114	0.1554	0.0000	0.0460	0.0481	0.0263	0.0503	1.0000
Public administration	0.0282	0.0969	0.0086	0.0341	0.4168	0.3365	0.0000	0.0099	0.0343	0.0149	0.0199	1.0000
Other services	0.0000	0.0945	0.1763	0.0825	0.1339	0.3254	0.0005	0.0351	0.0307	0.0699	0.0512	1.0000

Source: NSD& UNFPA, 2012a ; Table 25: Employed Population Age 15-64 by occupation and Industry

Table 3.2.22: Occupational structure by industry (Indonesia 2010)

Occupation / Industry	Professional, Technical	Administrative and Managerial	Clerical	Sales	Services	Agriculture, Forestry, Others	Production	Others	Total
Agriculture Fisheries	0.0007	0.0002	0.0015	0.0014	0.0020	0.9875	0.0067	0.0000	1.0000
Mining and Quarring	0.0383	0.0070	0.0392	0.0045	0.0352	0.0000	0.8757	0.0000	1.0000
Manufacturing	0.0206	0.0155	0.0442	0.0194	0.0259	0.0000	0.8744	0.0000	1.0000
Electricity,gas and water	0.1500	0.0138	0.2581	0.0450	0.0890	0.0000	0.4443	0.0000	1.0000
Construction	0.0236	0.0188	0.0187	0.0045	0.0223	0.0000	0.9121	0.0000	1.0000
Wholesale,Retail,Trade, Restaurants and hotels	0.0083	0.0047	0.0364	0.8209	0.0508	0.0000	0.0788	0.0000	1.0000
Transport, storage and communication	0.0247	0.0113	0.0898	0.0292	0.0582	0.0000	0.7869	0.0000	1.0000
Finance, Insurance, Real estates	0.1162	0.0293	0.4502	0.0656	0.1945	0.0000	0.1441	0.0000	1.0000
Public administration, Other services	0.3578	0.0253	0.1515	0.0066	0.2118	0.0000	0.2070	0.0400	1.0000
Total	0.0625	0.0089	0.0500	0.1776	0.0538	0.3787	0.2626	0.0059	1.0000

Source: Indonesia BPS, 2011; Table 18.1

The next source of professional or technical workers is secondary education graduates. According to Table 3.2.3, 42.4% of professional or technical workers who graduated from secondary schools are vocational secondary education graduates in Indonesia. Even if all other jobs are included, 35.8% of secondary school graduates come from the vocational stream. The situation is quite different in Timor-Leste, where only 11.6% of secondary school students are on vocational courses. As the number of vocational secondary school graduates is calculated to be 23,842 – 26,768, the number of professional or technical workers who are secondary school graduates may be more than 42.4%. However, as vocational education graduates are expected to work also in other areas, it is necessary to increase the ratio to some extent. According to a policy paper of the Ministry of Education, the ratio of vocational school students is planned to be 60% in 2030 (Ministry of Education, 2011).

3.2.3.7 Policy implications

Based on the previous analysis, the following policy implications are derived.

It is necessary to expand the quantity and to improve the quality of education to meet the

demand for sufficient number of qualified labour force in the future.   The current trend may not be enough. Accordingly, it is necessary not only to pursue the EFA target, but also to expand secondary and tertiary education.

It is important not only to increase the promotion rate from lower to higher levels of education, but also to reduce the dropout rate at all stages.   Improving the quality of education will expand the next stage of education.

Of course, the specialty of education is important, and the distribution of specialty should match the jobs required by the forthcoming structure of industry.   As planned, vocational secondary education should be further enhanced.   In tertiary education, the structure of specialized departments seems to be balanced now, and should be continued.

3.3   Technical Vocational Education and Training (TVET) in Timor-Leste

3.3.1   Background

With newly introduced national qualification framework, the TVET system in Timor-Leste is in the transitional period to provide more standardized and formal vocational training. At present, however, around 70 % of the employed are estimated to have obtained skills and knowledge either by self-taught or informal training. The number of people that has completed vocational training as the highest education remains at 2,000 among the working-age population of 628,000, where the total of 500,000 is pre-secondary school leavers or below[2].

Against this backdrop, the GOTL has formulated two sets of key policy documents that delineate the national strategy for providing skilled labour in line with the SDP: that is, 1) Technical and Vocational Education Plan (TVET Plan 2011-2030); and 2) the National Employment Strategy (NES). The major strategies addressed in the policy documents in relation to vocational training can be summarized as 1) increase in the quality and quantity of vocational training, and 2) appropriate matching system of skills demand and supply in the labour market.

3.3.2   Current TVET system in Timor-Leste

(1) National Qualification Framework

TVET in Timor-Leste is designed in parallel with formal schooling system with new National Qualification Framework (NQF) established in 2011 and put into practice from 2012 for the TVET.

Under the NQF, an autonomous institution of INDMO (National Labour Force Development Institute) under the supervision of SEFOPE (Secretariat of State of Professional Training and Employment) is responsible for accreditation of qualified training providers as well as their courses whereas ANAAA (National Agency for Academic Assessment and Accreditation) is for Level 5-10.

The major purposes of introducing the NQF are to set a single framework of standards provided to all levels of qualifications and to provide uniform and standardized courses of good quality to the recipients. This standardization of training also provides official recognition for individuals' skills and knowledge so that the trainees can have access to

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[2] GoTL, "Timor Leste Labour Force Survey (2010)."

the labour market with officially-accredited credentials, promoting the employment of certificate holders. Together with such formal vocational training, there are other institutions/ NGOs that provide training outside of the formal system, mostly of foundation skills to the local people across the country[3].
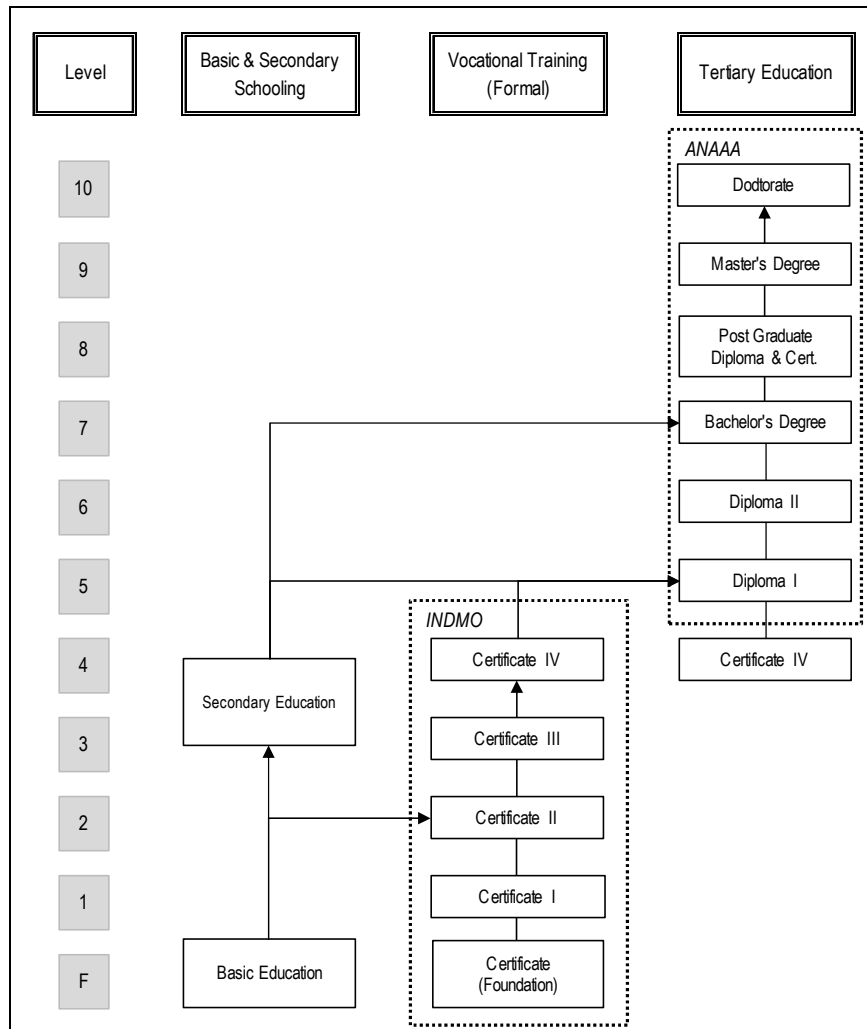
Source: INDMO "The First Five Years 2008-2013" (2013)

Figure 3.3.1: National Qualification Framework (NQF)

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[3] For example, Science of Life Studies (SOLS) 24/7, Malaysia-based International NGO, provides the foundation courses of English, computer skill, mathematics, etc. to the local youth and adults across the nation. (source: interview at SOLS community school in Suai).

(2) Registered certificates

As of August 2013, 32 vocational qualifications are registered in the NQF.

Table 3.3.1: Qualifications and national certificates by industrial sector

Industrial Sector	Founda-tion	Cert.. I	Cert. II	Cert. III	Cert. IV	Diploma *	Total
Administration, Finance and ICT	0	2	3	1	0	0	6
Agriculture	0	1	2	0	0	0	3
Automotive	0	1	2	0	0	0	2
Education, Training and Assessment	1	0	0	1	1	1	4
Construction	0	1	6	0	0	0	7
Public Safety	0	0	0	1	2	0	3
Public Sector	0	0	0	0	1	0	1
Health	0	0	0	1	1	0	2
Tourism and Hospitality	0	1	3	0	0	0	4
Total	1	5	16	4	5	1	32

* Jointly developed with ANAAA.

Source: INDMO "The First Five Years 2008-2013" (2013)

Each qualification or certificate consists of set of "competencies." Competency is a unit of specific skill, knowledge or ability to complete certain task in the workplace. INDMO has identified around 280 units of such competencies in eight industrial sectors, i.e. administration, finance and ICT; agriculture; automotive; education, training and assessment; construction; health; public security; and tourism and hospitality. As the table above shows, however, the courses for Certificate III and IV have not been developed well for key sectors such as agriculture, construction, tourism and hospitality.

To accommodate the training courses to the labour demands of the industries, Industry Sub-Commissions (ISCs) are set up in the INDMO[4]. The membership of each ISC consist of representatives from the sector, labour/ trade unions, training providers and relevant ministries. The major role of the ISC is to provide advice on the current needs of skills and knowledge required in the industry and examine and endorse the new courses applied by the training providers based on the industrial needs.

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[4] As of August 2013, there are 6 ISCs: 1) Tourism and Hospitality; 2) Administration, Finance and ICT; 3) Construction; 4) Education, Training and Assessment; 5) Agriculture; 6) Oil and Gas. Other 2 (Maritime and Community Services) are expected to be established in the near future.

(3) Accredited Training Providers (ATPs)

As of 2013, INDMO has accredited 21 training providers and 3 candidates for the provision of national qualifications and certificates. For some qualifications and national certificates, however, no training providers are so far accredited to undertake the courses. Notably, there is no accredited training provider in the sector of agriculture and ICT. In addition, more than half of the ATPs are placed in Dili (14 out of 24).

Table 3.3.2: Accredited Training Providers (ATPs)

Name	District	Type	No. of Cert. Provided
Centro Treinamentu Visaun Foin Sa'e, Baucau (CTVF)	Baucau	Independent	2
Centro Treino Integral e Desenvolvimento Canossa (CTID)	Baucau	Church	4
Dili Institute of Technology, Baucau (DIT)	Baucau	Independent	3
Centru Treinamentu Vokasional Canossa, Suai (CTVC)*	Cova Lima	Church	2
Centro de Formação Técnica em Comunicação (CEFTEC)	Dili	Government	1
Centro Treinamentu Visaun Foin Sa'e, Dili (CTVF)	Dili	Independent	3
Dili Institute of Technology, Dili (DIT)*	Dili	Independent	3
Don Bosco Training Centre, Comoro	Dili	Church	12
East Timor Development Agency (ETDA)	Dili	Independent	2
The Fred Hollows Foundation National Eye Centre	Dili	Independent	2
Industry Safety Assessment and Training (ISAT)	Dili	Independent	6
Instituto de Apoioao Desenvolvimento Emprezarial (IADE)	Dili	Government	2
Learning Resources Development Centre (SDRA)	Dili	Independent	2
Centro de Formação da Polícia	Dili	Government	3
Centro de Formação Profissional Brazil-Timor-Leste (SENAI, Becora)	Dili	Government	2
Sentru Treinametu Vokasional Juventude, Bairro Pite (STVJ)	Dili	Independent	5
Sentru Treinametu Vokasional Juventude, Camea (STVJ)	Dili	Independent	5
Sentru Treinametu Vokasional Juventude, Comoro (STVJ)	Dili	Independent	7
Sentru Treinametu Vokasional Juventude, Gleno (STVJ)	Ermera	Independent	5
Centro Formasaun Madre Madelena Morano, Fuiloro	Lautem	Church	2
Centro Nacional de Emprego e Formação Profissional	Liquica	Government	4
Centro da Paz Santa Isabel, Canossa, Manatuto	Manatuto	Church	2
Sentru Treinametu Vokasional Juventude, Manatuto	Manatuto	Independent	5
Sares Haburas Communidade, Same*	Manifahe	Independent	1

Note: The training providers with asterisk (*) are in process of accreditation.

Source: INDMO "The First Five Years 2008-2013" (2013)

Table 3.3.3: Number of Accredited Training Providers (ATPs)
for respective qualifications and national certificates

Sector	Qualification/ National Certificate	No. of ATP
Administration & Finance	Certificate I in Administration	12
	Certificate II in Administration	10
ICT	Certificate I in Basic Computer Operations	0
	Certificate II in Information Technology	0
Finance	Certificate II in Financial Services	1
	Certificate III in Financial Services	1
Agriculture	Certificate I in General Agriculture	0
	Certificate II in Horticulture	0
	Certificate II in Tree Crops	0
Automotive	Certificate II in Automotive Servicing – Light Vehicles	2
	Certificate II in Service and Repair of Small Engines	2
Education, Training & Assessment	Certificate III in Training and Assessment	5
	Certificate IV in Training and Assessment	3
	Diploma I in Training and Assessment	0
	Foundation Certificate	6
Construction	Certificate II in Electrical	1
	Certificate I in General Construction	4
	Certificate II in General Construction	4
	Certificate II in Carpentry	1

Sector	Qualification/ National Certificate	No. of ATP
	Certificate I in Plumbing	1
	Certificate II in Masonry	2
	Certificate II in Metal Fabrication and Welding	1
Health	Certificate III in Essential Eye Care	1
	Certificate IV in Refraction	1
Public Safety	Certificate III in Police Investigation	1
	Certificate IV in Police Investigation	1
	Certificate IV in Police Management	1
Public Sector	Certificate IV in Media and Communication	1
Tourism and Hospitality	Certificate II in Tour Guiding	0
	Certificate I in General Hospitality	9
	Certificate II in General Hospitality	1
	Certificate II in Food Production	9
National Certificates	National Certificate in Basic Computer Skills	0
	National Certificate in Improve Your Business Operation for Micro and Small Enterprises	1
	National Certificate in Managing Small Construction and Bids and Contracts	1
	National Certificate in Training	1
	National Certificate in Operation and Maintenance of Village Water Systems	1
	National Certificate in Labour Based Technology (LBT) for Rural Road Construction	1
	National Certificate in Preparing and Serving Espresso Coffee	0

Source: INDMO "The First Five Years 2008-2013" (2013)

(4) Enrolments to vocational training

The enrolment for the accredited vocational training courses started in 2012, and the annual average of 1,900 to 2,000 trainees is enrolled. The following table shows the enrolment of trainees by sector.

Table 3.3.4: Enrolments for accredited vocational training by sector

Sector	2012	2013 (as of July)
Administration and Finance	597	812
Agriculture	0	0
Automotive	0	34
Education, Training and Assessment	385	135
Construction (Electrical, carpentry, plumbing, masonry, and metal fabrication and welding)	637	289
Health	0	0
Public Security	47	204
Public Sector	29	18
Tourism and Hospitality	287	327
Total	1,982	1,819

Source: INDMO "The First Five Years 2008-2013" (2013)

3.3.3 Job matching system

(1) CEOP (Employment and Career Guidance Center)

As a formal system of job matching, i.e. matching of job offers and job seekers, the SEFOPE has established the Employment and Career Guidance Centers (CEOPs) in 5 districts[5]. The main functions of CEOPs are 1) career information provision and counselling, 2) career education and training, 3) employment counselling, and 4) job placement (job search service to connect jobseekers and employers). According to the SEFOPE five-year progress report[6], cumulative number of 40,359 people had registered for the services of CEOPs from 2007 to 2012, of which 15,051 utilized the service for employment placement. Among them, only 627 registered individuals have been employed through the service. The following table shows the number of employment by sector/service among the registered for 2011-12.
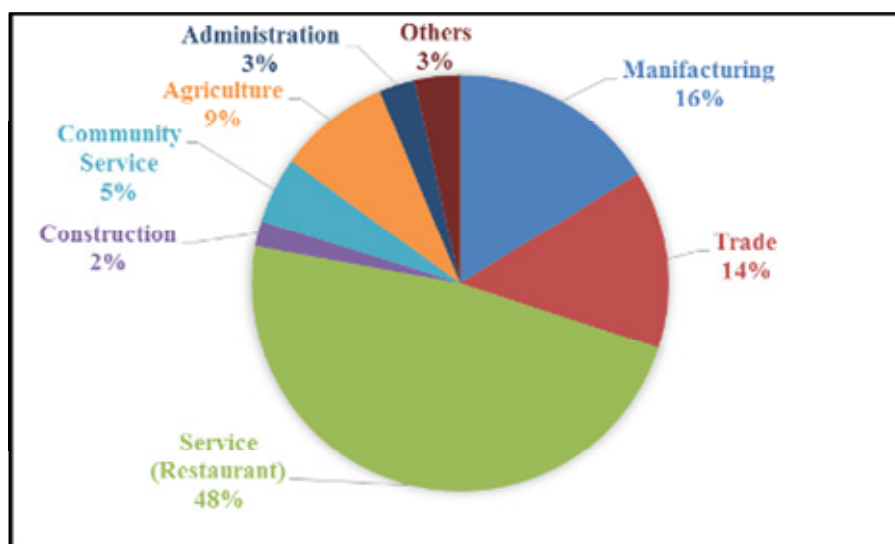
Figure 3.3.2: Employment by cector/ service (2011-12) (N=253)

Source: SEFOPE, "Cinco Anos na Marcha com o Povo, para o Desenvolvimento (2007-2012)" (2012).

(2) Support from individual training providers

As the performance of CEOPs is limited, each training provider/institute takes individual approach to the securement of employment for its graduates. No institute interviewed in the Study responded that the SEFOPE/CEOP service is widely used by their graduates and functional for job seeking. In the case of Don Bosco Training Centre (Comoro), its advantages in employment placement are said to be: 1) the connection with

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[5] Baucau, Oecusse, Manufahi, Ermera and Bobonaro Districts.
[6] SEFOPE, "Cinco Anos na Marcha com o Povo, para o Desenvolvimento (2007-2012)" (2012).

the alumni; 2) longstanding reputation of quality training the center provided; and 3) on-the-job training/ internship provided at the end of training. The above mentioned three points also apply for CNEFP (Centro Nacional de Emprego e Formação. Profissional) whereas the center also holds tailor-made courses for the youth to be employed for specific government-financed projects.

Table 3.3.5: Employments status: case of CNEFP (2001-2012)

Course	No. of Graduates	Self-Employment	Public Servant	Other Types of Employment	Tutor (CNEFP)	Unemployed	Continued to Hihger Education	Employed (Abroad)	Others (incl. no information)
Masonry	241	5	3	5	8	0	2	3	215
Carpentry	238	5	4	24	8	0	2	2	193
Electricity	232	9	21	39	5	3	19	9	127
Pluming	204	6	27	37	4	0	37	5	88
Solar power system	20	1	0	4	6	1	3	4	1
Rural water supply and sanitation	1,154	0	62	996	0	0	0	0	96
Solar power system (Rural)	136	0	0	0	0	0	0	0	136
Total	2,225	26	117	1,105	31	4	63	23	856

Note: 1) The data is based on the information obtained from the alumni, and there is no distinction between temporary and permanent employment in the data; 2) "Rural water supply and sanitation" and "Solar power system (rural)" include the tailor-made courses for community-level infrastructure project; 3) Major Private Employer (Number Employed): CBTibar (12); ENSUL (10); CHL (9); CVTL (7); EDS (4); IOM (3); RMS (2); ESSET (2). Major Public Employer (Number Employed): DNSAS (62); F-FDTL (3); EDTL (3); PNTL (3).

(3) SEFOPE's program for overseas working experience

As an attempt to promote the work experience abroad, the SEFOPE has concluded the MoU with the government of South Korea and Australia to dispatch Timorese youths to the respective countries to work on a temporary basis. While it cannot directly lead to permanent employment overseas, this arrangement will contribute to exposing the youth in Timor-Leste to find employment opportunities abroad if the program is to be expanded in number and country.

Table 3.3.6: Number of the Youth Dispatched for Working Abroad

Year	South Korea			Australia	
Area of Work	Fishery	Factory	Agriculture	Tourism and Hospitality	Agriculture
2009	64	30	0		
2010	185	83	72		
2011	62	107	16		
2012	280	172	34		
2013	177	58	2	19	24
Total	768	450	74	19	24

Note: For Australia, the program started in 2013.
Source: SEFOPE database

3.3.4 Issues to be addressed

The TVET system in Timor-Leste is still in its infancy with the NQF introduced and put into practice for the last couple of years. This effort should be highly evaluated from the viewpoint of introducing uniformity in vocational training courses and enabling recognition of one's skills and knowledge with a set of objective criteria. At present, however, it is fair to say that only the structure for vocational training has been placed for Certificate I to IV; the actual implementation of certified courses should be carefully observed and supported for quality assurance and credibility of the whole TVET system. In addition, there is a need to increase the number of certified courses as well as accredited training providers, especially for Certificate III and IV, with which one can be certified at least as semi-skilled worker. As 36 % of semi-skilled workers engaged in the Infrastructure Fund projects (2014-2018) are estimated to be expatriates in the Study, it is urgent to increase the Certificate IV holders through the improved access to those courses. As for the supply of skilled workers, managers or engineers, diploma or higher degrees are required as mentioned in Section 3.1, and the higher educational institutions, domestic or abroad, should take the responsibility of producing such human resources. The following describes the specific points to be considered for better provision of vocational training.

(1) Number and capacity of training providers

It is found that about 2,000 trainees/ year can be trained with the current capacity of accredited training providers. As the certified training courses are expected to increase, however, the number and capacity of training providers should also be increased. At the same time, decentralization of training providers should be enhanced in key strategic areas, i.e. agriculture, construction, tourism and oil and gas industries, considering the increase in local employment created by public investment projects. As the formal training system is set in place, coordination with existing local training providers should be enhanced, especially for foundation and lower-level training provision, to supplement the limited capacity of accredited training providers.

(2) Number of certified courses

Currently, the accredited training courses are formulated in much limited areas. This is partly due to the fact that the courses have been developed based on the capacity of existing training providers. To meet the labour demand in the mid to long term, however, number of certified courses should be increased to meet the demand of labour market for

semi-skilled workers in the strategic sectors. In addition to diversification of courses, provision of higher-level certificates, namely Certificate III and IV, should be promoted to meet the demands of semi-skilled labour.

(3) Functional employment placement system

It is found that the public service of employment placement service is not necessarily utilized and functional for the graduates of training in seeking job vacancies. While individual training provider takes respective approach to the support for job seeking, more functional service of employment placement should be in place. As a means for developing a connection with employers, on-the-job training and internships should be further promoted for the trainees with the government's funding.

(4) Strategy for labour supply by type of occupation

With the employment demand projection by classification of work in place, there is a need to further clarify what types of human resources respective educational and vocational training institutes are to provide. In this Study, the managers/engineers are supposed to be equipped with doctorate, master's, or bachelor's degree; skilled workers with diploma certificate; and semi-skilled workers with vocational certificates/ technical high school diploma. Since the administrative bodies for tertiary education and vocational training are different (i.e. the Ministry of Education for the former and the SEFOPE for the latter) the coordinated strategies for developing human resource by type of skill or occupation are required. In other words, the demarcation between the tertiary education and vocational training should be clarified in terms of categories of skill and occupational position with good understanding of the demands of labour market.

3.4 Construction of SAM for Timor-Leste 2010 and Multiplier Analysis

The purpose of this section is to construct SAM for Timor-Leste 2010 and conduct the multiplier analysis by using this SAM. The multiplier analysis is conducted to examine the validity of the estimation of jobs created by Infrastructure Fund budget (2014-2018) in Section 3.1 and to clarify the economic spillover effect on the overall economy of Timor-Leste and on urban and rural household income. Another purpose of the multiplier analysis is to find out how much government expenditure needs to be injected and into which industries in order to secure new employment corresponding to the increased number of workers with different educational backgrounds estimated in Section 3.2.

In this section, the 2010 Input-Output table for Timor-Leste (hereafter, the I/O table) will be made based on the 2010 System of National Accounts, 2005 Input-Output Table of Brunei Darussalam (hereafter, Brunei), and the trade-and-transportation margin tables attached to the 2000 Input-Output Table of Thailand. Then, the SAM will be constructed by using the I/O table, Household Survey (2010) and Labor force Survey (2010). Finally, the multiplier analysis will be conducted utilizing the constructed SAM.

3.4.1 Making method and future study for the Input-Output Table for domestic goods and imported goods

3.4.1.1 Making of the Input-Output Table for Timor-Leste

As the statistical data for the making of the I/O Table for Timor-Leste, those in the tables in the 2010 System of National Accounts (hereinafter referred to as the "SNA2010") will be used. Among them, the tables (Section III: Production Approach Table3.3 on TL's SNA 2000-2011) which contain output and intermediate consumption by industry, in other words, intermediate input, and value added are positioned as the basic data. With this set of data, we will make the I/O table with 22 industrial categories, as its industry categories –in addition to 16 categories shown in the table, Agriculture, forestry and fishery sector is broken down into 4 sectors, i.e. agriculture, coffee agriculture, forestry, and fishery, while manufacturing is into food processing, coffee processing, light industry and heavy industry.

The method for making the I/O Table is explained here. As the first step, we will calculate total consumption of domestic goods and services by industry for the sector of intermediate demand (the column vector of intermediate output in Table 3.4.1), which are not included in SNA2010. In order to do that, regarding each economic agent, we will estimate export by industry as well as consumption expenditure of domestic goods and

services by industry in the sector of final demand, based on the statistical data. Total consumption expenditure of domestic goods and services by industry in the intermediate demand sector will be calculated by subtracting two estimated domestic consumption and export from the above total output by industry. However, in this calculation process, some assumptions and accompanying adjustments to figures in the SNA2010 are necessary.

Table 3.4.1: Schematic Input-Output Table for Timor-Leste

	22 industries sector	Intermediate output	Final consumption	Gross capital formation	Exports	Total output
22 industries sector						
Domstic Intermediate input						
Use of imports						
Compensation of employees						
Operating surplus and capital consumption						
Domestic indirect tax less subsidies						
Import tax less subsidies						
Total input						

The first premise is that economic agents' final consumption expenditure of goods and services by industry, final consumption of imported goods, and the value of export are accurately estimated, based on the tables in SNA2010 including households final consumption expenditure: Section II: Expenditure Approach Table2.4 on TL's SNA 2000-2011 and Section II: Expenditure Approach Table2.1.5 on TL's SNA2004-2010 Volume I; Merchandise imports by Broad Economic Categories; Exports of goods and services: Section II :Expenditure Approach Table2.8.3 on TL's SNA2004-2010 Volume I; and Imports of goods and services: Section II: Expenditure Approach Table 2.8 and Table2.9 on TL's SNA2000-2011. With this premise, we can calculate each agent's final consumption expenditure of domestic goods and services by industry by subtracting final consumption of import from final consumption expenditure by industry; however, if we follow this rule, total domestic consumption of the intermediate demand section will become negative for Electricity-gas-and-water supply, Education-human health-and-social works, and Other services. Accordingly, for the industries of Electricity-gas-and-water supply, Education-human health-and-social works, and Other services, total consumption of domestic goods in the intermediate demand section is calculated using the ratio of Brunei's total consumption of domestic goods for the sector

of intermediate demand to total consumption of domestic goods for the sector of final demand. Moreover, for each industry, which is a subdivision of the manufacturing sector, total consumption of domestic goods for the sector of intermediate demand is calculated by multiplying total consumption of imported goods for the sector of intermediate demand with the ratio of Brunei's total consumption of imported goods to total consumption of domestic goods[7]. And then, Output will be calculated by adding total consumption of domestic goods and exports for the sector of final demand to these acquired above total consumption of domestic goods for the sector of intermediate demand. As a result, Output for these industries will be larger than under SNA2010, making total output of industries not USD 6,061.6 million in SNA2010 but USD 6,213.3 million. It ensures the consistency in the I/O Table.

The second premise is that output and value-added for each industry, which is a subdivision of the manufacturing sector, use the value-added ratio from Brunei's I/O table. Nevertheless, in accordance with the first premise, the increased value-added (USD 70 million) for the heavy industry will be adjusted with those for Public administration-defense-and-social security industry.

The third premise is that SNA's consumption approach data are shown by purchaser's price, and therefore, need to be converted to be shown in producer's price. For that purpose, trade margin table and transportation margin table, attached tables to Thailand's 2000 I/O table, are used[8]. It should be noted, however, as Thailand's data are used, adjustment parameters will be provided in order to ensure the consistency in Wholesale-and-retail trade and Transportation-and-storage industries between total consumption of domestic goods for the sector of intermediate demand and that for the sector of final demand. As a result, adjustments will be made by multiplying the coefficient of 0.6 to the trade margin for the sector of household consumption, and 0.5 to the transportation margin for total of the sector of intermediate demand, domestic goods and imported goods of the sector of investment, and the export sector. Note that as for products from Agriculture-forestry-and-fishery, the trade margins can be calculated from the table in 3.6 of SNA2004-2010 Volume II. Moreover, these figures will be taken into consideration when implementing the RAS method, as transportation margins can be estimated based on them.

The fourth premise is that there is basically no import of goods and services by industry of Electricity-gas-and-water supply, Whole sale-and-retail trade,

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[7]As a base rule, we will make the I/O table by using SNA for Timor-Leste, but if SNA is not consistent to statistical data, we must use the Brunei's I/O table that is balanced overall.

[8] As the Brunei's I/O table that we have obtained in this study is only shown by purchaser's price, we cannot calculate trade margin and transportation margin by this table. And we will use the trade-and- transportation margin tables attached to Thailand's I/O table as the second best.

Accommodation-and-food services, Real estate services, Education-human health-and-social works, etc. Moreover, since Coffee processing is also presumed to have no import, we will not get a converging solution if it is zero when conducting the RAS method. For that purpose, total import of goods and services by the sector of intermediate demand in each industry is presumed to be USD 0.1 million or USD 0.01 million. It should be noted that total import by the sector of intermediate demand of the whole industries will remain the same as said amount will be deducted collectively by Coffee processing from Other food processing, by Electricity-gas-and-water supply from Construction, by Wholesale-and-retail trade from Transportation-and-storage, Accommodation-and-food services from Other services, Real estate services from Financial-and-insurance services, and by Education-human health-and-social works from Public administration-defense-and-social security.

Next, as a second step, methods for decomposing the value added by industry will be explained. As the table of Section Ⅳ: Income Approach Table4.1 on TL's SNA 2000-2011 included in SNA2010 shows the details of Value added in two sectors, the oil and non-oil sectors, we can decompose Value added into four items i.e. Compensation of employees, Operating surplus -and-Capital consumption, Domestic indirect taxes less subsidies on production, and Import duties and tax less import subsidies. However, for the non-oil sector, there are no details for Value added by industry, and therefore, we will break it up based on the following thinking. It treats Operating surplus-and-Capital consumption as residuals, and estimates the remaining three items from some of the following premises.

The first premise is that total domestic indirect taxes included in SNA2010 are regarded as the initial value to be allocated to individual industries, which will be calculated by the component ratio of total consumption of domestic goods by industry for the sector of intermediate demand calculated in the first step. The reasoning is that the tax rates for products are not known, and Intermediate inputs by industry using of domestic goods and services are obtained ex-post for each industry as a result of subtracting value added and intermediate input for imported goods, etc. from Output. On the other hand, for imported goods, since import duties are not known for individual goods, distribution is made according to the composition ratio of input of imported goods by industry. Moreover, Import subsidies are given as negative figures from the table in 3.9 of Section VI: Primary Current accounts Table5.2 on TL's SNA2000-2011, Agriculture and Electricity-gas-and-water supply.

The second premise is that, based on the Value added, Compensation of employees by industry is obtained from the ratio of the labour cost calculated from the survey result as

Table 1.2 and Compensation of employees of Table 2.2 in Business Activity Survey of Timor-Leste 2011. Since the Survey has the categories for Construction, Wholesale-and-retail trade, and Accommodation-and-food services, these industries are applied to the value of the results of the Survey, but in other industries, the ratios of Manufacturing in the Survey are applied to four industries in the manufacturing sector and the ratio of Other industries in the Survey is applied to Transportation-and-storage, Information-and-communication, Financial-and-insurance services, Real estate services, and Other services. On the other hand, the ratios of industries including Agriculture-forestry-and-fishery, Public administration-defense-and-social security, Education-human health-and-social works are calculated based on those of Brunei with adjustments to take into consideration the difference in the ratios of Compensation of employees to the total value added in Brunei and Timor-Leste.

Lastly, as the third step, the matrix of intermediate input and output by industry is calculated in Table 3.4.1. As total consumption by industry and total intermediate input by industry for the sector of intermediate demand are estimated for both domestic and imported good from the above steps, the intermediate input/output matrix should be constructed in a way each industry has the same amount to both. Accordingly, we will proceed under the following premise.

The premise is that the matrix in Table 3.4.1 of initial values will be filled in by utilizing Brunei's output ratios by industry and multiplying the ratios with total consumption for the sector of intermediate demand. Intermediate input and output by industry will be obtained by using the RAS method to reconcile the total of rows and that of columns. However, since there is no industrial distinction between Coffee product and Coffee processing in Brunei's I/O table, the coefficients from the industrial distinction for "Coffee, Tea, and Cocoa" in Thailand's 2005 I/O table will be used. Note that the amount of import of services for Construction is the input for Construction only. Moreover, as stated above, the estimated amounts from Timor-Leste's data are used for input from Wholesale-and-retail trade and Transportation-and-storage for Agriculture-forestry-and-fishery.

Table 3.4.2: Non –competitive type's input-output table for Timor-Leste 2010 (Unit: millions of USD)

	Products of agriculture exluding coffee product	coffee product	Products of forestry	Fish and other fishing products	Crude petroleum and natural gas	Other minig and quarrying	Coffee processing	Other food processing	Products of light industries	Products of heavy industries	Electricity, gas, and water supply	Construction	Wholesale and retail trade	Transportatio n and storage	Accommodati on and food services	Information and communicati on	Financial and insurance services	Real estate services	Professional ,administration and support serives	Public adminstration , defense and social security	Education, human health and social works	Other services	Intermediate output	Final consumption expenditure by household	Final consumption expenditure by company	Final consumption expenditure by government	Gross capital formation including changes in inventory	Final demand	Export	Total
Products of agriculture exluding coffee product	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	186.8	0.0	0.0	0.0	186.8	0.0	187.3
coffee product	0.0	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	1.4	0.0	0.0	0.0	1.4	24.6	32.9
Products of forestry	0.0	0.1	0.3	0.0	0.0	0.1	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Fish and other fishing products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.0	2.4	0.0	0.0	0.0	0.6	0.0	0.0	0.0	4.0	9.1	0.0	0.0	0.0	9.1	0.0	13.1
Crude petroleum and natural gas	0.0	0.0	0.0	0.0	4.2	1.3	0.0	0.0	0.0	0.7	1.5	0.0	0.3	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	0.0	0.0	0.0	0.0	0.0	3,824.3	3,833.5
Other minig and quarrying	0.0	0.0	0.0	0.0	0.2	1.7	0.0	0.0	0.1	3.7	2.7	0.0	0.2	8.6	1.1	18.5	4.7	0.1	0.2	0.0	0.4	0.1	42.3	0.0	0.0	0.0	0.0	0.0	0.0	42.3
Coffee processing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Other food processing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.6	0.0	0.1	0.3	0.0	1.7	2.5	0.0	0.0	0.0	2.5	0.1	4.3
Products of light industries	0.0	0.0	0.0	0.0	0.8	0.4	0.0	0.0	2.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.6	0.0	0.1	4.7	16.6	0.0	0.0	4.2	20.9	0.3	25.8
Products of heavy industries	0.0	0.5	0.0	0.0	3.4	0.7	0.0	0.0	0.0	1.2	2.5	0.1	0.7	18.5	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	28.1	14.0	10.8	36.6	53.2	114.6	0.3	143.0
Electricity, gas, and water supply	0.0	0.0	0.0	0.0	1.1	0.1	0.0	0.0	0.0	0.1	5.3	0.0	0.1	0.3	0.0	0.2	0.0	0.2	0.0	14.1	0.1	0.2	21.8	22.5	0.0	0.0	0.0	22.5	0.0	44.3
Construction	0.0	0.0	0.0	0.1	1.7	9.0	0.0	0.0	0.1	22.4	1.5	13.2	3.4	0.5	0.9	0.0	0.8	3.7	0.1	0.0	5.2	1.0	63.5	0.0	0.0	0.0	267.8	267.8	0.0	331.3
Wholesale and retail trade	6.1	3.1	0.5	0.4	3.5	1.3	0.0	0.1	1.7	2.4	0.7	0.3	1.6	4.1	0.4	0.9	0.3	1.0	0.2	0.9	0.8	0.5	30.8	82.2	2.3	7.9	14.7	107.1	23.9	161.8
Transportation and storage	5.8	3.0	0.5	0.4	6.9	2.8	0.0	0.3	3.5	4.9	1.5	0.5	3.2	8.4	0.9	1.2	0.3	2.1	0.4	2.5	1.6	0.8	51.4	19.2	0.2	0.6	1.2	21.3	23.9	96.6
Accommodation and food services	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.5	1.2	0.8	0.6	0.2	1.0	0.1	0.2	0.2	0.0	0.2	0.0	0.0	16.9	26.3	32.7	0.0	0.0	0.0	32.7	0.0	59.0
Information and communication	0.0	0.0	0.0	0.0	2.0	0.6	0.0	0.0	0.1	0.6	1.6	0.2	1.0	2.5	0.1	6.2	1.1	1.1	0.2	49.1	0.7	3.2	70.3	10.2	0.0	0.0	0.0	10.2	5.9	86.4
Financial and insurance services	0.0	0.3	0.0	0.0	4.5	0.8	0.0	0.0	0.2	1.1	0.3	0.5	0.5	1.0	0.1	0.3	2.1	1.9	0.1	17.6	0.2	0.9	32.5	0.0	0.0	0.0	0.0	0.0	0.0	32.5
Real estate services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4	0.0	0.0	13.6	85.2	0.0	0.0	0.0	85.2	0.0	98.8
Professional ,administration and support serives	0.0	0.0	0.0	0.0	2.3	0.2	0.0	0.0	0.1	0.4	0.3	0.1	0.1	0.4	0.0	0.2	0.1	0.0	0.1	5.7	0.0	1.2	11.2	0.0	0.0	0.0	0.0	0.0	0.0	11.2
Public adminstration, defense and social security	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.7	0.0	0.4	0.1	0.2	0.0	91.3	0.1	0.0	94.0	0.0	0.0	748.1	0.0	748.1	26.7	868.8
Education, human health and social works	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	1.3	14.5	0.0	18.5	0.0	33.0	0.0	34.3
Other services	0.0	0.0	0.0	0.0	0.5	0.3	0.0	0.0	0.2	1.2	1.2	0.5	0.2	0.5	0.0	0.1	1.6	1.7	0.0	10.9	0.1	6.2	25.1	34.2	12.4	0.0	0.0	46.6	29.9	101.6
Domestic Intermediate input	12.3	7.6	1.4	0.8	35.6	19.3	0.1	1.2	12.4	40.0	21.8	16.2	12.4	47.7	12.6	28.3	11.3	12.7	2.4	206.7	9.7	31.4	543.7	531.2	25.7	811.7	341.2	1,709.8	3,959.8	6,213.3
Use of imported goods and services	29.3	5.0	0.1	3.4	506.6	12.2	0.0	2.6	9.5	27.3	11.6	164.6	26.0	20.7	14.2	24.7	7.0	23.7	2.9	586.8	22.8	21.9	1,523.2							
Import tax less subsidies	-20.9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4	-17.0	5.2	0.4	0.2	0.3	0.6	0.2	0.2	0.6	18.6	0.7	0.4	-9.7							
Compensation of employee	7.7	0.5	0.4	0.8	41.1	0.1	0.0	0.0	0.3	5.7	4.2	76.3	24.3	4.2	7.9	4.9	2.1	9.4	0.8	8.3	0.3	7.2	206.6							
Operating surplus and consumption of fixed capital	158.9	19.7	2.5	8.1	3,215.2	10.7	0.1	0.3	3.2	69.5	23.6	68.4	98.7	23.7	23.9	27.7	11.8	52.8	4.3	46.8	0.7	40.6	3,911.0							
Indirect domestic tax less subsidies	0.0	0.0	0.0	0.0	35.0	0.0	0.0	0.0	0.1	0.2	0.0	0.6	0.0	0.1	0.1	0.2	0.1	0.0	0.1	1.6	0.1	0.2	38.5							
Value Added	166.6	20.3	2.9	8.8	3,291.3	10.8	0.1	0.3	3.6	75.4	27.9	145.3	123.0	28.0	31.9	32.8	14.0	62.2	5.2	56.8	1.1	47.9	4,156.1							
Total	187.3	32.9	4.3	13.1	3,833.5	42.3	0.2	4.3	25.8	143.0	44.3	331.3	161.8	96.6	59.0	86.4	32.5	98.8	11.2	868.8	34.3	101.6	6,213.3							

Table 3.4.3: Input-output table for imports ,Timor-Leste 2010 (CIF prices, Unit: millions of USD)

	Products of agriculture exluding coffee product	coffee product	Products of forestry	Fish and other fishing products	Crude petroleum and natural gas	Other minig and quarrying	Coffee processing	Other food processing	Products of light industries	Products of heavy industries	Electricity, gas, and water supply	Construction	Wholesale and retail trade	Transportation and storage	Accommodation and food services	Information and communication	Financial and insurance services	Real estate services	Professional ,administration and support serives	Public adminstration, defense and social security	Education, human health and social works	Other services	Intermediate output	Final consumption expenditure by household	Final consumption expenditure by petroleum company	Final consumption expenditure by government	Gross capital formation including changes in inventory	Final demand	Total
Products of agriculture exluding coffee product	7.7	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	1.2	0.0	0.0	0.0	0.6	0.0	0.0	0.0	12.4	12.7	0.0	0.0	0.0	12.7	25.1
coffee product	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.4	0.8
Products of forestry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fish and other fishing products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.3	0.6
Crude petroleum and natural gas	0.1	0.0	0.0	0.0	473.8	0.0	0.0	1.7	1.1	0.0	0.0	0.3	14.5	0.3	3.1	0.0	0.1	4.5	0.2	50.9	0.2	3.1	553.8	0.0	0.0	0.0	203.9	203.9	757.8
Other minig and quarrying	0.1	0.0	0.0	0.0	0.2	1.9	0.0	0.0	0.1	7.1	1.4	0.0	0.2	4.7	2.5	13.1	4.2	0.0	0.2	0.0	0.4	0.1	36.2	0.0	0.0	0.0	0.0	0.0	36.2
Coffee processing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Other food processing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.1	0.0	1.7	0.0	2.8	0.0	0.0	3.2	0.1	0.3	2.3	0.0	10.9	37.4	0.0	0.0	0.0	37.4	48.3
Products of light industries	0.0	0.0	0.0	0.0	1.2	0.6	0.0	0.1	4.2	0.1	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.2	0.1	2.0	0.1	0.1	9.3	10.3	0.0	0.0	1.0	11.3	20.6
Products of heavy industries	0.3	1.0	0.0	0.2	16.9	4.3	0.0	0.2	0.2	9.7	1.6	0.8	3.4	3.2	0.5	0.0	0.0	2.1	0.2	2.6	10.4	1.3	58.9	18.3	12.8	11.8	28.3	71.3	130.1
Electricity, gas, and water supply	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	162.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	162.5	0.0	0.0	0.0	0.0	0.0	162.5
Wholesale and retail trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transportation and storage	21.1	2.7	0.1	2.8	4.2	2.9	0.0	0.3	2.7	6.3	0.8	0.4	2.2	4.3	2.0	0.8	0.3	1.6	0.3	1.3	1.6	0.4	59.1	2.1	0.2	0.2	1.7	4.1	63.3
Accommodation and food services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Information and communication	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.0	0.9	0.1	0.0	0.0	3.8	0.0	0.1	5.5	0.0	0.0	0.0	0.0	0.0	5.5
Financial and insurance services	0.0	1.2	0.0	0.0	1.2	0.3	0.0	0.0	0.1	0.6	0.1	0.1	0.1	0.2	0.1	0.1	0.6	0.7	0.0	2.9	0.1	0.2	8.7	0.0	0.0	0.0	0.0	0.0	8.7
Real estate services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Professional ,administration and support serives	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3
Public adminstration, defense and social security	0.0	0.0	0.0	0.0	1.1	0.1	0.0	0.0	0.1	1.9	6.4	0.2	0.4	5.4	0.3	4.2	0.8	2.4	0.3	480.2	0.8	0.4	504.9	0.0	0.0	0.0	0.0	0.0	504.9
Education, human health and social works	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Other services	0.0	0.0	0.0	0.4	5.7	2.1	0.0	0.0	1.0	1.6	1.1	0.2	2.4	2.3	0.9	5.5	0.9	8.9	0.9	42.6	6.8	16.0	99.5	0.0	0.0	0.0	0.0	0.0	99.5
Total	29.3	5.0	0.1	3.4	506.6	12.2	0.0	2.6	9.5	27.3	11.6	164.6	26.0	20.7	14.2	24.7	7.0	23.7	2.9	586.8	22.8	21.9	1,523.2	81.5	13.0	12.0	234.9	341.4	1,864.6

3.4.1.2 Findings from the Input Output Table for Timor-Leste 2010

We will look at the meaningful relationship between Table 3.4.2 and Table 3.4.3 before studying the input structure of Timor-Leste industries by Table 3.4.4. In Table 3.4.3, the column of aggregated intermediate imports in Table 3.4.2 is expanded by the intermediate imports of each industry. The reason for dividing domestic goods and imports into intermediate goods is that we want to consider the impact of domestic goods (domestic industry) on the exogenous changes such as the increase of government expenditure in order to perform the multiplier analysis. If the intermediate goods are the Armington composite goods that combined domestic goods with imports, we cannot see the spillover effect on domestic goods that causes an exogenous increase in government expenditure.

Table 3.4.4: Input structure of Timor-Leste industries

Unit: Millions US Dollars,%	Oil sector	Non-oil sector	Agriculture, forestry and fishing	Manufacture and other mining	Electricity, gas, and water supply	Construction	Wholesale and retail trade	Transportation and storage	Accommodation and food services	Public administration and social services	Other tertiary industry
Oil sector	4.2	5.0	0.0	2.1	1.5	0.0	0.3	1.1	0.0	0.0	0.0
Non-oil sector	31.4	503.1	22.0	70.9	20.3	16.1	12.1	46.6	12.6	216.4	86.0
Agriculture, forestry and fishing	0.2	15.5	1.2	4.6	0.0	0.0	0.3	0.0	8.6	0.0	0.7
Manufacture and other mining	4.4	72.6	0.6	10.0	5.2	0.3	1.5	27.2	1.5	1.7	24.7
Electricity, gas, and water supply	1.1	20.7	0.0	0.2	5.3	0.0	0.1	0.3	0.0	14.2	0.6
Construction	1.7	61.8	0.1	31.5	1.5	13.2	3.4	0.5	0.9	5.2	5.6
Wholesale and retail trade	3.5	27.3	10.1	5.5	0.7	0.3	1.6	4.1	0.4	1.7	2.9
Transportation and storage	6.9	44.5	9.7	11.5	1.5	0.5	3.2	8.4	0.9	4.1	4.7
Accommodation and food services	4.2	22.1	0.0	1.8	0.8	0.6	0.2	1.0	0.1	0.0	17.6
Public administration and social services	0.1	95.3	0.0	0.1	0.9	0.0	0.0	0.7	0.0	92.6	0.8
Other tertiary industry	9.3	143.3	0.4	5.6	4.4	1.2	1.9	4.4	0.2	96.8	28.5
Domestic intermediate input	35.6	508.1	22.0	73.0	21.8	16.2	12.4	47.7	12.6	216.4	86.1
Oil sector	473.8	80.0	0.1	2.7	0.0	0.3	14.5	0.3	3.1	51.1	8.0
Non-oil sector	32.8	936.6	37.7	48.9	11.6	164.4	11.6	20.4	11.1	558.5	72.3
Agriculture, forestry and fishing	2.0	11.2	7.7	0.1	0.0	0.0	0.9	0.0	1.9	0.0	0.6
Manufacture and other mining	18.3	97.1	1.6	28.9	3.1	0.9	5.5	7.9	5.9	18.1	25.1
Electricity, gas, and water supply	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0.0	162.5	0.0	0.0	0.0	162.5	0.0	0.0	0.0	0.0	0.0
Wholesale and retail trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transportation and storage	4.2	54.9	26.7	12.2	0.8	0.4	2.2	4.3	2.0	2.9	3.4
Accommodation and food services	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Public administration and social services	1.1	503.9	0.0	2.0	6.4	0.2	0.4	5.4	0.3	481.1	8.0
Other tertiary industry	7.1	106.9	1.7	5.8	1.3	0.4	2.6	2.7	1.0	56.4	35.1
Use of imports on intermediate input	506.6	1,016.6	37.8	51.7	11.6	164.6	26.0	20.7	14.2	609.6	80.3
Labor	41.1	165.5	9.4	6.1	4.2	76.3	24.3	4.2	7.9	8.7	24.4
Capital	3,215.2	695.9	189.1	83.8	23.6	68.4	98.7	23.7	23.9	47.6	137.1
Indirect domestic and import tax less subsidies	35.0	-6.2	-20.8	1.1	-17.0	5.8	0.4	0.3	0.4	21.0	2.6
Total	3,833.5	2,379.8	237.6	215.6	44.3	331.3	161.8	96.6	59.0	903.2	330.5
Ratio of deomstic intermediate input	0.93	21.35	9.28	33.84	49.20	4.88	7.66	49.33	21.35	23.96	26.05
Ratio of used of imports on intermediate input	13.22	42.72	15.90	23.98	26.27	49.69	16.10	21.44	24.09	67.49	24.29
Ratio of Labor input	1.07	6.95	3.97	2.82	9.50	23.03	15.02	4.37	13.39	0.96	7.38
Ratio of capital input	83.87	29.24	79.61	38.86	53.39	20.63	60.98	24.53	40.54	5.27	41.49

The first feature of industry in Timor-Leste can be seen from the first column of Table 3.4.4. Comparing intermediate inputs for the oil sector between domestic ones and imported, the ratio of the domestic to the imported is 1/14 (USD 35.6 million to USD 506.6 million). Thus, the oil sector shows high dependency on the imported intermediate inputs. Of the total inputs value (total cost) for the oil sector, the domestic inputs account for only 0.93% of the total, and the share of labour inputs also is very small at 1.07% of the total inputs, while capital inputs account for 83.87% of the total inputs. We may characterize the oil sector as a "landlord" industry[9], depending on inputs from outside, not utilizing own intermediate inputs and labour.

Second, we note the same tendency of imported goods dependency for the non-oil sector (the second column of Table 3.4.4). The value of domestic intermediate inputs for the non-oil sector is USD 508.1 million while that of imported inputs is USD 1,016.6 million, and so domestic inputs account for only half. Of the non-oil sector, Construction and Public administration-defense-and-social security are relatively dependent on imported intermediate inputs due to larger imported service inputs than imported goods inputs. Moreover, the input structure for Agriculture-forestry-and-fishery is dependent on imported inputs although its value in monetary terms is less. On the other hand, there exist industries where domestic inputs dominate imported ones such as manufacturing, mining excluded oil-and-natural gas sector, Electricity-gas-and-water supply and other tertiary industry. Especially, in Electricity-gas-and-water supply, domestic inputs are double imported inputs by value. Note that domestic goods tend to produce where an industry is dependent on domestic intermediate goods, so an increase in final demand results in larger domestic production, and vice versa.

Third, the feature can be found with comparing ratios of domestic intermediate, imported intermediate, labour input and capital input costs respectively to the total cost. Agriculture-forestry-and-fishery sector and Wholesale-and-retail sector show as high capital input costs as the oil sector. This is because their capital costs include mixed income of independent farmers and self-operated businesses on the one hand and their intermediate inputs ratio is less than that of other sectors on the other. On the contrary, intermediate inputs costs account for 60-70% of the total in Electricity-gas-and-water supply and Public administration-defense-and-social security. Although an increase in the final demand induces intermediate inputs for these sectors, it would not contribute to raising labour income or capital return. In this regard, Construction industry leads to an increase of labour income, of which labour inputs cost lie at around 20% of the total cost.

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[9] "Landlord" industry means that the industry receives the return as the sale's part of commodities that are produced by the land and the right that landowner lends to other persons.

Next, Table 3.4.5 shows the output/supply and demand structure of Timor-Leste by industry. The upper half indicates domestic goods and services and the lower indicates imported goods and services. Reading a row to the right, we can observe the corresponding sector's products supplied to and demanded for the column sectors, and reading a column to the bottom, column sector/product demanded for or consumed as the corresponding row sector/product can be found. From the table we can observe inter-industrial linkage by sector/product.

First, the oil sector supplies domestic goods worth USD 3,833.5 million in total, and almost all the products are exported. As for the imported goods in the oil sector, USD 757.8 million are used, of which 73.09% are used as intermediate consumption and the rest for investment (gross capital formation) as the final demand. In this connection, the linkage between oil sector and non-oil sector is almost nil.

Second, 22.46 % of the domestic product in the non-oil sector is consumed as intermediate consumption and the rest for the final demand. For the non-oil sector, it is noted that even in Electricity-gas-and-water supply, Accommodation-and-food services and the other tertiary industry, intermediate consumption shows a nearly even ratio to the final demand. Furthermore, while the manufacturing-and-other mining products consume 35.72% (USD 77 million) of total domestic output as an intermediate consumption, imported products valued at USD 115.4 million are used for the intermediate consumption. In this regard, the manufacturing industry is revealed to be in the early development stage.

Table 3.4.5: Output/supply structure of Timor-Leste industries

Unit: Millions US Dollars,%	Total	Intermediate output	Final demand	Household	Company	Government	Gross capital formation	Exports	Ratio of intermediate output	Ratio of final demand	Ratio of exports
Oil sector	3,833.5	9.2	0.0	0.0	0.0	0.0	0.0	3,824.3	0.24	0.00	99.76
Non-oil sector	2,379.8	534.5	1,709.8	531.2	25.7	811.7	341.2	135.5	22.46	71.85	5.70
Agriculture,forestry and fishing	237.6	15.7	197.3	197.3	0.0	0.0	0.0	24.6	6.60	83.04	10.36
Manufacture and other mining	215.6	77.0	138.0	33.1	10.8	36.6	57.5	0.6	35.72	64.00	0.28
Electricity, gas, and water supply	44.3	21.8	22.5	22.5	0.0	0.0	0.0	0.0	49.22	50.78	0.00
Construction	331.3	63.5	267.8	0.0	0.0	0.0	267.8	0.0	19.17	80.83	0.00
Wholesale and retail trade	161.8	30.8	107.1	82.2	2.3	7.9	14.7	23.9	19.03	66.21	14.76
Transportation and storage	96.6	51.4	21.3	19.2	0.2	0.6	1.2	23.9	53.23	22.00	24.77
Accommodation and food services	59.0	26.3	32.7	32.7	0.0	0.0	0.0	0.0	44.56	55.44	0.00
Public adminstration and social services	903.2	95.4	781.1	14.5	0.0	766.6	0.0	26.7	10.56	86.48	2.96
Other tertiary industry	330.5	152.7	142.1	129.7	12.4	0.0	0.0	35.8	46.19	42.98	10.83
Domestic goods and services	6,213.3	543.7	1,709.8	531.2	25.7	811.7	341.2	3,959.8	8.75	27.52	63.73
Oil sector	757.8	553.8	203.9	0.0	0.0	0.0	203.9	—	73.09	26.91	—
Non-oil sector	1,106.8	969.3	137.5	81.5	13.0	12.0	31.0	—	87.58	12.42	—
Agriculture,forestry and fishing	26.6	13.2	13.4	13.4	0.0	0.0	0.0	—	49.52	50.48	—
Manufacture and other mining	235.3	115.4	119.9	66.0	12.8	11.8	29.3	—	49.04	50.96	—
Electricity, gas, and water supply	0.0	0.0	0.0	0.0	0.0	0.0	0.0	—	100.00	0.00	—
Construction	162.5	162.5	0.0	0.0	0.0	0.0	0.0	—	100.00	0.00	—
Wholesale and retail trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	—	100.00	0.00	—
Transportation and storage	63.3	59.1	4.1	2.1	0.2	0.2	1.7	—	93.47	6.53	—
Accommodation and food services	0.1	0.1	0.0	0.0	0.0	0.0	0.0	—	100.00	0.00	—
Public adminstration and social services	505.0	505.0	0.0	0.0	0.0	0.0	0.0	—	100.00	0.00	—
Other tertiary industry	114.0	114.0	0.0	0.0	0.0	0.0	0.0	—	100.00	0.00	—
Import of goods and services	1,864.6	1,523.2	341.4	81.5	13.0	12.0	234.9	—	81.69	18.31	—

Third, let us look into the use of domestic product and the imported products in Agriculture-forestry-and-fishery. The sector produces USD 237.6 million of domestic goods and supplies, of which only USD 15.7 million is for the intermediate use, equivalent to 6.60% of the total domestic production. USD 24.6 million in the coffee sector is exported, and the amount accounts for only 10% shown as the ratio of exports (the last column). Most of agricultural products are destined for the final consumption by the household. On the other hand, USD 13.2 million of imported agricultural products are used for intermediate consumption, and almost the same amount is destined for final household consumption. Beyond this supply structure, there would be much space to increase intermediate consumption of domestic agricultural products by substituting imported product into domestic production.

From the development point of view, it would be recommended to promote the food processing industry in collaboration with the accommodation and food service industry to boost value added industries and inter-industrial linkage in the Timor-Leste economy.

3.4.1.3 Future study for Making of the Input Output Table for Timor-Leste

As stated in the previous section, this I/O table can be made by using certain premises, but it is not possible to verify whether such premises are correct. Accordingly, we present the issues for verification.

The first issue is to understand trade and transportation margins for major products from the survey. While adjustment items are provided due to the use of Thailand's data, we have used it, aware of the possibility that it may be considered too aggressive. On the other hand, in order to conduct multiplier analysis using the I/O table and SAM, stability of input coefficients needs to be secured, which in turn requires showing producer's prices; therefore, it is essential to make these two margin tables.

The second issue is the necessity of information for calculating input coefficients in major industries. For example, the Business Activity Survey should be utilized. Specifically, it should be possible to acquire data for calculating input coefficients by studying in more detail the purchasing costs of raw materials, etc. in expenditure items of the questionnaire.

3.4.2 Construction of Prototype Macro SAM (Social Accounting Matrix) for Timor-Leste 2010

In this section, we will make macro SAM in preparation for constructing micro SAM which is necessary for multiplier analysis. The reason that we will construct macro SAM is that we can make the outline of SAM by using SNA without the I/O table. In such countries as Timor-Leste where I/O table does not exist, macro SAM ensures the conditions where the column sum and row sum of each account is equal on SAM in order to make use of I/O table of other countries.

3.4.2.1 Macro Social Accounting matrix of Timor-Leste

A social accounting matrix (SAM) is a comprehensive description of transactions between economic agents, production units and functional entities in terms of monetary receipts and payments. Where the I/O table of the last section captures inter-industry transactions in the economy, SAM captures transactions among institutions such as government, companies and households, between production sectors and these institutions, and between factors of production, production sectors and foreign trade and transfer.

A schematic macro SAM for Timor-Leste is shown in Table 3.4.6[10]. A SAM is a square matrix of accounts of transactions, in which a column indicates payment to corresponding row items, and the row indicates receipts from column items. Considering some specific features of Timor-Leste's economy, we divided production sectors into two parts: oil sector and non-oil sector. Taking account of the external inflow of funds and the Petroleum Fund, the rest of the world is divided into goods-and-services part and current-transfer part. Based on Table 3.4.6, we construct a macro SAM.

When constructing the macro SAM for Timor-Leste 2010, we must note that we constructed the I/O table for Timor-Leste with some assumptions. First, there is a difference between the presentation of economic transactions by SAM and by National Accounts estimates, other than conceptual differences such as FOB or CIF for imported goods, where intermediate goods input coefficients of the non-oil sector are taken from Brunei's case.

The difference between SAM calculation and National Account estimates is found in the following points.

i) Operating surpluses of the oil sector and the non-oil sector are increased by USD 10.1 million and USD 92.8 million, respectively in order to equalize the total cost and total output.

ii) It is adjusted by each savings in order to equalize the column sum and the row sum of the account on the institution sector such as household, non-petroleum company, petroleum company and government.

iii)Investment-Savings balance is adjusted by the current account such as goods and services account and income account.

3.4.2.2   Preliminary Macroeconomic Snap-Shot of Timor-Leste 2010

According to this Macro SAM (Table 3.4.7), we find following features of the economic structure of Timor-Leste.

(1) The gross output of 2010 is USD 6,213.2 million, of which the oil sector produced USD 3,833.5 million and the non-oil sector USD 2,379.8 million.

(2) While the total of intermediate goods and services is USD 2,133.7 million, inputs of domestic goods and services are USD 543.7 million, while those of imported ones are USD 1,523.2 million, which means 28.3 % is utilized for domestic goods and services. Looking at the oil sector, intermediate goods and services are USD 35.6 million; this

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[10] A schematic SAM shows where some data of SNA is located on macro SAM. Therefore, we can make macro SAM by using SNA in any country as the statistics of SNA are standardized by the UN.

amount is less than 10% of the inputs of domestic goods and services.

(3) The column of ROW (Rest of the World) shows that the trade balance of goods and services is a surplus of USD 2,095.2 million while the non-trade balance shows deficit of USD 1,451.0 million, resulting in a current account surplus of USD 644.2 million, in other words, foreign savings being USD -644.2 million. In this regard, the total savings of Timor-Leste in the SAM are USD 592.3 million, which is composed of USD 168.1 million of household savings, USD 308.9 million of non-petroleum company savings, USD 505.8 million of government savings, (almost equal to the capital and resources for development in the Budget book) and USD -644.2 million for foreign savings. These savings are used for domestic investment activities.

(4) In the row of Government, the total revenue is USD 1,394.4 million, which is composed of USD 1,299.9 million of current transfer by petroleum companies and USD 94.5 million of tax revenues. On the other hand, the column of Government shows a total expenditure of USD 1,371.3 million, which is composed of government final consumption of the non-oil sector (domestic) of USD 794.9 million, compensation of government employees (USD 108.9 million), depreciation of government capital (USD 55.6 million), social security payment to household (USD 168.5 million), net import tax and duties (USD 0.8 million), Government savings (USD 253.7 million) and Government final consumption of imports (USD 12.0 million).

Given these four points mentioned above, Timor-Leste's economic activity has managed to keep conditions that both the supply-demand situation of domestic production and the balances of the overseas sector and budget sector are balanced by the large amount of oil exports. Thus, Timor-Leste's economy is so-called a resource-based economy with a monoculture structure. In order to break away from this economic structure, it is necessary to introduce some industrial policy in order to increase the proportion of domestic private investment in the non-oil sector, which accounts for only 25.6 % (USD 341.2 million) of domestic savings at present.

Table3.4.6: A schematic Macro Social Accounting Matrix for Timor-Leste

Income (Receipt) \ Expenditure	Oil sector	Non-oil sector	Labor	Capital	Household	Non-petroleum Company	Petroleum Company	NPISHs	Government	Direct tax	Net indirect domstic tax	Net import tax and duties	Combined capital account (Investment)	Goods and Services (ROW)	Current transfer (ROW)	Total
Production activities – Oil sector	Raw material purchases of domestic goods and services	Raw material purchases of domestic goods and services												Export of goods and services		Gross output
Production activities – Non-oil sector	Raw material purchases of domestic goods and services	Raw material purchases of domestic goods and services			Household consumption expenditure on domestic goods and services	Non-petroleum comapny consumption expenditure on domestic goods and services	Petroleum company consumption expenditure on domestic goods and services	NPISHs consumption expenditure on domestic goods and services	Goverment consumption expenditure on domestic goods and serives				Investment expenditures on domestic goods and serices and Increase in stock	Export of goods and services		Gross output
Factors of production – Labor	Value added in payments to labor factor	Value added in payments to labor factor					Value added in payments to labor factor		Value added in payments to labor factor						Receivable from ROW (Compensation of empolyees)	Income of labor factor of production
Factors of production – Capital	Value added in payments to capital factor	Value added in payments to capital factor					Value added in payments to capital factor		Value added in payments to capital factor						Receivable from ROW (Investment income)	Income of capital factor of production
Institutions – Household			Allocation of labor income to household	Allocation of capital income to household	Current transfers to households	Current transfers to households	Current transfers to households		Current transfers to households						Current transfers from ROW	Total current receipts-household
Institutions – Non-petroleum Company				Allocation of capital income to non-petroleum company	Current transfers to non-petroleum company										Current transfers from ROW	Total current receipts non-petroleum company
Institutions – Petroleum Company				Allocation of capital income to petroleum company	Current transfers to petroleum company										Current transfers from ROW	Total current receipts petroleum company
Institutions – NPISHs									Current transfers to NPISHs						Current transfers from ROW	Total current receipts-NPISHs
Institutions – Government					Current transfers to government		Current transfers to Government			Direct taxs	Net indirect domstic tax	Net import tax and duties			Current transfers from ROW	Total current receipts-government
Tax sector – Direct tax					Direct taxes on households	Direct taxes on corporations									Current transfers from ROW	Total direct tax
Tax sector – Net indirect domstic tax	Indirect taxes less Subsidies on production	Indirect taxes less Subsidies on production														Ttoal net indirect domstice tax
Tax sector – Net import tax and duties	Import tax and Import duty less Import subsidies	Import tax and Import duty less Import subsidies			Import tax and Import duty	Import tax and Import duty	Import tax and Import duty	Import tax and Import duty	Import tax and Import duty				Import tax and Import duty			Total net import tax and duties
Combined capital account (Savings)					Saving of households (Residual)	Saving of Non- petroleum comapany (Residual)	Saving of petroleum comapany (Residual)	Saving of NPISHs (Residual)	Saving of government (Residual)					Forign saving (Current external balance) (Residual)		Total capital receipts
Rest of the World (ROW) – Goods and Services	Imports of raw materials	Imports of raw materials			Household consumption expenditure on import goods and services	Non-petroleum comapny consumption expenditure on import goods and services	Petroleum company consumption expenditure on import goods and services	NPISHs consumption expenditure on import goods and services	Goverment consumption expenditure on import goods and serives				Imports of capital goods and services			Total current payments abroad
Rest of the World (ROW) – Current transfer			Payable to ROW (Compensation of empolyees)	Payable to ROW (Investment income)	Current transfers to ROW	Current transfers to ROW	Current transfers to ROW	Current transfers to ROW	Current transfers to ROW	Current transfers to ROW						Total current payments abroad
Total	Total costs of production	Total costs of production	Income of labor factor of production	Income of capital factor of production	Total houshold expenditures	Total non-petroleum company expenditures	Total petroleum company expendidues	Total NPISHs expenditures	Total goverment expenditures	Total direct tax	Net indirect domstic tax	Net import tax and duties	Total captial payments	Total current receipts abroad		

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Table3.4.7: A Macro Social Accounting Matrix for Timor-Leste 2010

| | | | Expenditure | | | | | | | | | | | | | | | |
| | | | Production activities | | Factors of production | | Institutions | | | | | Tax | | | Combined capital account | Rest of the world | | Total |
Millions of US dollars			Oil sector	Non-oil sector	Labor	Capital	Household	Non-petroleum Company	Petroleum Company	NPISHs	Government	Dirct tax	Net indirect domestic tax	Net import tax and duties		Goods and Services	Current transfer	
Income	Production activities	Oil sector	4.2	5.0												3,824.3		3,833.5
		Non-oil sector	31.4	503.1			531.2	14.0	11.7	16.8	794.9				341.2	135.5		2,379.8
	Factors of production	Labor	41.1	165.5						5.8	108.9						150.7	472.0
		Capital	3,215.2	695.9						1.6	55.6						41.3	4,009.5
	Institutions	Household			419.0	321.0	0	0	0		168.5						0	908.5
		Non-petroleum Company				374.9	0										56.6	431.5
		Petroleum Company				2,254.3	0										534.9	2,789.2
		NPISHs									0						24.2	24.2
		Government					0		1,299.9			42.2	38.5	13.8			0.0	1,394.4
	Tax	Dirct tax					11.1	7.2									857.9	876.2
		Net indirect domestic tax	35.0	3.5														38.5
		Net import tax and duties	0.0	-9.7			5.6	0.0	0.9	0	0.8				16.2			13.8
	Combined capital account						168.1	308.9	505.8	0.0	253.7					-2,095.2	1,451.0	592.3
	Rest of the world	Goods and Services	506.6	1,016.6			81.5	0.0	13.0	0	12.0				234.9			1,864.6
		Current transfer			52.9	1,059.3	111.0	101.4	957.9	0	0	834.0						3,116.6
	Total		3,833.5	2,379.8	472.0	4,009.5	908.5	431.5	2,789.2	24.2	1,394.4	876.2	38.5	13.8	592.3	1,864.6	3,116.6	

Note : Colored cell in the above table is residuals to consistent with the column sum and the row sum.

3.4.3　Division Method and Future Study for the Labor, Capital and Household Sectors

In this section, we divide the columns and rows of labour, capital and household in Table 3.4.7 of macro SAM in order to understand the economic spillover effect on the production factor (labour and capital) sector and household sector in detail by the multiplier analysis. In accordance with the results, we divide the row of Compensation of employees and Operating surplus-and-capital consumption and the column of Final consumption expenditure by household in Table 3.4.2. In the following section, we explain some premises and method for these divisions, and present the issues.

3.4.3.1　Division of Labor in the production factor sector

We explain the method used to divide Compensation of employees by industry in this I/O table into Compensation of employees for Skilled labour, Semi-skilled labour, and Un-skilled labour.　First, these three categories of workers are defined in accordance with their level of education. Skilled labour is one with Polytechnic/Diploma and University, Semi-skilled with Secondary, and Un-skilled labour with no more than Pre-secondary. The reason is that under the assumption of higher wages in accordance with the level of skill, there is a considerably strong co-relation between the wage level and education level. Therefore, with some premises, Compensation of employees by industry is divided into three categories.

The first premise is that the result by Okiyama, who divided Compensation of employees by industry in the 2005 I/O table for Thailand into three categories of Skilled, Semi-skilled, and Un-skilled based on the distinction of wage level, is used as the initial value. We have this premise for the following two reasons. First, there is an issue of applicability of Timor-Leste Labour Force Survey 2010. Looking at the aggregate Table 4.5a and Table 4.7a in the Survey, it is difficult to divide them into three labour categories by industry. However, we think it is possible to divide the whole Compensation of employees into three skill categories at the total industry level because we need to use the composition ratios of potential workers in each industry as the base when conducting multiplier analysis. In other words, when trying to strategically develop promising industries, we need the composition of the potential labour according to skill levels in the industry, in order to understand how many employees of each skill level will be necessary for the development of the industry.

The second premise is that Compensation of employees (payment to overseas agents), which the agent managing the labour sector in the macro SAM pays to the overseas sector,

is part of payment to Skilled labour in production activities. This premise increases the number of Skilled labour obtained from the Labour Survey. This premise does not ingore the reality where the lack of domestic Skilled labour is compensated by foreign labour at present, regardless of whether it is in the public or private sector; this premise is necessary to clarify the potential need for Skilled labour as well. Under this premise, the production activities sector is USD 39.0 million if USD 52.9 million paid to the overseas sector as Compensation of employees from the macro SAM is distributed, according to the composition ratio to each labour demand, to the three sectors of production activities, non-profit institutions serving households (NPISHs), and the government. This amount is estimated to cover 6,200 skilled workers, assuming that the wage level of skilled labour is double the monthly wage of Skilled labour obtained from the distribution of monthly wages by education level shown in Table 6.2.3[11] of the Household Survey. For reference, it is the same number as Skilled labour estimated from the Labour Survey at 6,000.

The third premise is that all employees in the sector for Agriculture-forestry-and-fishery are regarded as Un-skilled labour. This is because Skilled and Un-skilled labour correspond to owner farmers and self-employed workers, and family workers can be regarded as unpaid workers.

Under these premises, according to the Labour Survey, employees of Timor-Leste as a whole in the production activities sector, including the cumulative total number of foreign workers (Expatriate), consists of Skilled labour of 5,500, Semi-skilled labour of 22,400 and Un-skilled labour of 26,200. On the other hand, if the average monthly wage of each category of labour is estimated from the Household Survey, USD 227.7 million is distributed for Skilled labour, USD 162.4 for Semi-skilled labour, and USD 144.8 million for Un-skilled labour. Then, if Compensation of employees of the I/O table of USD 206.6 million is distributed by using the component ratios obtained by comparing the total wages of each category by multiplying the number of employees and the average monthly wage, we obtain USD 49.1 million for Skilled labour, USD 88.7 million for Semi-skilled labour, and USD 68.8 million for Un-skilled labour; it is distributed according to the composition ratios of Skilled and Semi-skilled labour in each industry obtained under the first premise. Compensation of Un-skilled employees is the amount obtained by subtracting Compensation of Skilled employees and Semi-skilled employees from Compensation of employees for each industry. Moreover, the labour sectors for NPISHs and the government in this macro SAM are divided by using the composition ratios obtained above for Public administration-defense-and-social security, while Compensation of employees from the overseas sector (payment from overseas agents) is

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[11] We cannot obtain the number of foreigner employees yet, and so assume double the monthly wage of Timorese employees of skilled labour.

distributed according to the level of skill, using the composition ratios of the overall production activities sector.

3.4.3.2 Division of Capital in the production factor sector

We will explain the method to divide Operating surplus-and-capital consumption by industry in this I/O table into four categories of Capital of own-account worker for Agriculture-forestry-and-fishery, Capital of own-account worker for Non-agriculture sector, Capital of Non-oil sector and Capital of Oil sector.

First, we pay our attention to the Household's amount of Gross mixed income (USD 243.6 million) in Table 5.4 of Section IV: Income Approach on TL's SNA 2000-2011. This amount has been broken down into two categories of "subsistence agriculture" and "Informal business sector." USD 179.9 million of the former is Capital of own-account worker for Agriculture-forestry-and-fishery (Land owner & Own work) and USD 141.1 million adding to Capital of the household sector on Gross Operating Surplus (USD 77.4 million) of the latter is Capital of own-account worker for Non-agriculture sector (Non-Land owner & Own work). USD 282.1 million of Non-financial and financial corporations into Gross Operating Surplus is Capital of Non-oil sector. In another table of Table 5.1(Section IV: Income Approach), Oil sector of Gross Operating Surplus is Capital of Oil sector. Therefore, with some premises, the column and row of Capital in the macro SAM and Operating Surplus in the I/O table by industry are divided into four categories.

The first premise is that the ratio for dividing the receipt of capital from overseas and payment of capital to overseas in macro SAM into oil sector and non-oil sector is the same as the capital ratio of oil-sector to non-oil sector on the production activity sector.

The second premise is that the ratio for dividing each Capital of own-account worker of Agriculture sector and Non-Agriculture sector into urban household and rural household is the same as the ratio of urban to rural in the agriculture income and non-agriculture income respectively that is calculated using the statistical data for more detailed information about income (Table 5.2.1-Table 5.2.11) in Timor-Leste Household Income and Expenditure Survey 2011 (hereafter, the Household Survey).

The third premise is that the ratio for dividing Capital of own-account worker of Agriculture sector into four industries on the production activity is the same as the composition ratios of concerned type of income to all agriculture income. And Capital of Non-oil sector in Agriculture industries is calculated by subtracting this capital of own-account worker for agriculture sector from Operating surplus by each industry in the I/O table. On the other hand, Capital of own-account worker of Non-Agriculture is

allocated among 13 industries except for five industries (Other mining industry, Electricity-gas-and-water supply, Public administration-defense-and-social security, Education-human health-and-social works and Professional administration-and-support services) and oil sector where self-operated businesses can hardly enter. The ratio of allocation among these industries is the same as the composition ratios for capital ratio of each industry to total non-agriculture and non-oil sector. And Capital of Non-oil sector in Non-agriculture industries is calculated by subtracting this capital of own-account worker for non-agriculture sector from Operating surplus by each industry in the I/O table.

3.4.3.3 Division of the Household Sector

Division of the household sector refers to division of the rows and columns in this macro SAM into two parts corresponding to urban and rural. The statistical data to be used for the division are 2010 tables in the Household Survey. We need to have several premises in dividing the household sector because the Survey shows expenditure and income for each household, the amount are shown in purchaser's price, and expenditures are not distinguished for domestic and imported goods.

The first premise is that the composition ratios for consumption of domestic goods and imported goods by industry are assumed to be the same for households in both urban and rural.

The second premise is that the household consumption in urban and rural is divided based on purchaser's price, and then converted into producer's price using the ratios used in the previous section between trade margin and transportation margin.

The third premise is that since these amounts are those for households, each item of households on this SAM is weighted before division, using the number of households (53,574 households in urban and 129,367 for rural) which is obtained by dividing the population of urban and rural with the number of household members (5.9 people in urban and 5.8 people in rural) based on the 2010 census results.

Under these premises, each item of SAM is divided according to the following tables in the Household Survey. We will start with the method for dividing columns of this macro SAM. Wage income and Capital income which households receive from production factor agents are divided based on the table (Table 5.1.11) of the Household Survey's average monthly household income by type. Moreover, it will be explained at the end how to divide wage income in urban and rural further into three based on the level of skill. Then, income transfer from the government to households is divided based on miscellaneous income per household and social benefits of last month in the table

(Table5.2.12) for money transfers.

Next, we will explain how to divide the rows of households. As for division of household consumption of domestic goods and imported goods by industry, it is divided, regardless of whether domestic goods or imported goods under the first premise by replacing it with the corresponding industries from the expenditure items in the Household Survey in Table 5.1.14 and Table 5.1.16, etc. Regarding the division of the section for tax and the section for the current transfer to overseas, they are divided based on the sum of annual payment per household of income tax and land-rent (Table 5.4.5) for the former, while the latter on costs of funds transfer (Table 5.5.1).

Finally, we will explain the method to compile figures in the matrix consisting of two categories of households and three categories of labour. First, we estimate from the Labor Survey the number of male and female employees by education level in urban and rural, respectively. In addition to it, under the assumption of no difference in monthly wages between male and female at each education level, the total wage is calculated for each of three skill levels separately for male and female employees as well as urban and rural. On the other hand, the Household Survey has the table (Table 5.2.1) which shows the composition ratios of wages for male and female in household income separately for urban and rural. The total wage of male in urban is obtained by multiplying the total wage of the whole households in urban calculated from this table with the ratio of wage that male employees have received; and then, by multiplying this with the composition ratio of each of three skill categories of employees obtained from the Labor Survey, the wages for male employees in urban at three different skill levels are calculated. On the other hand, the total wage that female employees in urban have received is the residual of the total wage in urban after deducting the total wage for male employee; by multiplying this with the composition ratio for each of three skill levels obtained from the Labor Survey, the wages for female employees in urban at three different skill levels are calculated. Similarly, wages for male and female employees in rural at three different skill levels are obtained. The results we get from the above procedure are shown in Table 3.4.8. Accordingly, in order to match these with each wage obtained from three categories of the labour sector in the previous paragraph, the difference is redistributed between Skilled and Semi-skilled labour using the vertical composition ratios that are obtained by the division of labour sector; and thus, wages of Skilled labour in urban and rural are calculated. Similar calculation is to be done for Semi-skilled labour. And Un-skilled labour is treated as the residual.

Table 3.4.8: The matrix consisting of division of labour and household

(unit: millions of US dollars)

Unit:US$ millions		Skilled Labor	Semi-skilled Labor	Unskilled Labor	Total
Male	Urban	35.2	100.5	88.8	224.6
	Rural	7.6	38.0	65.2	110.8
Female	Urban	14.9	37.3	7.5	59.7
	Rural	0.0	24.0	0.0	24.0
Total		57.8	199.7	161.6	419.0
Ref. Total(division of labor)		55.6	204.7	158.8	419.0

Table 3.4.9: Compare with adjusted savings in Macro SAM and savings

calculated from the survey (unit: millions of US dollars)

Unit: US$ millions	Savings obtained by household survey	Savings as the residual	difference
Urban Household	119.0	67.7	-51.3
Rural Household	49.1	100.4	51.3
Total	168.1	168.1	0.0

From the above, the total of columns is determined on this macro SAM for households in urban and rural, respectively. And the total of rows for households should be made to match each total of columns. Saving is the adjustment item for the purpose of matching. On the other hand, the Household Survey has the table (EO050A and EO060A: Table 5.5.1) for monthly saving per household separately for urban and rural. When comparing the amount of savings calculated from this table with those that match the total of columns, the saving in urban based on the Household Survey is USD 119.0 million, while the saving as the residual is USD 67.7 million, or USD 51.3 million less as shown in Table 3.4.9. On the contrary, in rural, the former is USD 49.1 million with USD 100.4 million for the latter. We consider that there are two reasons about the difference between the former and the latter mentioned above. One reason is that some promises as stated in this section are unsuitable for the division of the production factor. Another reason is that the results of Labor Survey and Household Survey do not have enough accuracy for our use. At any rate, it is difficult to determine the cause of difference under present circumstances. Therefore, we must carry out a further examination of this problem.

From the above results, we can get the I/O table (Table 3.4.10) consisting of two

categories of household, three categories of labour and four categories of capital, and Table 3.4.11 is the expanded macro SAM which is obtained by dividing the Macro SAM of Table 3.4.7 into Labor, Capital and Household sectors.

3.4.3.4 Future study for Division of the Production factor Sector and of Household Sector

As for the division into three of the Labor sector, four of the Capital sector and two of the household sector as implemented above, division can be done with several assumptions, using the aggregate table for the Labour Survey and the Household Survey. Such division of the labour sector and the household sector is extremely important in order to determine: what kind of personnel should be developed for pursuing large-scale projects in future; and what changes such pursuits will bring about on regional disparities between urban and rural, especially on income gaps. Accordingly, we need to understand whether the results of both surveys have the degree of accuracy for our use, and what limitations there are for using their results. Therefore, we will explain the issues and limitations in order to better utilize the results of both surveys.

First, regarding the issues and limitations for the Labour Survey, even if the survey accurately reflects the actual situation of the labour markets in Timor-Leste, there is an issue of whether it is appropriate to divide, based on the acquired result, employees by industry according to their skill level. This is because the composition of desirable labour by industry cannot be obtained by the Labour Survey. If there is restraint on the supply of labour by skill level, the resulting mismatch in the labour market is causing inefficiency in production, which currently is presumably made up for by foreign employees. In order to understand the actual situation, a survey of companies is necessary, and based on such survey result, we had better estimate the number of desirable employees by skill level for each industry. For instance, it might be a good idea to conduct the survey on corporate behaviors.

Second, the Household Survey is an essential one if we examine division of households, especially their disparities among income classes. Nevertheless, the Household Survey always has the problem of coverage. In particular, it is a common issue for every country that household income cannot be obtained accurately. Is it possible for Timor-Leste to clear this issue? If it is difficult, it will become necessary to develop a framework to estimate income classes from other statistics for expenditure brackets and ownership ratio of durable goods, as well as the Household Survey in other countries, including Thailand and Malaysia.

Table 3.4.10: The input-output table consisting of two categories of household, three categories of labour and four categories of capital (unit: millions of US dollars)

	Products of agriculture exluding coffee product	coffee product	Products of forestry	Fish and other fishing products	Crude petroleum and natural gas	Other minig and quarrying	Coffee processing	Other food processing	Products of light industries	Products of heavy industries	Electricity, gas, and water supply	Construction	Wholesale and retail trade	Transportati on and storage	Accommoda tion and food services	Information and communicati on	Financial and insurance services	Real estate services	Professional, administratio n and support serives	Public adminstration, defense and social security	Education, human health and social works	Other services	Intermediate output	Final consumption expenditure by urban household	Final consumption expenditure by rural household	Final consumption expenditure by non-petroleum company	Final consumption expenditure by petroleum company	Final consumption expenditure by NPISHs	Final consumption expenditure by government	Gross capital formation including changes in inventory	Final demand	Export	Total
Products of agriculture exluding coffee product	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	69.0	117.8	0.0	0.0	0.0	0.0	0.0	186.8	0.0	187.3
coffee product	0.0	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	0.4	1.0	0.0	0.0	0.0	0.0	0.0	1.4	24.6	32.9
Products of forestry	0.0	0.1	0.3	0.0	0.0	0.1	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Fish and other fishing products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.0	2.4	0.0	0.0	0.0	0.6	0.0	0.0	0.0	4.0	5.7	3.4	0.0	0.0	0.0	0.0	0.0	9.1	0.0	13.1
Crude petroleum and natural gas	0.0	0.0	0.0	0.0	4.2	1.3	0.0	0.0	0.0	0.7	1.5	0.0	0.3	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3,824.3	3,833.5
Other minig and quarrying	0.0	0.0	0.0	0.0	0.2	1.7	0.0	0.0	0.1	3.7	2.7	0.0	0.2	8.6	1.1	18.5	4.7	0.1	0.2	0.0	0.4	0.1	42.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.3
Coffee processing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Other food processing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.6	0.0	0.1	0.3	0.0	1.7	1.0	1.6	0.0	0.0	0.0	0.0	0.0	2.5	0.1	4.3
Products of light industries	0.0	0.0	0.0	0.0	0.8	0.4	0.0	0.0	2.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.6	0.0	0.1	4.7	8.6	8.0	0.0	0.0	0.0	0.0	4.2	20.9	0.3	25.8
Products of heavy industries	0.0	0.5	0.0	0.0	3.4	0.7	0.0	0.0	0.0	1.2	2.5	0.1	0.7	18.5	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	28.1	9.4	4.6	1.3	9.5	0.0	36.6	53.2	114.6	0.3	143.0
Electricity, gas, and water supply	0.0	0.0	0.0	0.0	1.1	0.1	0.0	0.0	0.0	0.1	5.3	0.0	0.1	0.3	0.0	0.2	0.0	0.2	0.0	14.1	0.1	0.2	21.8	14.2	8.3	0.0	0.0	0.0	0.0	0.0	22.5	0.0	44.3
Construction	0.0	0.0	0.0	0.1	1.7	9.0	0.0	0.0	0.1	22.4	1.5	13.2	3.4	0.5	0.9	0.0	0.8	3.7	0.1	0.0	5.2	1.0	63.5	0.0	0.0	0.0	0.0	0.0	0.0	267.8	267.8	0.0	331.3
Wholesale and retail trade	6.1	3.1	0.5	0.4	3.5	1.3	0.0	0.1	1.7	2.4	0.7	0.3	1.6	4.1	0.4	0.9	0.3	1.0	0.2	0.9	0.8	0.5	30.8	32.8	49.4	0.3	2.0	0.0	7.9	14.7	107.1	23.9	161.8
Transportation and storage	5.8	3.0	0.5	0.4	6.9	2.8	0.0	0.3	3.5	4.9	1.5	0.5	3.2	8.4	0.9	1.2	0.3	2.1	0.4	2.5	1.6	0.8	51.4	7.8	11.5	0.0	0.2	0.0	0.6	1.2	21.3	23.9	96.6
Accommodation and food services	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.5	1.2	0.8	0.6	0.2	1.0	0.1	0.2	0.2	0.0	0.2	0.0	0.0	16.9	26.3	22.2	10.5	0.0	0.0	0.0	0.0	0.0	32.7	0.0	59.0
Information and communication	0.0	0.0	0.0	0.0	2.0	0.6	0.0	0.0	0.1	0.6	1.6	0.2	1.0	2.5	0.1	6.2	1.1	1.1	0.2	49.1	0.7	3.2	70.3	6.0	4.2	0.0	0.0	0.0	0.0	0.0	10.2	5.9	86.4
Financial and insurance services	0.0	0.3	0.0	0.0	4.5	0.8	0.0	0.0	0.2	1.1	0.3	0.5	0.5	1.0	0.1	0.3	2.1	1.9	0.1	17.6	0.2	0.9	32.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.5
Real estate services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4	0.0	0.0	13.6	63.7	21.5	0.0	0.0	0.0	0.0	0.0	85.2	0.0	98.8
Professional, administration and support serives	0.0	0.0	0.0	0.0	2.3	0.2	0.0	0.0	0.1	0.4	0.3	0.1	0.1	0.4	0.0	0.2	0.1	0.0	0.1	5.7	0.0	1.2	11.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2
Public adminstration, defense and social security	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.7	0.0	0.4	0.1	0.2	0.0	91.3	0.1	0.0	94.0	0.0	0.0	0.0	0.0	0.0	748.1	0.0	748.1	26.7	868.8
Education, human health and social works	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	1.3	8.8	5.7	0.0	0.0	16.8	1.7	0.0	33.0	0.0	34.3
Other services	0.0	0.0	0.0	0.0	0.5	0.3	0.0	0.0	0.2	1.2	1.2	0.5	0.2	0.5	0.0	0.1	1.6	1.7	0.0	10.9	0.1	6.2	25.1	20.6	13.6	12.4	0.0	0.0	0.0	0.0	46.6	29.9	101.6
Domestic Intermediate input	12.3	7.6	1.4	0.8	35.6	19.3	0.1	1.2	12.4	40.0	21.8	16.2	12.4	47.7	12.6	28.3	11.3	12.7	2.4	206.7	9.7	31.4	543.7	270.1	261.1	14.0	11.7	16.8	794.9	341.2	1,709.8	3,959.8	6,213.3
Use of imported goods and services	29.3	5.0	0.1	3.4	506.6	12.2	0.0	2.6	9.5	27.3	11.6	164.6	26.0	20.7	14.2	24.7	7.0	23.7	2.9	586.8	22.8	21.9	1,523.2										
Import tax less subsidies	-20.9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4	-17.0	5.2	0.4	0.2	0.3	0.6	0.2	0.2	0.6	18.6	0.7	0.4	-9.7										
Compensation of skilled employee	0.0	0.0	0.0	0.0	10.4	0.0	0.0	0.0	0.0	1.2	2.8	7.4	5.1	2.1	3.5	2.4	1.1	4.9	0.3	4.4	0.2	3.2	49.1										
Compensation of semi-skilled employee	0.0	0.0	0.0	0.0	17.7	0.0	0.0	0.0	0.2	3.4	0.6	40.4	12.4	1.3	2.5	1.5	0.6	2.9	0.2	2.5	0.1	2.3	88.7										
Compensation of un-skilled employee	7.7	0.5	0.4	0.8	13.0	0.0	0.0	0.0	0.1	1.1	0.8	28.5	6.7	0.9	1.9	1.0	0.4	1.6	0.2	1.5	0.1	1.7	68.8										
Land Owner & Own Work	154.0	18.7	2.3	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	179.9										
Non-Land Owner & Own Work	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.1	23.3	0.0	22.9	33.1	8.0	8.0	9.3	3.9	17.7	0.0	0.0	0.0	13.6	141.1										
Non-oil Sector of Operation surplus	4.9	1.1	0.1	3.2	0.0	10.7	0.0	0.2	2.2	46.2	23.6	45.4	65.6	15.7	15.9	18.4	7.8	35.1	4.3	46.8	0.7	26.9	374.9										
Oil Sector of Operation surplus	0.0	0.0	0.0	0.0	3,215.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3,215.2										
Indirect domestic tax less subsidies	0.0	0.0	0.0	0.0	35.0	0.0	0.0	0.0	0.1	0.2	0.0	0.6	0.0	0.1	0.1	0.2	0.1	0.0	0.1	1.6	0.1	0.2	38.5										
Value Added	166.6	20.3	2.9	8.8	3,291.3	10.8	0.1	0.3	3.6	75.4	27.9	145.3	123.0	28.0	31.9	32.8	14.0	62.2	5.2	56.8	1.1	47.9	4,156.1										
Total	187.3	32.9	4.3	13.1	3,833.5	42.3	0.2	4.3	25.8	143.0	44.3	331.3	161.8	96.6	59.0	86.4	32.5	98.8	11.2	868.8	34.3	101.6	6,213.3										

Table 3.4.11: The expanded macro SAM which is obtained by dividing the labour, the capital and household sectors (unit: millions US dollars)

Millions of US dollars		Oil sector	Non-oil sector	Skilled Labor	Semi-silled Labor	Unsilled Labor	Land owner & own work	Non-land owner & own work	Non-oil Sector of Capital	Oil Sector of Capital	Urban Household	Rural Household	Non-petroleum Company	Petroleum Company	NPISHs	Government	Direct tax	Net indirect domestic tax	Net import tax and duties	Combined capital account	Goods and Services	Current transfer	Total
Production activities	Oil sector	4.2	5.0																	0.0	3,824.3		3,833.5
	Non-oil sector	31.4	503.1								270.1	261.1	14.0	11.7	16.8	794.9				341.2	135.5		2,379.8
Factors of production	Skilled Labor	10.4	38.7												3.0	57.0						13.1	122.2
	Semi-silled Labor	17.7	71.0												1.7	32.5						77.5	200.4
	Unsilled Labor	13.0	55.8												1.0	19.4						60.1	149.4
	Land owner & own work	0.0	179.9												0.0	0.0						0.0	179.9
	Non-land owner & own work	0.0	141.1												0.0	0.0						0.0	141.1
	Non-oil Sector of Capital	0.0	374.9												1.6	55.6						4.0	436.0
	Oil Sector of Capital	3,215.2	0.0												0.0	0.0						37.3	3,252.5
Institutions	Urban Household			60.2	138.2	85.9	31.4	88.7	0.0	0.0						50.3							454.7
	Rural Household			9.1	62.2	63.5	148.5	52.4	0.0	0.0						118.2							453.8
	Non-petroleum Company								374.9	0.0												56.6	431.5
	Petroleum Company								0.0	2,254.3												534.9	2,789.2
	NPISHs																					24.2	24.2
	Government													1,299.9			42.2	38.5	13.8				1,394.4
Tax	Direct tax										9.6	1.4	7.2									857.9	876.2
	Net indirect domestic tax	35.0	3.5																				38.5
	Net import tax and duties	0.0	-9.7								2.6	3.0	0.9			0.8				16.2			13.8
Combined capital account											67.7	100.4	308.9	505.8		253.7					-2,095.2	1,451.0	592.3
Rest of the world	Goods and Services	506.6	1,016.6								37.7	43.8		13.0		12.0				234.9			1,864.6
	Current transfer			52.9	0.0	0.0	0.0	0.0	61.2	998.2	67.0	44.0	101.4	957.9			834.0						3,116.6
Total		3,833.5	2,379.8	122.2	200.4	149.4	179.9	141.1	436.0	3,252.5	454.7	453.8	431.5	2,789.2	24.2	1,394.4	876.2	38.5	13.8	592.3	1,864.6	3,116.6	

Table 3.4.12: The 41 x 41 dimension trial SAM for Timor-Leste 2010 (unit: millions of US dollars)

	code	A01AGR	A02CFE	A03FRT	A04FSH	A05OIL	A06MIN	A07CFP	A08FPC	A09MLI	A10MHI	A11EGW	A12CNT	A13TRD	A14TST	A15RST	A16COM	A17FIS	A18EST	A19PSS	A20PUB	A21EDC	A22SEV	F01LSK	F02LSS	F03LUS	F04CAP	F05CAP	F06CAP	F07CAP	H01HUB	H02HRR	I03NPC	I04PEC	N05NSH	I06GOV	O01DRT	O02IDT	O03IMT	O04CCA	O05RWG	O06RWT	Total
Products of agriculture including coffee product	A01AGR	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.0	117.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	187.3
coffee product	A02CFE	0.0	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.6	0.0	32.9
Products of forestry	A03FRT	0.0	0.1	0.3	0.0	0.0	0.1	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Fish and other fishing products	A04FSH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.0	2.4	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.1
Crude petroleum and natural gas	A05OIL	0.0	0.0	0.0	0.0	4.2	1.3	0.0	0.0	0.0	0.7	1.5	0.0	0.3	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3,824.3	3,833.5
Other mining and quarrying	A06MIN	0.0	0.0	0.0	0.0	0.2	1.7	0.0	0.0	0.1	3.7	2.7	0.0	0.2	8.6	1.1	18.5	4.7	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.3
Coffee processing	A07CFP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Other food processing	A08FPC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.6	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	4.5
Products of light industries	A09MLI	0.0	0.0	0.0	0.0	0.8	0.4	0.0	0.0	2.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.3	25.8
Products of heavy industries	A10MHI	0.0	0.5	0.0	0.0	3.4	0.7	0.0	0.0	0.0	1.2	2.5	0.1	0.7	18.5	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4	4.6	1.3	0.0	9.5	36.6	0.0	0.0	0.0	53.2	0.3	0.0	143.0
Electricity, gas, and water supply	A11EGW	0.0	0.0	0.0	0.0	1.1	0.1	0.0	0.0	0.0	0.1	5.3	0.0	0.1	0.3	0.0	0.2	0.0	0.2	0.0	0.2	14.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	14.2	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.3
Construction	A12CNT	0.0	0.0	0.0	0.1	1.7	9.0	0.0	0.0	0.1	22.4	1.5	13.2	3.4	0.5	0.9	0.0	0.8	3.7	0.1	0.0	5.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	267.8	0.0	0.0	331.3
Wholesale and retail trade	A13TRD	6.1	3.1	0.5	0.4	3.5	1.3	0.0	0.1	1.7	2.4	0.7	0.3	1.6	4.1	0.4	0.9	0.3	1.0	0.2	0.9	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.8	49.4	0.3	2.0	0.0	7.9	0.0	0.0	0.0	14.7	23.9	0.0	161.8
Transportation and storage	A14TST	5.8	3.0	0.5	0.4	6.9	2.8	0.0	0.3	3.5	4.9	1.5	0.5	3.2	8.4	0.9	1.2	0.3	2.1	0.4	2.5	1.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.8	11.5	0.0	0.2	0.0	0.6	0.0	0.0	0.0	1.2	23.9	0.0	96.6
Accommodation and food services	A15RST	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.5	1.2	0.8	0.6	0.2	1.0	0.1	0.2	0.2	0.0	0.2	0.0	0.0	16.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.2	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.0
Information and communication	A16COM	0.0	0.0	0.0	0.0	2.0	0.6	0.0	0.0	0.1	0.6	1.6	0.2	1.0	2.5	0.1	6.2	1.1	1.1	0.2	49.1	0.7	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	86.4
Financial and insurance services	A17FIS	0.0	0.3	0.0	0.0	4.5	0.8	0.0	0.0	0.2	1.1	0.3	0.5	0.5	1.0	0.1	0.3	2.1	1.9	0.1	17.6	0.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.5
Real estate services	A18EST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.7	21.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	98.8
Professional, administration and support services	A19PSS	0.0	0.0	0.0	0.0	2.3	0.2	0.0	0.0	0.1	0.4	0.3	0.1	0.1	0.4	0.0	0.2	0.1	0.0	0.1	5.7	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2
Public administration, defense and social security	A20PUB	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.7	0.0	0.4	0.1	0.2	0.0	91.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	748.1	0.0	0.0	0.0	0.0	26.7	0.0	868.8
Education, human health and social works	A21EDC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	5.7	0.0	0.0	16.8	1.7	0.0	0.0	0.0	0.0	0.0	0.0	34.3
Other services	A22SEV	0.0	0.0	0.0	0.0	0.5	0.3	0.0	0.0	0.2	1.2	1.2	0.5	0.2	0.5	0.0	0.1	1.6	1.7	0.0	10.9	0.1	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.6	13.6	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.9	0.0	101.6
Labor Skilled Employee	F01LSK	0.0	0.0	0.0	0.0	10.4	0.0	0.0	0.0	0.0	1.2	2.8	7.4	5.1	2.1	3.5	2.4	1.1	4.9	0.3	4.4	0.2	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	57.0	0.0	0.0	0.0	0.0	0.0	13.1	122.2
Labor Semi-skilled Employee	F02LSS	0.0	0.0	0.0	0.0	17.7	0.0	0.0	0.2	3.4	0.6	40.4	12.4	1.3	2.5	1.5	0.6	2.9	0.2	2.5	0.1	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	32.5	0.0	0.0	0.0	0.0	0.0	77.5	200.4
Labor Un-skilled Employee	F03LUS	7.7	0.5	0.4	0.8	13.0	0.0	0.0	0.1	1.1	0.8	28.5	6.7	0.9	1.9	1.0	0.4	1.6	0.2	1.5	0.1	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	19.4	0.0	0.0	0.0	0.0	0.0	60.3	149.6
Land Owner & Own Work	F04CAP	154.0	18.7	2.3	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	179.0
Non-Land Owner & Own Work	F05CAP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.1	23.3	0.0	22.9	33.1	8.0	8.0	9.3	3.9	17.7	0.0	0.0	0.0	13.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	141.1
Non-oil Sector of Capital	F06CAP	4.9	1.1	0.1	3.2	0.0	10.7	0.0	0.2	2.2	46.2	23.6	45.4	65.6	15.7	15.9	18.4	7.8	35.1	4.3	46.8	0.7	26.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	55.6	0.0	0.0	0.0	4.0	0.0	0.0	436.0
Oil Sector of Capital	F07CAP	0.0	0.0	0.0	0.0	3,215.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.3	0.0	3,252.5
Urban Household	H01HUB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.2	138.2	85.9	31.4	18.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.3	0.0	0.0	0.0	0.0	0.0	0.0	454.7
Rural Household	H02HRR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	62.2	63.5	148.5	52.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.2	0.0	0.0	0.0	0.0	0.0	0.0	453.8
Non petroleum company	I03NPC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	376.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.6	0.0	0.0	431.5
Petroleum company	I04PEC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,254.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	534.9	0.0	2,789.2
NPISHs	N05NSH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.2	0.0	24.2
Government	I06GOV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,299.9	0.0	0.0	42.2	38.5	13.8	0.0	0.0	0.0	1,394.4
Direct Tax	O01DRT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.6	1.4	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	857.9	876.2
Indirect domestic tax less subsidies	O02IDT	0.0	0.0	0.0	0.0	35.0	0.0	0.0	0.1	0.2	0.0	0.6	0.0	0.1	0.1	0.2	0.1	0.0	0.1	1.6	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.5
Import tax less subsidies	O03IMT	-20.9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4	-17.0	5.2	0.4	0.2	0.3	0.6	0.2	0.2	0.6	18.6	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	3.0	0.0	0.9	0.0	0.8	0.0	0.0	0.0	16.2	0.0	0.0	13.6
Combined Capital Account	O04CCA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.7	100.4	308.9	505.8	0.0	253.7	0.0	0.0	0.0	0.0	-2,095.2	1,451.0	592.3
Rest of World of goods and services	O05RWG	29.3	5.0	0.1	3.4	506.6	12.2	0.0	2.6	9.5	27.3	11.6	164.6	26.0	20.7	14.2	24.7	7.0	23.7	2.9	586.8	22.8	21.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.7	43.8	0.0	13.0	0.0	12.0	0.0	0.0	0.0	234.9	0.0	0.0	1,864.6
Rest of World of current transfer	O06RWT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.9	0.0	0.0	0.0	0.0	0.0	61.2	67.0	44.0	101.4	957.9	0.0	834.0	0.0	0.0	0.0	0.0	0.0	998.2	3,116.6
Control total	Total	187.3	32.9	4.3	13.1	3,833.5	42.3	0.2	4.5	25.8	143.0	44.3	331.3	161.8	96.6	59.0	86.4	32.5	98.8	11.2	868.8	34.3	101.6	122.2	200.4	149.6	179.0	141.1	436.0	3,252.5	454.7	453.8	431.5	2,789.2	24.2	1,394.4	876.2	38.5	13.8	592.3	1,864.6	3,116.6	

3.4.4   Multiplier Analysis utilizing the SAM for Timor-Leste 2010

3.4.4.1   The outline of the Social Accounting Matrix (SAM) for Timor-Leste 2010

In this study, the SAM is constructed by using a top-down approach. Before this section, the expanded macro SAM in Table 3.4.11 and the I/O table are prepared first. Then the Micro SAM is constructed by inserting the macro SAM into the production activities sector of the I/O table. The 41 x 41 dimensions of matrix for Timor-Leste's tentative SAM is presented in Table 3.4.12. The matrix is composed of the following parts. At first we take into account 22 production activities staring from agriculture excluding coffee production to other services. 22 production activities are identified, i.e. agriculture excluding coffee production, agriculture of coffee production, forestry, fish-and-other fishing products, Crude petroleum-and-national gas, other mining-and-quarrying, coffee processing industries, other food processing industries, light industries, heavy industries, electricity gas-and-water supply, construction, wholesale-and-retail trade, transportation-and-storage, accommodation-and-food services, information-and-communication, financial-and-insurance services, real estate services, professional administration-and-support services, public administration-defense-and-social security, education-human health-and-social works and other services. Next, factor of production is distinguished in terms of seven factors, i.e. labour sector has three categories of skilled labour, semi-skilled labour un-skilled labour and capital sector has four categories of capital of own-account worker for agriculture-forestry-and-fishery, capital of own-account worker for non-agriculture sector, capital of non-oil sector and capital of oil sector. Institution sector is composed of urban household, rural household, non-petroleum company, petroleum company, NPISHs and government. In additional tax sector is distinguished in terms of three parts, i.e. direct tax, indirect tax less subsidies on domestic products and import tax less subsidies. And the remaining row parts are capital accounts (investment-savings) and the rest of world.

The coefficient matrix that is derived from Table 3.4.12 can be obtained by dividing a particular element in any of the endogenous accounts by the total income for the column account in which the element occurs. SAM multiplier analysis by using the coefficient matrix makes use of N matrix as endogenous accounts shown by the schematic SAM in Table 3.4.13.

Table 3.4.13: Schematic Social Accounting Matrix

			Production activites	Factors of Production	Institutions		Capital accounts	Rest of the world	Indirect tax	
					Household & Company	Government				
Endogenous accounts	(i)	Production activites	N			X				y
	(ii)	Factors of Production								
	(iii)	Institutions	Household & Company							
	(iv)		Government							
Exogenous accounts	(v)	Capital accounts	L			R				z
	(vi)	Rest of the world								
	(vii)	Indirect tax								
Totals			y'			z'				

Source: Adopted from Pyatt and Round(1979) Table2 and Pyatt and Round(2006) Table12-1

3.4.4.2   Position of 22 Industries in Production Activities Sector

The degree of inter-industry relationship is checked by calculating the effect ratio and the response ratio from the inverse matrix of domestic products using 22 production activities sectors constituting the SAM. Moreover, as a reference, we calculate these two indicators from the inverse matrix of Armington composite goods for which the SAM import sector is incorporated into 22 production activities sector, and compare with the above result. These two indicators, calculated from 22 production activities categories, show the degree of deviation from the average value of all industries; we will construct four quadrants dividing between no less than "1" and no more than "1" from these two indicators and examine which quadrant 22 production activities sectors should be entered[12]. Table 3.4.14 shows the results.

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[12] The first quadrant consists of industries that have both large Effect ratio and Response ratio, for example, Raw material and manufacturing industries. The second quadrant consists of industries under large influence of other industries and with small influence on other industries, for example commerce and services are entered. The third quadrant consists of industries that have both small Effect ratio and Response ratio, for example, agriculture, electricity and gas. The fourth quadrant consists of industries with large influence on other industries, usually including the sector for manufacturing final goods such as automobiles.

Table 3.4.14: The effect ratio and the response ratio in production activities sectors

	Production Activites	Domestic goods			Armingtion's composed goods		
		Effect ratio	Response ratio	Positoion of quadrant	Effect ratio	Response ratio	Positoion of quadrant
1	Products of agriculture excluding coffee product	0.795	0.733	Third quadrant	0.650	0.499	Third quadrant
2	Coffee product	0.962	1.290	Second quadrant	0.802	0.805	Third quadrant
3	Products of forestry	1.052	0.927	Forth quadrant	0.719	0.575	Third quadrant
4	Fish and other fishing products	0.791	0.934	Third quadrant	0.784	0.589	Third quadrant
5	Crude petroleum and natural gas	0.738	0.832	Third quadrant	0.506	1.296	Second quadrant
6	Other minig and quarrying	1.148	1.425	First quadrant	1.168	1.596	First quadrant
7	Coffee processing	1.308	0.734	Forth quadrant	0.958	0.432	Third quadrant
8	Other food processing	0.990	0.757	Third quadrant	1.120	0.591	Forth quadrant
9	Products of light industries	1.256	0.829	Forth quadrant	1.313	0.674	Forth quadrant
10	Products of heavy industries	0.980	1.156	Second quadrant	0.911	1.519	Second quadrant
11	Electricity, gas, and water supply	1.246	0.866	Forth quadrant	1.366	0.550	Forth quadrant
12	Construction	0.768	1.538	Second quadrant	0.941	2.527	Second quadrant
13	Wholesale and retail trade	0.804	1.325	Second quadrant	0.621	0.902	Third quadrant
14	Transportation and storage	1.243	1.622	First quadrant	1.201	1.938	First quadrant
15	Accommodation and food services	0.932	0.972	Third quadrant	0.840	0.755	Third quadrant
16	Information and communication	1.096	1.070	First quadrant	1.159	0.855	Forth quadrant
17	Financial and insurance services	1.102	0.931	Forth quadrant	1.058	0.730	Forth quadrant
18	Real estate services	0.856	0.762	Third quadrant	0.795	0.473	Third quadrant
19	Professional ,administration and support serives	0.941	0.784	Third quadrant	0.895	0.498	Third quadrant
20	Public administration, defense and social security	0.973	0.863	Third quadrant	1.933	2.292	First quadrant
21	Education, human health and social works	0.989	0.731	Third quadrant	1.367	0.431	Forth quadrant
22	Other services	1.030	0.920	Forth quadrant	0.894	1.474	Second quadrant

Looking at 4 industries in the sector for Agriculture, forestry and fishery in Table 3.4.14, Products of Agriculture excluding coffee product and Fish-and-other fishing products are located in the third quadrant, while Coffee product and Product of forestry are in the second quadrant and in the fourth quadrant respectively. On the other hand, in the case of Armington composite goods that include imported goods, all are located in the third quadrant, further reinforcing the "independent-type industry" character of the Agriculture, forestry, and fishery industry. This happens because the weak economic linkage between the primary industry and other industries was revealed by effect of including imported goods, and Agriculture, forestry and fishery products lowering these two indicators in relative terms. As for mining, Crude petroleum and natural gas, Timor-Leste's major industries, are located in the third quadrant, exhibiting a strong "independent-type industry" character. However, Other mining-and-quarrying —both domestic and Armington composite goods—are located in the first quadrant. In other words, they belong to the industry category for the "Raw material and manufacturing industries" which have both large Effect ratio and Response ratio. The industries located in the first quadrant as this industry are Transportation-and-storage and Information-and-communication. On the other hand, among 4 industries broken down from the manufacturing sector, both Products of light industry and Coffee processing are located in the fourth quadrant, while Products of heavy industries and Other food

processing are in the second quadrant and in the third quadrant respectively.

The fourth quadrant consists of industries that are Electricity-gas-and-water supply, Financial-and-insurance services and Other services. Among other tertiary industries, Real estate services, Accommodation-and-food services, Professional-administration-and-support services, Public administration-defense-and-social security and Education-human health-and-social works are located in the third quadrant, while Wholesale-and-retail trade is in the second. Although Construction is usually located in the fourth quadrant, this industry of Timor-Leste is in the second quadrant for both domestic and Armington composite goods. Presumably, this is because of using Brunei's I/O table. For example, Construction of Thailand is located in the fourth quadrant and Wholesale-and-retail trade is in the second quadrant.

3.4.4.3   Spillover Effect on each sector by multiplier Analysis

As for data to be multiplied by the multiplier coefficients (Appendix-I of this report, M of equation (6)), when assuming there occurs exogenous increase in the final demand of each 22 industries by government's big project as investment demand of USD 100 million, we will first comprehensively examine on which among 22 industries the spillover effect is the largest; and as for the detail, examine the spillover effect on production activities sector, on labour at three different skill levels and capital at four types on production factors sector, and on household income in urban and rural.

(1)   Magnitude of Comprehensive Economic Spillover Effect

From Table 3.4.15, we see the largest economic spillover effect on industries for Products of agriculture excluding coffee product and Products of forestry. Both have the economic spillover effect which is four times larger than the injected USD 100 million. On the other hand, the industries with the smallest economic spillover effect are Other food processing, Public administration-defense-and-social security, and Education-human health-and-social works, which have only the same level of spillover effect as the injected amount or less. And other industries have the spillover effect of about twice the injected amount.

Such difference in the spillover effect occurs due to the small open loop effect on the sector for production factors. This is because this effect will be linked to open loop effect and closed loop effect on the system sector, as shown in Figure 1 of Appendix-I. For example, when difference in this loop effects is compared between Coffee product and Other food processing, open loop effect is twice larger and closed loop effect five times

larger while they have almost the same transfer effect. Similar points can be said about Products of agriculture excluding coffee product and Other food processing. Products of agriculture has the transfer effect of only a quarter of that for Other food processing but its open loop effect on production factors is 3.5 times larger. And one of the factors is the level of dependency on intermediate input of imported goods and services; and another is whether value added ratio is small. These points also apply to Public administration-defense-and-social security and Education-human health-and-social works. Furthermore, Fish-and-other fishing products has the similar level of the closed loop effect as the injected amount. This is because while belonging to the industry with a small transfer effect among 22 industries, Fish-and-other fishing products has the next larger open loop effect after Agriculture and fishery, which itself has relatively large open loop effect, and it has the synergism with this large open loop effect. On the contrary, Electricity-gas-and-water supply can be said to have both large open loop effect and transfer effect, though with a small closed loop effect.

Table3.4.15: Result of Comprehensive Economic Spillover Effect

	Resultis of SAM multiplier analysis by the injection of 100 millions US$ Production Activites	Total effect (M-I)	Closed loop effect (N3)	Open loop effect (N2)		Transfer effect (N1)
				Factors of production	Institution	
1	Products of agriculture excluding coffee product	401.9	206.4	93.6	92.8	9.1
2	Coffee product	340.4	154.5	77.9	75.9	32.1
3	Products of forestry	401.1	178.5	90.3	88.0	44.4
4	Fish and other fishing products	255.8	107.5	71.8	68.0	8.5
5	Crude petroleum and natural gas	150.0	3.5	85.6	59.6	1.3
6	Other minig and quarrying	183.5	29.8	51.2	44.8	57.7
7	Coffee processing	361.2	124.0	81.0	76.6	79.6
8	Other food processing	116.7	31.0	25.9	23.9	36.0
9	Products of light industries	222.7	59.5	47.2	43.5	72.5
10	Products of heavy industries	229.5	66.1	67.6	61.3	34.5
11	Electricity, gas, and water supply	294.5	44.4	97.0	82.0	71.1
12	Construction	165.1	70.5	46.1	43.0	5.5
13	Wholesale and retail trade	249.9	86.0	80.5	73.0	10.3
14	Transportation and storage	239.8	55.6	60.1	53.4	70.7
15	Accommodation and food services	241.0	82.4	68.9	61.8	27.9
16	Information and communication	203.7	48.9	55.3	49.0	50.5
17	Financial and insurance services	226.5	57.8	62.3	55.2	51.3
18	Real estate services	218.7	68.6	70.2	62.4	17.5
19	Professional ,administration and support serives	171.6	32.0	59.2	51.2	29.2
20	security	75.0	10.3	16.6	14.4	33.7
21	Education, human health and social works	89.8	19.9	18.0	16.1	35.8
22	Other services	237.0	68.1	67.3	60.1	41.5

(2)   Magnitude of Economic Spillover Effect on Production Activities Sector

Spillover effect on the production activities sector will be examined based on Table 3.4.16. Industries with small transfer effect in Table 3.4.15 also have smaller effect than other industries in Table 3.4.16 which includes the closed loop effect. The industry with the smallest spillover effect is Crude petroleum-and-natural gas, and this effect has only USD 2.9 million. In other words, it is much better for the government to inject the same amount into other industries with larger effect rather than into this industry. In addition, the industries with relatively small spillover effect include Construction, Wholesale-and-retail trade, and Real estate services and so on, all of which have the transfer effect up to USD 5-10 million as shown in Table 3.4.15. Meanwhile, Fish-and-other fishing products, which has small transfer effect like the above mentioned industries, has almost the same level of spillover effect as other industries due to large closed loop effect. On the other hand, Products of Agriculture and forestry, Coffee processing, Products of light industries, Electricity-gas-and-water supply, and Transportation-and-storage have a relatively large spillover effect on the production activities sector. For Coffee processing, Products of light industries, and Transportation-and-storage, transfer effect itself is larger than other industries.

Table3.4.16: Result of Spillover Effect on Production Activities Sector

	Spillover effect on production activities sector Unit: Millions US$	Total effect (N1+N3)	Oil sector	Non-oil sector	Primary industry	Manufacture and Other mining	Construction and Teriary industry
1	Products of agriculture excluding coffee product	100.6	0.4	100.3	32.6	9.1	58.6
2	Coffee product	100.7	0.4	100.3	26.1	11.1	63.0
3	Products of forestry	123.8	0.5	123.3	35.6	11.5	76.2
4	Fish and other fishing products	56.4	0.2	56.2	16.5	5.2	34.6
5	Crude petroleum and natural gas	2.9	0.1	2.8	0.4	0.6	1.8
6	Other minig and quarrying	71.3	3.5	67.8	4.4	11.5	51.9
7	Coffee processing	135.0	0.3	134.7	79.7	8.2	46.8
8	Other food processing	49.9	0.3	49.6	20.8	6.4	22.5
9	Products of light industries	99.3	0.6	98.7	25.8	18.4	54.4
10	Products of heavy industries	64.6	0.7	63.8	9.0	8.0	46.8
11	Electricity, gas, and water supply	91.6	4.2	87.3	5.9	19.2	62.2
12	Construction	37.4	0.1	37.3	9.6	3.1	24.6
13	Wholesale and retail trade	49.4	0.3	49.1	11.7	5.5	31.9
14	Transportation and storage	96.0	1.9	94.1	7.7	36.4	50.0
15	Accommodation and food services	65.2	0.2	65.0	26.4	7.3	31.3
16	Information and communication	72.8	0.9	71.8	6.6	28.1	37.1
17	Financial and insurance services	77.6	0.7	76.9	8.0	20.9	48.0
18	Real estate services	48.7	0.2	48.5	9.2	5.1	34.2
19	Professional ,administration and support serives	43.8	0.2	43.6	10.7	6.8	26.1
20	security	38.4	0.2	38.2	1.4	3.2	33.6
21	Education, human health and social works	44.8	0.2	44.6	2.9	6.0	35.7
22	Other services	72.4	0.2	72.2	11.9	5.4	54.9

Moreover, in terms of the spillover effect on a specific industry, Other mining-and-quarrying and Electricity-gas-and-water supply have a relatively large effect on Crude petroleum and natural gas. As for the primary industry, large spillover effects come from such industries as Coffee processing, and Accommodation-and-food services which are dependent on Agriculture, forestry and fishery for their raw materials. Regarding mining and manufacturing industries, the industries such as Transportation-and-storage and Information-and-communication have a large effect. It should be noted that Products of light industries have a large effect on both the primary and secondary industries.

(3)   Employment Creation Effect

Table 3.4.17 shows, assuming that the same amount of government expenditure is additionally injected to each industry, the increment in wage payment will be how much for which skill level of employee. While the result depends substantially on the preconditions of the division in the labour sector, the industries with larger incremental wage payment to Skilled employees are Electricity-gas-and-water supply, Financial-and-insurance services and Real estate services. In particular, Electricity-gas-and-water supply produces USD 8.8 million of incremental wage payment to Skilled employees. On the other hand, Agriculture-forestry-and-fishery sector and Other food processing, as well as Products of light industries produce larger wage payment to Un-skilled employees in relative terms. Also, Products of heavy industries, Construction, and Wholesale-and-retail trade produce larger incremental wage payment to Semi-skilled employees; in particular, Construction produces USD 13.6 million of incremental wage payment. Crude petroleum and natural gas, Transportation-and-storage, Accommodation-and-food services, Public administration-defense-and-social security and Other services produce almost the same amount of incremental wage payment to all types of employees (Skilled, Semi-skilled, Un-skilled).

Table 3.4.17: Results of Spillover Effect on Labor of Production factor sector

	Spillover effect on factores of production sector Unit: Millions US$	Labor	Skilled Employee	Semi-skilled Employee	Un-skilled Employee
1	Products of agriculture excluding coffee product	11.9	2.1	2.7	7.1
2	Coffee product	9.5	2.1	2.9	4.4
3	Products of forestry	19.8	2.6	3.5	13.8
4	Fish and other fishing products	10.4	1.2	1.6	7.6
5	Crude petroleum and natural gas	1.3	0.3	0.5	0.4
6	Other minig and quarrying	8.4	1.5	4.0	2.9
7	Coffee processing	9.4	2.2	3.6	3.7
8	Other food processing	3.9	0.8	1.2	1.9
9	Products of light industries	8.5	1.9	3.0	3.6
10	Products of heavy industries	11.3	2.3	5.6	3.4
11	Electricity, gas, and water supply	16.6	8.8	3.9	3.9
12	Construction	26.6	3.1	13.6	9.9
13	Wholesale and retail trade	19.1	4.3	9.2	5.6
14	Transportation and storage	11.0	3.9	4.2	2.9
15	Accommodation and food services	17.8	7.0	5.8	5.0
16	Information and communication	10.1	4.0	3.5	2.6
17	Financial and insurance services	12.0	5.0	4.2	2.8
18	Real estate services	13.7	6.1	4.6	3.0
19	Professional ,administration and support serives	10.1	3.9	3.3	2.9
20	security	2.9	1.3	0.9	0.7
21	Education, human health and social works	6.6	1.5	3.0	2.1
22	Other services	13.6	5.5	4.5	3.6

Provided that the wage per employee is unchanged for each skill level, the increment in wage payment can be translated into the increase in the number of jobs, i.e. employment creation effect. The result is shown in Table 3.4.18.

According to Table 3.4.18, Construction has the largest employment effect with new 7,500 jobs. Subsequently, Products of forestry, Wholesale-and retail trade and Accommodation-and-food services create 6,400 jobs, 4,900 jobs and 4,200 jobs, respectively. On the other hand, the industry with the smallest employment creation effect is Crude petroleum-and-natural gas, which creates 300 new jobs. Other industries with small employment creation effect (1,000 to 2,000 jobs) are Other food processing, Public administration-defense-and-social security and Education-human health-and-social works. The rest of the industries create between 2,000 and 3,000 jobs. Looking at the employment creation effect by skill level, the industry with the largest employment creation effect on Skilled employees is Electricity-gas-and-water supply, which creates 1,000 new jobs. Next, Accommodation-and-food services, Financial-and-insurance

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services and Real estate services create between 600 and 800 jobs for skilled workers. For Semi-skilled employees, Construction has the largest employment creation effect with 3,400 new jobs, followed by Wholesale-and-retail trade (2,300 jobs) and Products of heavy industries and Accommodation and food service (between 1,400 and 1,500 jobs). As for Un-skilled employees, Products of forestry creates the largest number of jobs at 5,200, followed by Construction (3,800 jobs), Fish-and-other fishing products (2,900 jobs), Products of agriculture excluding coffee products (2,700 jobs).

The numbers of newly created jobs are calculated by dividing the incremental wage payment (shown in Table 3.4.17) by the compensation of employees per employee (USD 8.9 million for Skilled employee, USD 4.0 million for Semi-skilled employees and USD 2.6 million for Un-skilled employees).

Table3.4.18: Results of Employment Creation Effect

	Spillover effect on factores of production sector Unit: Thousand persion	Labor	Skilled Employee	Semi-skilled Employee	Un-skilled Employee
1	Products of agriculture excluding coffee product	3.6	0.2	0.7	2.7
2	Coffee product	2.7	0.2	0.7	1.7
3	Products of forestry	6.4	0.3	0.9	5.2
4	Fish and other fishing products	3.4	0.1	0.4	2.9
5	Crude petroleum and natural gas	0.3	0.0	0.1	0.2
6	Other minig and quarrying	2.3	0.2	1.0	1.1
7	Coffee processing	2.6	0.2	0.9	1.4
8	Other food processing	1.1	0.1	0.3	0.7
9	Products of light industries	2.3	0.2	0.7	1.4
10	Products of heavy industries	3.0	0.3	1.4	1.3
11	Electricity, gas, and water supply	3.4	1.0	1.0	1.5
12	Construction	7.5	0.3	3.4	3.8
13	Wholesale and retail trade	4.9	0.5	2.3	2.1
14	Transportation and storage	2.6	0.4	1.1	1.1
15	Accommodation and food services	4.2	0.8	1.5	1.9
16	Information and communication	2.3	0.4	0.9	1.0
17	Financial and insurance services	2.7	0.6	1.1	1.1
18	Real estate services	3.0	0.7	1.2	1.2
19	Professional ,administration and support serives	2.4	0.4	0.8	1.1
20	security	0.6	0.2	0.2	0.3
21	Education, human health and social works	1.7	0.2	0.8	0.8
22	Other services	3.1	0.6	1.1	1.4

(4)   Spillover Effects on Household Income in Urban and Rural

From Table 3.4.19 to Table 3.4.21 we consider the spillover effects of the injection in each industry on household income in urban and rural. The magnitude of spillover effects on household income depends on both the increase of wage payments to employees and the increase of capital income in Table 3.4.19. Capital of own-account worker for Agriculture-forestry-and-fishery greatly affects the change of the household income gap between urban and rural in particular.

First, we consider the spillover effect on capital of production factors in Table 3.4.19. The injection of government expenditure in Agriculture-forestry-and-fishery brings about a larger increase in capital income for own-account workers than that in other industries. The injection in Agriculture excluding coffee products especially results in an increase of USD 108.1 million for capital income of independent farmers (Land Owner & Own work) only. Also, the injection in Coffee processing brings about an increase of USD 106.9 million for capital income in total, i.e. USD 49.4 million for capital income of independent farmers, USD 17.8 million for that of self-operating business (Non-Land Owner & Own work) and USD 39.5 million for that of Non petroleum company (Non-oil Sector of Capital). On the other hand, the injection in Other food processing and Construction leads to an increase of between USD 30 million and USD 40 million for capital income, which is equal to one third of the spillover effect of Coffee processing. This is because the ratio of value-added in Other food processing is smaller than that in other industries, and the capital equipment ratio in Construction is smaller. The industries which are similar to Other food processing are Public administration-defense-and-social security and Education-human health-and-social works.

Table3.4.19: Results of Spillover Effect on Capital of Production factor sector

	Spillover effect on factores of production sector Unit: Millions US$	Capital	Land Owner & Own Work	Non-Land Owner & Own Work	Non-oil Sector of Capital	Oil Sector of Capital
1	Products of agriculture excluding coffee product	140.9	108.1	8.9	23.7	0.3
2	Coffee product	112.6	77.0	9.7	25.5	0.3
3	Products of forestry	121.5	79.9	11.5	29.7	0.4
4	Fish and other fishing products	92.1	50.4	5.2	36.3	0.2
5	Crude petroleum and natural gas	85.2	0.3	0.3	0.7	84.0
6	Other minig and quarrying	51.2	3.3	5.7	39.2	3.0
7	Coffee processing	106.9	49.4	17.8	39.5	0.2
8	Other food processing	30.8	9.7	5.4	15.5	0.2
9	Products of light industries	55.6	16.0	12.3	26.8	0.5
10	Products of heavy industries	74.9	7.0	21.8	45.5	0.6
11	Electricity, gas, and water supply	92.8	4.4	6.9	78.0	3.5
12	Construction	39.4	7.5	10.3	21.6	0.1
13	Wholesale and retail trade	85.7	9.1	25.0	51.3	0.3
14	Transportation and storage	64.8	5.9	17.7	39.6	1.6
15	Accommodation and food services	74.4	16.7	18.1	39.3	0.2
16	Information and communication	59.0	5.1	15.3	37.8	0.8
17	Financial and insurance services	66.6	6.1	18.2	41.7	0.6
18	Real estate services	75.8	7.2	22.4	46.1	0.2
19	Professional ,administration and support serives	58.1	5.9	3.4	48.6	0.2
20	security	16.6	1.1	2.4	13.0	0.1
21	Education, human health and social works	17.0	2.2	3.8	10.9	0.2
22	Other services	73.0	8.6	20.7	43.5	0.2

Second, we consider the spillover effect on the household income of the institution sector. The results are shown in Table 3.4.20. From Table 3.2.20, we can see that the injection in the Agriculture-forestry-and-fishery sector and coffee processing industry results in a greater increase in rural household income than that in urban, and has a larger spillover effect on household income than that in other industries. For example, the injection of government expenditure in Products of agriculture excluding coffee product brings about the total increase of USD 127.9 million for household income, in which USD 31.4 million for urban household income and USD 96.5 million for rural household income (three times more than urban household income). On the contrary, for any industries other than the above industries, the spillover effect on household income is not more than USD 50 million, and the income of urban household increases by more than that of rural household.

Table3.4.20: Results of Spillover Effect on Institution sector

	Spillover effect on Institution sector Unit: Millions US$	Total effect (N2+N3)	Household	Urban Household	Rural Household	Non petroleum company	Petroleum company
1	Products of agriculture excluding coffee product	148.5	127.9	31.4	96.5	20.4	0.2
2	Coffee product	117.5	95.4	25.2	70.2	22.0	0.2
3	Products of forestry	136.0	110.1	32.8	77.3	25.5	0.3
4	Fish and other fishing products	96.9	65.5	18.1	47.4	31.2	0.1
5	Crude petroleum and natural gas	60.5	1.7	1.0	0.7	0.6	58.2
6	Other minig and quarrying	52.5	16.8	9.4	7.4	33.7	2.0
7	Coffee processing	109.8	75.7	25.5	50.2	34.0	0.2
8	Other food processing	32.1	18.6	7.4	11.2	13.3	0.2
9	Products of light industries	59.3	35.9	15.6	20.4	23.1	0.4
10	Products of heavy industries	78.7	39.1	21.9	17.2	39.1	0.4
11	Electricity, gas, and water supply	93.5	24.1	14.3	9.7	67.0	2.5
12	Construction	61.6	43.0	24.3	18.7	18.6	0.1
13	Wholesale and retail trade	95.6	51.3	29.0	22.3	44.1	0.2
14	Transportation and storage	68.0	32.9	18.6	14.3	34.1	1.1
15	Accommodation and food services	83.6	49.7	24.7	25.0	33.8	0.1
16	Information and communication	61.8	28.8	16.4	12.4	32.5	0.5
17	Financial and insurance services	70.4	34.1	19.4	14.7	35.9	0.4
18	Real estate services	80.4	40.7	23.3	17.4	39.6	0.1
19	Professional ,administration and support serives	59.6	17.7	9.0	8.7	41.8	0.1
20	security	17.1	5.8	3.4	2.4	11.2	0.1
21	Education, human health and social works	21.4	11.9	6.8	5.1	9.3	0.1
22	Other services	78.0	40.5	22.4	18.1	37.4	0.1

Since the number of households in rural is 2.4 times larger than in urban, spillover effects on household income in rural must be at least as large as that in urban, in order to reduce the gap in income per household between urban and rural. The household income per household is shown in Table 3.4.21. Regarding this table, we can see that the injection in Agriculture and Fishery sector has a larger spillover effect on household income per household in rural than in urban. Therefore, it is found that the injection of government expenditure in Agriculture and Fishery reduces the income gap between urban and rural, but expands the household income gap between urban and rural in other industries. Industries such as Products of heavy industries Construction, Wholesale-and-retail trade, Accommodation-and-food services, Real estate services and Other services have a large spillover effect on household income and accelerate expansion of the income gap between urban and rural. On the other hand, Products of forestry and Coffee processing, which have a large spillover effect on household income, cannot significantly reduce the income gap between urban and rural, but merely mitigate the expansion of the gap.

Table3.4.21: Results of Spillover Effect on Capital of Production factor sector

	Spillover effect on Institution sector Unit: US$	Household	Urban Household	Rural Household		Spillover effect on Institution sector Unit: US$	Household	Urban Household	Rural Household
1	Products of agriculture excluding coffee product	699.2	585.9	746.1	12	Construction	235.0	454.3	144.2
2	Coffee product	521.2	470.3	542.3	13	Wholesale and retail trade	280.6	541.2	172.6
3	Products of forestry	602.1	612.1	597.9	14	Transportation and storage	179.8	347.5	110.3
4	Fish and other fishing products	358.1	338.4	366.2	15	Accommodation and food services	271.4	460.5	193.1
5	Crude petroleum and natural gas	9.6	18.9	5.7	16	Information and communication	157.3	305.8	95.8
6	Other minig and quarrying	91.8	174.9	57.4	17	Financial and insurance services	186.5	363.0	113.4
7	Coffee processing	413.5	475.1	388.0	18	Real estate services	222.4	434.5	134.5
8	Other food processing	101.8	138.3	86.7	19	Professional ,administration and support serives	96.9	168.5	67.2
9	Products of light industries	196.5	290.8	157.4	20	Public administration, defense and social security	31.8	63.0	18.9
10	Products of heavy industries	213.9	409.2	133.0	21	Education, human health and social works	65.2	126.4	39.8
11	Electricity, gas, and water supply	131.5	267.6	75.1	22	Other services	221.2	417.8	139.8

(5) Summary and Issues for Multiplier Analysis

The multiplier analysis in this section examined, for instance, the spillover effect on the sectors for production activities, production factors, and system (households and companies) when government's new projects are injected in each industry at the same level. As a result of this, totally speaking, among 22 industries, four industries—Products of Agriculture-and- Forestry and Coffee processing —have the largest spillover effects, while Mining, Other food processing, Construction and Public service related have small economic spillover effects. Since this analysis is only for domestic goods, the spillover effect tends to be small for industries that are dependent on intermediate input of imported goods and services. Accordingly, if Timor-Leste proceeds with import substitution going forward, we will see a different result from this multiplier analysis. In particular, while Construction is usually treated as non-tradable goods like Electricity-gas-and-water supply and Real estate services, such results for Timor-Leste occurs because its imported services account for more than double of domestic goods and services for intermediate input. Similar results can be pointed out for Food processing and Public services related.

Moreover, this section examined the spillover effects of dividing SAM into the labour, capital and household sectors. If the government promotes large-scale projects in Electricity-gas-and- water supply, Financial-and-insurance services, Real estate services, Professional- administration-and-support services and Other services, it will have a larger job creation effect for skilled employees than others; on the other hand, it will have a by-product of expanding the income gap between urban and rural. On the contrary,

promotion of projects in Agriculture-forestry-and-fishery as well as Food processing industries will have a job creation effect on un-skilled employees, and, it is expected to reduce the income gap between urban and rural. Moreover, while having smaller job creation effects in absolute terms than the above industries, Products of heavy industries, Construction, and Wholesale-and-retail trade are expected to have job creation effects on semi-skilled employees.

It should be noted that when referring to the above results for selections of future projects, intermediate input coefficients for domestically supplied goods and services are calculated by applying Brunei's intermediate input coefficients as analogy, and the results of above multiplier analysis were acquired using the coefficients obtained from SAM based on the I/O table with such intermediate input coefficients.

3.4.4.4 Examination of the Employment Creation Effect of the Infrastructure Fund and the Measures for New Employment of 300,000 in 2030

It is intended here to verify by the SAM multiplier analysis the employment creation effect of the Infrastructure Fund in the first section of this chapter (3.1), as well as to find out from the SAM multiplier analysis simulation how much government expenditure needs to be injected and into which industries in order to secure new employment corresponding to the increase of the number of workers with different educational backgrounds given by the estimated labour composition in 2030 in the second section (3.2).

(1) Verification of the Employment Creation Effect of the Infrastructure Fund

For starters, before verifying the employment creation effect in the first section, SAM multiplier analysis will be conducted for the following two cases. And based on their results, it will be presented as to what procedures will be taken for the verification.

In Case A, it is assumed that the total budget of USD 2,518.1 million from 2014 to 2018 is injected into Construction industry. In other words, economic spillover effect of Construction industry on the hardware side will only be simulated, assuming that the business contents of Construction industry do not change regardless of whether the funds are allocated to agricultural irrigation facilities, infrastructure construction such as roads, airports and seaports or construction of public buildings. On the other hand, while Case B is actually construction on the hardware side, the simulation assumes the economic spillover effect based on the construction. For example, it assumes that the amount injected to construct an agricultural irrigation facility is the amount corresponding to

inducing an increase in agricultural production through the improved agricultural productivity caused by the irrigation facility. In other words, it is on the premise that the funds will be injected into the industries which are in line with the purpose of the Infrastructure Fund program. Table 3.4.22 shows, as the precondition for Case B, the amounts of injection to be distributed to each industry according to the program contents of the Infrastructure Fund.

The result of SAM multiplier analysis of the two cases is shown in Table 3.4.23. It can be seen that Case A has a larger employment creation effect than Case B by about 60,000 jobs, with a bigger increase in household income of USD 1,300 per household as well. On the other hand, the result shows that Case B has a bigger overall economic spillover effect and does not expand the income gap between urban and rural as much as Case A. Which case is more desirable depends on what one wants to know from the simulation result. Namely, while Case B is more appropriate if one wants to verify the economic spillover effect of the Infrastructure Fund, Case A suits better to verify simply the spillover effect of public investment.

The following points should be kept in mind when such SAM multiplier analysis of the Infrastructure Fund is conducted. First, it assumes that domestic construction companies have received all the orders for infrastructure construction. Second, the effect of the employment creation according to SAM multiplier analysis includes not only direct employment creation by increased production of domestic construction industry, but also the employment creation in other industries induced by the increased output by the construction industry.

Accordingly, the employment creation effect in the first section of this chapter estimates the number of Timorese employed in infrastructure construction, assuming that in addition to domestic general contractors, foreign ones also receive orders. And its numbers are the result of calculating the manpower engaging in the process of constructing these infrastructure buildings. Considering these points, we think it appropriate to compare with Case A in order to verify the estimated result. As a result, from the above two points of attention, the comparison will cover 190,000 persons in Case A as well as 112,000 persons—the sum of Timorese and foreign workers in Table 3.1.3. And the SAM multiplier analysis naturally shows a larger effect; what needs to be done is to verify whether the difference of 78,000 persons between the two is appropriate as the employment creation effect in other industries caused by the economic spillover effect. Accordingly, if we calculate the average economic spillover effect of industries from Table 3.4.15, and then divide it by the average employment creation effect of industries calculated from Table 3.4.18, we get USD 76,600 for the economic spillover

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effect of creating employment for one person. If the overall economic spillover effect of USD 4,156 million (Case A) is divided by it, the result is 54,000 persons. As this is the number of employment created by the economic spillover effect, the estimated result in the first section is concluded as basically appropriate.

Table3.4.22: The Amounts of Injection by each industry in Case B

The amounts of injection in industry :Millions US Dollars	201-2018 Budget	The amounts of injection in industry :Millions US Dollars	201-2018 Budget
Products of agriculture exluding coffee product	52.7	Construction	1,475.9
coffee product	9.2	Wholesale and retail trade	0.0
Products of forestry	1.2	Transportation and storage	0.0
Fish and other fishing products	3.7	Accommodation and food services	7.9
Crude petroleum and natural gas	365.2	Information and communication	4.9
Other minig and quarrying	0.0	Financial and insurance services	54.6
Coffee processing	0.0	Real estate services	0.0
Other food processing	0.0	Professional ,administration and support serives	19.8
Products of light industries	0.0	Public administration, defense and social security	45.0
Products of heavy industries	0.0	Education, human health and social works	187.4
Electricity, gas, and water supply	290.7	Other services	0.0

Table3.4.23: Result of the Employment Creation Effect of the Infrastructure Fund

	Injection in industry	Total Injection aoumts	Total economic spillover effect	Total Jobs created	Skilled labor	Semi-skilled Labor	Un-skilled Labor	Incease of household income	Urban household	Rural household
unit		Millions US$	Millions US$	Thousand persons				US Dollars per household		
Case A	Construction	2,518.1	4,156.4	189.9	8.8	86.2	94.9	5,918	11,441	3,631
Case B	Each industry concerned of Programe Funded	2,518.1	4,485.7	130.8	9.1	56.8	64.8	4,609	8,472	3,009

(2) Measures for New Employment of 300,000 in 2030

To begin with, the assumptions for the calculation here will be explained. The first assumption is that all new 300,000 employees in 2030 will be those employed by private companies. In other words, they will not become self-employed, employers, or public servants. The second assumption is that Timorese will not replace foreign workers who were employed by private companies in 2010. These assumptions are rather hard to follow, but necessary in order to calculate based on the number of workers with different educational backgrounds given by Table 3.2.19-20 in the section 2 (3.2). If the number of employees at different skill levels in 2030 is calculated from the baseline in Table 3.2.16 under these assumptions, the number of new skilled employees will be 47,000, semi-skilled 127,300 and unskilled 125,500. We will examine based on the following four scenarios to see how much budget government will need, and how much of it should be allocated to which industry in order to absorb these potential new employees.

For starters, the basic thinking of preparing the four scenarios will be explained. First, considering that economic spillover effect of the increased government expenditure will invigorate activities of each industry, the same amount of budget will be allocated to Electricity-gas-and-water supply, and Construction in all scenarios. Second, the total budget is the same for all scenarios, in selecting industries to effectively creating employment for 300,000 employees in total. Third, the budget will be prioritized to develop strategic industries. In accordance to these points, the following scenarios are to be established.

The total budget will be USD 8 billion for all scenarios from scenario A to D, with Electricity-gas-and-water supply and Construction receiving USD 1 billion respectively. The remaining USD 6 billion will be allocated to the industries listed in Table 3.4.24. The Scenario A is the one for "Development of strategic industries in the primary and related industries" in which USD 1 billion will be distributed to 6 industries in total—i.e., four

industries in Agriculture-Forestry-and-Fishery, as well as two relevant industries in Food processing industry. The Scenario B is the one for "Development of strategic industries in the manufacturing sector" with the light and heavy industries getting USD 1 billion and USD 5 billion respectively. The Scenario C is the one for "Development of strategic industries in IT, finance, sightseeing, etc." with Accommodation-and-food service and Information-and-communication getting USD 1.5 billion respectively, while Finance-and-insurance, Real estate services, and Other services getting USD 1 billion respectively. The last Scenario D is a combination of the Scenarios B and C.

Table 3.4.25 shows the result of SAM multiplier analysis based on the above scenarios. According to this table, Scenario A has a larger economic spillover effect of USD 23.3 billion, larger by over USD 5 billion than other scenarios with USD 18.0 - 18.3 billion. Moreover, the employment creation effect is also the largest at 308,000 jobs. Furthermore, the increase in the household income per household is over USD 30,000, which is about USD 14,000 larger than in other scenarios, and at the same time reducing the expansion of income gap between urban and rural. It should be noted, however, in this scenario problems will remain that while labour demand for unskilled employees will be 200,000, or 75,000 more than supply, there will arise serious mismatches in the skilled and semi-skilled labour markets, with 22,000 new skilled workers and 44,000 semi-skilled ones unable to find a job corresponding to their skill level.

Table3.4.24: The Amounts of Injection in industries by each scenario

The amounts of injection in industry :Millions US Dollars	Scenario A	Scenario B	Scenario C	Scenario D	The amounts of injection in industry :Millions US Dollars	Scenario A	Scenario B	Scenario C	Scenario D
Products of agriculture exluding coffee product	1,000	0	0	0	Construction	1,000	1,000	1,000	1000
coffee product	1,000	0	0	0	Wholesale and retail trade	0	0	0	0
Products of forestry	1,000	0	0	0	Transportation and storage	0	0	0	0
Fish and other fishing products	1,000	0	0	0	Accommodation and food services	0	0	1,500	1000
Crude petroleum and natural gas	0	0	0	0	Information and communication	0	0	1,500	500
Other minig and quarrying	0	0	0	0	Financial and insurance services	0	0	1,000	500
Coffee processing	1,000	0	0	0	Real estate services	0	0	1,000	500
Other food processing	1,000	0	0	0	Professional ,administration and support serives	0	0	0	0
Products of light industries	0	1,000	0	500	Public administration, defense and social security	0	0	0	0
Products of heavy industries	0	5,000	0	2,000	Education, human health and social works	0	0	0	0
Electricity, gas, and water supply	1,000	1,000	1,000	1,000	Other services	0	0	1,000	1000

Between the remaining three scenarios from Scenarios B to D, no significant difference is observed in economic spillover effects and the increase in household income per household, and the degree of expansion in the income gap between urban and rural. However, there is a difference in the employment creation effect at different skill levels. In Scenario B, labour demand for skilled workers will be short by as much as 21,000; but in the unskilled and semi-skilled labour markets, supply and demand of labour almost match to each other, despite some mismatches. On the other hand, in Scenario C, while there arises excess demand for skilled workers, unemployment of semi-skilled workers will occur. And, in scenario D, which is an in-between Scenarios B and C, imbalances in labour supply and demand at different skill levels will result, although they are not as serious mismatches of labour as those in Scenario A.

It is suggested from the above examination that prioritized allocation like that in scenario A—in which budget is prioritized for development of strategic sectors with agriculture, forestry and fishery as the core—is effective for Timor-Leste which has a lot of households, including those of independent farmers, and potential workers in the agricultural sectors. It should be noted that it is necessary for the government to take additional measures to avoid mismatches in labour markets at different skill levels if the government would try to develop such strategic industries.

Table3.4.25: Result of the Employment Creation Effect by each scenario

	Injection in industry	Total Injection aoumts	Total economic spillover effect	Total Jobs created	Skilled labor	Semi-skilled Labor	Un-skilled Labor	Increase of household income	Urban household	Rural household
unit		US$	US$	Thousand persons				US Dollars per household		
Scenario A	Main Primary industry and Food industry	8,000.0	23,366.5	307.8	25.7	83.3	198.7	30,623	33,420	29,465
Scenario B	Main Manufacture excluding food industry	8,000.0	18,296.2	281.8	28.4	122.9	130.4	16,325	30,587	10,419
Scenario C	Main Tertiary industry	8,000.0	18,088.1	295.1	50.4	112.7	132.0	16,397	30,868	10,405
Scenario D	Both Manufacture and Tertiary industry	8,000.0	18,323.0	293.8	42.0	117.8	134.0	16,683	31,157	10,689

CHAPTER 4: CONCLUSIONS

This chapter summarizes the study results and their policy implications in light of the objectives shown in Chapter 2. They will be presented by analysis.

4.1 Employment to Be Created by Infrastructure Fund Budget and Future Job Projection (Analysis 1)

In Analysis 1, employment to be created through the implementation of the SDP was estimated focusing on the demand side of the labour force. For the short-term (FY 2013 and FY 2014) and mid-term (FY 2014-2018) estimations, the Study referred to the budget books for Infrastructure Fund. For the long-term projection (2010-2030), the cases of Trengganu State in Malaysisa and Rayong Province in Thailand were used for estimation. These two cases were selected as references for the following reasons: 1) the key industry of these areas has been the oil and gas industry like in Timor-Leste; 2) while setting the oil and gas industry as the core industry, these areas also extended their focus to agriculture and tourism for achieving economic development, providing implications for future industrial development of Timor-Leste. Also, in the estimation of labour force demand, the numbers of jobs to be created were calculated by nationality (Timorese nationals and expatriates) and by technical level (manager/engineer, skilled, semi-skilled and unskilled), and so the results could also be utilized for deriving policy implications on the supply side of the labour force.

4.1.1 Study results

The short-term and mid-term projections are made as follows.

- Number of jobs created by the Infrastructure Fund in FY 2013: 21,600
- Number of jobs created by the Infrastructure Fund in FY 2014: 16,000
- Numbers of jobs created by the Infrastructure Fund (FY 2014-2018): 112,000

Among the number of jobs created from FY 2014 to FY 2018 (112,000 in total), 82% of manager/engineer positions, 67% of skilled labour, 36% of semi-skilled labour, and 8% of unskilled labour are estimated to be given to expatriates.

For the long-term projection, the following three models are used to estimate the effect on job creation from 2010 to 2030.

- Malaysia Model (using the case of Trengganu State, Malaysia): 185,000 increase
- Thailand Model (using the case of Rayong Province, Thailand): 242,000 increase

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- Combination Model (using both cases of Malaysia and Thailand):

  Case 1:   185,000 increase

  Case 2:   242,000 increase

  Case 3:   300,000 increase

In the "Combination Model," three cases are developed with job creation in the manufacturing industry as a parameter. As the increase in labour supply in 2030 is projected at 300,000 in Analysis 2, Case 3 is the only case where labour supply and demand will be balanced in 2030. Since Case 3 assumes that the manufacturing industry will develop as rapidly as in the case of Thailand, this result indicates that promoting the manufacturing industry could be the key for considering future industrial development policy in Timor-Leste.

4.1.2   Policy implications

(1)   Replacement of expatriates with Timorese workers

As the result shows, a high proportion of newly created professional/technical jobs (manager/engineer, skilled and semi-skilled workers) in FY 2014-2018 would be given to expatriates. To absorb the additional domestic labour supply estimated in Analysis 2 (300,000 persons), it is important to draw up policies for increasing the proportion of domestic workers.

The replacement of expatriates' jobs by Timorese should be planned with consideration for how to maintain the quality of the jobs. Thus, it is crucial to strategically develop human resources with sufficient technical backgrounds and experience.

As for manager/engineer positions, the required academic qualifications are bachelor's degree, master's degree and doctoral degree. These positions are assumed to be replaced initially by graduates of the UNTL, and then by graduates of other universities in Timor-Leste. To promote this transition, the curricula of domestic universities, especially for technical subjects, should be improved to meet the demands of industry. Until this transition is completed, Timorese graduates of overseas universities would continue to replace the expatriates.

For skilled and semi-skilled workers, diplomas and certificates are required as academic qualifications, respectively. The replacement in these positions would be achieved with the graduates of TVET institutes. To promote this transition, training contents and equipment should be improved to meet the demands of key industries. For

training in advanced skills (e.g. welding and plumbing for the construction of oil refineries and/or LNG terminals, which cannot be provided currently by training providers in Timor-Leste), it is necessary to prepare training materials, training guidelines, etc. While the TVET system is currently being developed in Timor-Leste, it will take time to build a system which meets the needs of industry. During this preparatory period, utilization of TVET institutes in neighboring countries, such as Thailand, Malaysia, Indonesia and the Philippines, can be an alternative to develop highly-skilled workers.

Another approach for developing highly-skilled workers is to use on-the-job training. For example, it is advisable to include a clause in the contract for purchasing large infrastructure or plants (as in the Tasi Mane project) stating that "it is the obligation of contractor to give training to a certain number of Timorese semi-skilled and/or un-skilled workers prior to the start of construction."

(2)   Industrial development through catalyst effect of oil and gas industry

For estimating long-term job creation, the Study referred to the cases of Terengganu State in Malaysia and Rayong Province in Thailand. Both cases are similar to Timor-Leste in setting the oil and gas industry as the core for promoting economic development. In the case of Terengganu State, development of the agriculture and tourism sectors has been achieved with the oil and gas sector as the core industry. Rayong Province has focused on agricultural development and also developed tourism around Pattaya based on oil and gas industry. These cases reveal policy implications for the direction of future industrial development in Timor-Leste, for the country is also planning to reduce its dependency on oil revenue. The success of both cases depended on the "catalyst effect of oil and gas industry." In other words, while the oil and gas industry itself cannot directly employ large numbers of workers, 1) related industries, such as machinery, construction, restaurant and hotel management, school management and other public services have created indirect employment, and 2) well-developed infrastructure (e.g. ports, airports, roads and power) attracted investments in other industries such as the automotive industry and home appliance industry, thus having positive impacts on employment creation. Yet this does not mean that infrastructure development automatically leads to job creation; rather, the increase in employment can be attributed to the efforts for attracting industries made by central and local governments in these countries. For example, one-stop agencies for investors were established, such as the Board of Investment in Thailand, the Industrial Estate Authority of Thailand, the Malaysian Investment Development Authority and Terengganu State Development

Corporation. Investment promotion seminars were organized both at home and abroad, and advertisements were broadcast widely through television, the internet, newspapers and business magazines abroad. Policies to promote investment by giving privileges including tax exemptions and/or reduction, as well as lifting of restrictions were implemented.

The analysis of the long-term employment effect (Combination Model) also shows that investment in the manufacturing sector has a large impact on job creation. As such, it is recommended that focus be placed on promotion of the manufacturing industry for considering future industrial development policies in Timor-Leste.

4.2   Effect of Quality Improvement of Labour Force by Education and Training (Analysis 2)

This analysis focused on the supply side of the labour force, and an estimation of labour provision was conducted for effective implementation of the SDP. First, the Labour Force Survey (2010) was re-analyzed to clarify the current status of labour force supply and its quality. Then, the Study estimated the labour force supply until 2030 (SDP target year) for four scenarios, and based on the results, presented policy implications for human resource development.

4.2.1   Study results

(1)   Current status of labour force supply

Looking at the working population by educational background, the quality of the labour force is currently very low in Timor-Leste. To achieve the industrial structure projected in the SDP, the quality of the labour force should be improved. The SDP aims to make Timor-Leste an upper-middle income country by 2030. To achieve this goal, the country's GDP/C has to exceed USD 2,000 (excluding oil and gas revenue) by the target year. This level of GDP/C was achieved by Indonesia and Malaysia, which also rely on oil and gas revenue, in 2008 and 1990, respectively. Compared to these two countries, the education level of Timor-Leste is low. For example, only 3.4% of the working population receives higher education in Timor Leste (2010) while the rate is 7.6% in Indonesia (2010) and 8.8% in Malaysia (1990). On the other hand, 49.5% of the working population has not completed primary education in Timor-Leste (2010) while the rate is 21.4% in Indonesia (2010) and 12.0% in Malaysia (1990). Therefore, there is an urgent need to improve the education level of the work force, especially the proportion of those who

have completed higher education if Timor-Leste is to achieve the goal of becoming an upper-middle income country by 2030.

Through re-analysis of the Labour Force Survey (2010), the Study examined the relationship between educational background and quality of the labour force and revealed the challenges. The results are as follows. Among those who have completed higher education, both the labour participation rate and employment rate are high for both men and women. Although the employment rate for men is higher than that for women, the gap is closing. The low employment rate of Timor-Leste, compared to other countries, is attributed more to the low labour participation rate than to the unemployment rate. The primary reason for the low labour participation rate is "attending school," while "family responsibility or housework" is often raised as the main reason among women. Also, the large number of household members negatively affects the labour participation rate. The income level of households has a positive relation with household members' economic activities (i.e. employment and employment seeking). Looking at the relationship between type of work and educational background, "Professionals" has a positive relation with "tertiary and vocational education," but a has negative relation with "less than primary education."

(2)   Simulation on improving the quality of labour force by education

The population composition of Timor-Leste shows a typical pyramid-type structure with 62% of the population being under 20 years old (2010). This means that the quality of the labour force can be dramatically improved in the future by providing proper education and training to young people. In other words, a quality labour force is not possible without proper education and training for youths.

Based on this understanding, the Study estimated the labour structure in 2030. For this estimation, four scenarios were projected with intake/promotion rate, dropout rate and repetition rate as parameters. The scenarios were as follows.

1) Baseline Scenario (assumption: the parameters do not change from 2010 to 2030)
2) 20% Improvement Scenario (assumption: the parameters improve by 20% every 5 years)
3) Planned Scenario (assumption: the parameters are borrowed from the policy paper of the Ministry of Education)
4) 40% Improvement Scenario (assumption: the parameters improve by 40% every 5 years)

First of all, the number of labour force is estimated to double from 278,032 in 2010 to

577,998 in 2030, i.e. an additional 300,000 will enter the labour market by 2030. This increase is consistent among the four scenarios by definition; the only difference between the scenarios is the educational background of the additional workers.

In all scenarios, there is a significant increase in the number of highly educated labour force. Even in the Baseline Scenario, the number of highly educated workforce will double. As a whole, graduates of tertiary education are projected to increase by 2.0-3.3 times, and high school leavers by 3.7-4.3 times. As these increases in highly educated workforce are expected to be absorbed in secondary and tertiary industries, industrial development is required. The primary academic institution to receive the increased population would be the UNTL. The intake capacity of the UNTL from 2010 to 2030 is estimated to be 22,280, and is capable of providing a highly educated labour force in the Baseline Scenario. Even the 40% Improvement Scenario is realistic in terms of numbers if the graduates of other higher education institutes (e.g. DIT, overseas universities, etc.) are taken into account.

On the other hand, it is found that professional and technical workers cannot be filled only by highly educated people if their areas of specialty are taken into account. To fill the increased number of positions of professional and technical workers, at least the 20% Improvement Scenarios is required. If the labour supply is not sufficient in time, then the gap will be filled by foreign workers.

4.2.2   Policy implications

The study results indicate the following policy implications.

The quality of the labour force is currently very low in Timor-Leste. To achieve the industrial structure outlined in the SDP by 2030, the quality of the labour force should be improved. Accordingly, it is urgent to improve the education level of the work force, especially the proportion of those who have completed higher education if Timor-Leste is to achieve the goal of becoming an upper-middle income country by 2030. This improvement can be achieved through providing sufficient education and training to the youth population, which accounts for 60% of the total population.

From the analysis of the current status, the increase in highly educated population is expected to improve the labour force participation rate as well as the employment rate. Therefore, efforts should be continued to enhance and expand secondary and tertiary education in order to develop a highly skilled labour force.

To increase the graduates of secondary schools and universities, it is important to

improve the intake/promotion rate, dropout rate and repetition rate to achieve the higher level scenario among the four scenarios.

In expanding secondary and tertiary education, the priority areas of specialty should be considered; it is necessary to increase the provision of professional and technical workers to meet the labour demand of the future industrial structure of Timor-Leste. For secondary education, the proportion of secondary technical education should be increased as described in the policy of the Ministry of Education. As for tertiary education, the composition of enrolled students among the faculties is fairly balanced at the moment; however, it is important not to focus on the humanities and sociology departments, which are less costly, in the process of expanding tertiary education.

4.3   Construction of SAM for Timor-Leste 2010 and Multiplier Analysis (Analysis 3)

The results of Analysis 3 are shown below. Policy implications extracted from the study results are also presented (with underlines).

4.3.1   Study Results and Policy Implications

(1)   Summary and Issues for Multiplier Analysis

The multiplier analysis examined the spillover effect on the sectors for production activities, production factors, and system (households and companies) when government's new projects are injected in each industry at the same level. As a result of this, among 22 industries, four industries—Products of Agriculture-and- Forestry and Coffee processing —have the largest spillover effects, while Mining, Other food processing, Construction and Public service related have small economic spillover effects. Since this analysis is only for domestic goods, the spillover effect tends to be small for industries that are dependent on intermediate input of imported goods and services. Accordingly, if Timor-Leste proceeds with import substitution going forward, a different result from this multiplier analysis will be observed. In particular, while Construction is usually treated as non-tradable goods like Electricity-gas-and-water supply and Real estate services, such results for Timor-Leste occurs because its imported services account for more than double of domestic goods and services for intermediate input. Similar results can be pointed out for Food processing and Public services.

Moreover, the Study examined the spillover effects of dividing SAM into the labour, capital and household sectors. If large-scale projects proceed in Electricity-gas-and-

water supply, Financial-and-insurance services, Real estate services, Professional-administration-and-support services and Other services in the future, they will have a larger job creation effect for skilled employees than others; however, they will have a by-product of expanding the income gap between urban and rural. On the contrary, promotion of projects in Agriculture-forestry-and-fishery as well as Food processing industries will have a job creation effect on un-skilled labour force, and, they are expected to reduce the income gap between urban and rural. Moreover, while having smaller job creation effects in absolute terms than the above industries, Products of heavy industries, Construction, and Wholesale-and-retail trade are expected to have job creation effects on semi-skilled employees.

(2)   Verification of the Employment Creation Effect of the Infrastructure Fund

As a result of the multiplier analysis, the estimation on the number of jobs created by Infrastructure Fund (2014-2018) in Analysis 1 is verified as valid.

The verification procedure is as follows. First, two cases are assumed (Case A and B), and the multiplier analysis is conducted for these two cases.

<Case A>
Total budget of USD 2,518.1 million from 2014 to 2018 is assumed to be injected into Construction industry. In this case, economic spillover effect of construction projects per se is simulated without regard to the projects' purpose or contents.

<Case B>
The same amount of budget injection in the same period is assumed in this case as well; however, the simulation is extended to the spillover effect that results from construction projects. For example, the government spending for constructing an irrigation scheme is counted as an investment to improve agricultural productivity. Thus, the spillover effect on agricultural productivity is included in this analysis.

Analysis 1 estimates the number of jobs created in infrastructure construction, and the number is the result of calculating the manpower engaged in the process of constructing these infrastructure buildings. Considering these points, it is appropriate to compare with Case A in order to verify the estimated result. Accordingly, the verification can be made through comparing employment creation effects in Case A (190,000 persons) and Analysis 1 (112,000 persons). And the SAM multiplier analysis (Case A) naturally shows a larger effect; what needs to be done is to verify whether the difference of 78,000 persons between the two is appropriate as the employment creation effect in other industries caused by the economic spillover effect. Accordingly, the average economic

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spillover effect of industries is calculated, and then divided by the average employment creation effect of industries. The result is USD 76,600 for the economic spillover effect of creating employment for one person. If the overall economic spillover effect of USD 4,156 million (Case A) is divided by this figure, the result is 54,000 persons. As this is the number of employment created by the economic spillover effect, the estimated result in Analysis 1 is concluded as basically appropriate.

(3)   Measures for New Employment of 300,000 in 2030

Through the SAM multiplier analysis simulation, it is analyzed how much government expenditure needs to be injected and into which industries in order to secure new employment corresponding to the increase of the number of workers with different educational backgrounds given by the estimated labour composition in 2030 through Analysis 2. To do this, four scenarios with different premises are developed as below.

<Scenario A: Development of strategic industries in the primary and related industries>
USD 1 billion is distributed to each of 6 industries, i.e. four industries in Agriculture-Forestry-and-Fishery, and two relevant industries in food processing, which has close linkage with agriculture, forestry and fisheries industry.

<Scenario B: "Development of strategic industries in the manufacturing sector">
USD 1 billion is distributed to light industry, and USD 5 billion to heavy industry.

<Scenario C: "Development of strategic industries in information technology, finance, tourism, etc.">
USD 1.5 billion is distributed to Accommodation-and-food service and Information-and-communication industries respectively, while Finance-and-insurance, Real estate services, and Other services getting USD 1 billion each.

<Scenario D: "Combination Scenario">
Combination of Scenario B and C.

Preconditions for all scenarios above are as follows:
1) Considering that economic spillover effect of the increased government expenditure will enhance production activities in each industry, the same amount of budget is allocated Electricity-gas-and-water supply, and Construction.
2) The total budget is set at USD 8 billion for all scenarios in order to select the industries which effectively create employment for 300,000 persons.
3) The budget allocation is prioritized to develop strategic industries.
4) In accordance with the first precondition, USD 1 billion is allocated to

Electricity-gas-and-water supply, and Construction respectively. And the remaining 6 billion is allocated among other industries.

Scenario A has the largest economic spillover effect of USD 23.3 billion, larger by over USD 5 billion than other scenarios with USD 18.0-18.3 billion. Moreover, the employment creation effect is also the largest at 308,000 jobs. Furthermore, the increase in the household income per household is over USD 30,000, which is about USD 14,000 larger than in other scenarios, and at the same time reducing the expansion of income gap between urban and rural. It should be noted, however, in this scenario problems will remain that while labour demand for unskilled employees will be 200,000, or 75,000 more than supply, there will arise serious mismatches in the skilled and semi-skilled labour markets, with 22,000 new skilled workers and 44,000 semi-skilled ones unable to find a job corresponding to their skill level.

Between the remaining three scenarios from Scenarios B to D, no significant difference is observed in economic spillover effects and the increase in household income per household, and the degree of expansion in the income gap between urban and rural. However, there is a difference in the employment creation effect at different skill levels. In Scenario B, labour demand for skilled workers will be short by as much as 21,000; but in the unskilled and semi-skilled labour markets, supply and demand of labour almost match to each other, despite some mismatches. On the other hand, in Scenario C, while there arises excess demand for skilled workers, unemployment of semi-skilled workers will occur. And, in scenario D, which is an in-between Scenarios B and C, imbalances in labour supply and demand at different skill levels will occur, although they are not as serious mismatches of labour as those in Scenario A.

It is suggested from the above examination that prioritized allocation like that in scenario A—in which budget is prioritized for development of strategic sectors with agriculture, forestry and fishery as the core—is effective for Timor-Leste which has a lot of households, including those of independent farmers, and potential workers in the agricultural sectors. It should be noted that it is necessary for the government to take additional measures to avoid mismatches in labour markets at different skill levels if the government would try to develop such strategic industries.

Appendix

Appendix-I The SAM framework

The SAM framework is based on the typical approach of Pyatt and Round(1979 and 2006), and can be used to estimate the effects of exogenous changes and injections, such as an increase in the demand for a given production activity, government expenditures or exports on the whole system by using the Accounting multipliers.

Several important conditions are underlying the SAM multiplier analysis. They stress the limits of this type of exercises.

i) The existence of excess capacity which would allow prices to remain constant.
ii) Constant expenditure propensities of endogenous account
iii) Production technology and resource endowment are given.

The SAM multipliers can be used to evaluate the potential impacts of the output changes on the corresponding production activity, factorial income distribution changes on three skilled-types of labor and capital and the household income distribution changes on urban household and rural household starting with an exogenous shocks.

We will explain the SAM framework briefly. For analytical purposes, the endogenous part of the transaction matrix is converted into the corresponding matrix of coefficients. We would take notice of N and L in Table 3.4.13.

y_i is the column vector of endogenous total income that each economic unit i.e. production activity, production factor and institution (household and company) is received .n is the column vector of row sums of the endogenous accounts N, and x is the column vector of row sums of the exogenous accounts L.

$$y_n = n + x \tag{1}$$

$$N = A_n \times \hat{y}_n \tag{2}$$

where A_n is sub-matrices containing an average expenditure propensities, showing the income of endogenous account i received form endogenous account j as a proportion of expenditure of endogenous account j. $\hat{y}_n$ is a diagonal matrix of element in y_i.

$$n = A_n \times y_n \tag{3}$$

$$y_n = A_n \times y_n + x \tag{4}$$

$$y_n = (I - A_n)^{-1} \times x \tag{5}$$

$$= M \times x \tag{6}$$

Equation (6) indicates that endogenous income y_n (production incomes, factorial income, household and company income) can be derived by multiplying injection x by the multiplier matrix of Ma. This Ma has been referred to as is Accounting multiplier matrix.

And equation (7) is the three part decomposition Ma established in Pyatt and Round(1979).

$$Ma = Ma_3 \times Ma_2 \times Ma_1 \tag{7}$$

$Ma_3,$ Ma_2 and Ma_1 can be formalised by writing A_n. Ma and A_n are abbreviated as M and A as follows;

First, A can be written as 3×3 matrix

$$A = \begin{bmatrix} A_{PP} & 0 & A_{PI} \\ A_{FP} & 0 & 0 \\ 0 & A_{IF} & A_{II} \end{bmatrix} \tag{8}$$

in which four of the sub-matrices are zero. The sub-matrices A_{PP} and C_{II} represent trnsfers wthin a given class of accounts: the matrix A_{PP} captures inter-industry transactions while A_{II} represents current trnasfers between institutions. The three remaining sub-matrices are A_{PI}, A_{FP} and A_{IF}. Together they characterise the circular flow of incomes and uotlays whereby any increase in espmediture by institutions generates extra demand for products via the mapping A_{PI}. Next, thesupply respose to this increase in demand genreates an incrase in demand for factor services via the mapping A_{FP} and hence generates some extra income for institutions via A_{IF}. This extra incme will, in turn, generate a further increase in the consumption expenditures of institutions, which acts as a trigger for further rounds of multiplier process, the size of which will depend on whether the elements of A remain constant as effective demand increases within the system.

This characterization of the structure of A can be formalized by writing

$$A = \left(A - \hat{A} \right) + \hat{A} \tag{9}$$

where $\hat{A} = \begin{bmatrix} A_{PP} & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & A_{II} \end{bmatrix}$ $\qquad A - \hat{A} = \begin{bmatrix} 0 & 0 & A_{PI} \\ A_{FP} & 0 & 0 \\ 0 & A_{IF} & 0 \end{bmatrix}$

which implies that $\hat{A}$ captures the transfer elemens of A while the elements of $A - \hat{A}$ generate the circular flow.

Using equation (9), it follows directly from rearranging $M = (I - A)^{-1}$

$$M = \left(I - \widetilde{A} \right)^{-1} \times \left(I - \hat{A} \right)^{-1} \tag{10}$$

where $\widetilde{A} = (I - \hat{A})^{-1} \times (A - \hat{A}) = \begin{bmatrix} 0 & 0 & \widetilde{A}_{PI} \\ \widetilde{A}_{FP} & 0 & 0 \\ 0 & \widetilde{A}_{IF} & 0 \end{bmatrix}$

provided that $\widetilde{A}_{PI} = (I - A_{PP})^{-1} \times A_{PI}$ 、 $\widetilde{A}_{FP} = A_{FP}$ 、 $\widetilde{A}_{IF} = (I - A_{II})^{-1} \times A_{IF}$

The inverse $(I - \widetilde{A})^{-1}$ can be rewritten as

$$(I - \widetilde{A})^{-1} = (I - \widetilde{A}^3)^{-1} \times (I + \widetilde{A} + \widetilde{A}^2) \tag{11}$$

and it now follows form equation (10) and (11) that

$$M = M_3 \times M_2 \times M_1$$

where

$$M_1 = (I - \hat{A})^{-1} = \begin{bmatrix} (I - A_{PP})^{-1} & 0 & 0 \\ 0 & I & 0 \\ 0 & 0 & (I - A_{II})^{-1} \end{bmatrix} \tag{12}$$

$$M_2 = (I + \widetilde{A} + \widetilde{A}^2) = \begin{bmatrix} I & \widetilde{A}_{PI}\widetilde{A}_{IF} & \widetilde{A}_{PI} \\ \widetilde{A}_{FP} & I & \widetilde{A}_{FP}\widetilde{A}_{PI} \\ \widetilde{A}_{IF}\widetilde{A}_{FP} & \widetilde{A}_{IF} & I \end{bmatrix} \tag{13}$$

$$M_3 = (I - \widetilde{A}^3)^{-1} = \begin{bmatrix} \left(I - \widetilde{A}_{PI}\widetilde{A}_{IF}\widetilde{A}_{FP}\right)^{-1} & 0 & 0 \\ 0 & \left(I - \widetilde{A}_{FP}\widetilde{A}_{PI}\widetilde{A}_{IF}\right)^{-1} & 0 \\ 0 & 0 & \left(I - \widetilde{A}_{IF}\widetilde{A}_{FP}\widetilde{A}_{PI}\right)^{-1} \end{bmatrix} \tag{14}$$

Richard Stone(1985) suggested that a useful variant of equation (7) could be obtained by rewriting our result as

$$M = (M_3 - I) \times M_2 \times M_1 + (M_2 - I) \times M_1 + (M_1 - I) + I \tag{15}$$

We can also rewarite equation (15) as

$$M = N_3 + N_2 + N_1 + I \tag{16}$$

Acoording to Pyatt and Round (1979), matrix of multiplier M can be decomposed into three separate effects of (i) transfer effect – captures the effect of transfer within the economy i.e. transfers of income among production sector or among institutions, (ii) open loop effect – captures the cross-effects of multiplier process whereby an injection into one part of the system has repercussions on the other parts, and (iii) closed loop effect – captures full circular effects of an income injection going round the system and back to its point of origin in a series of repeated.
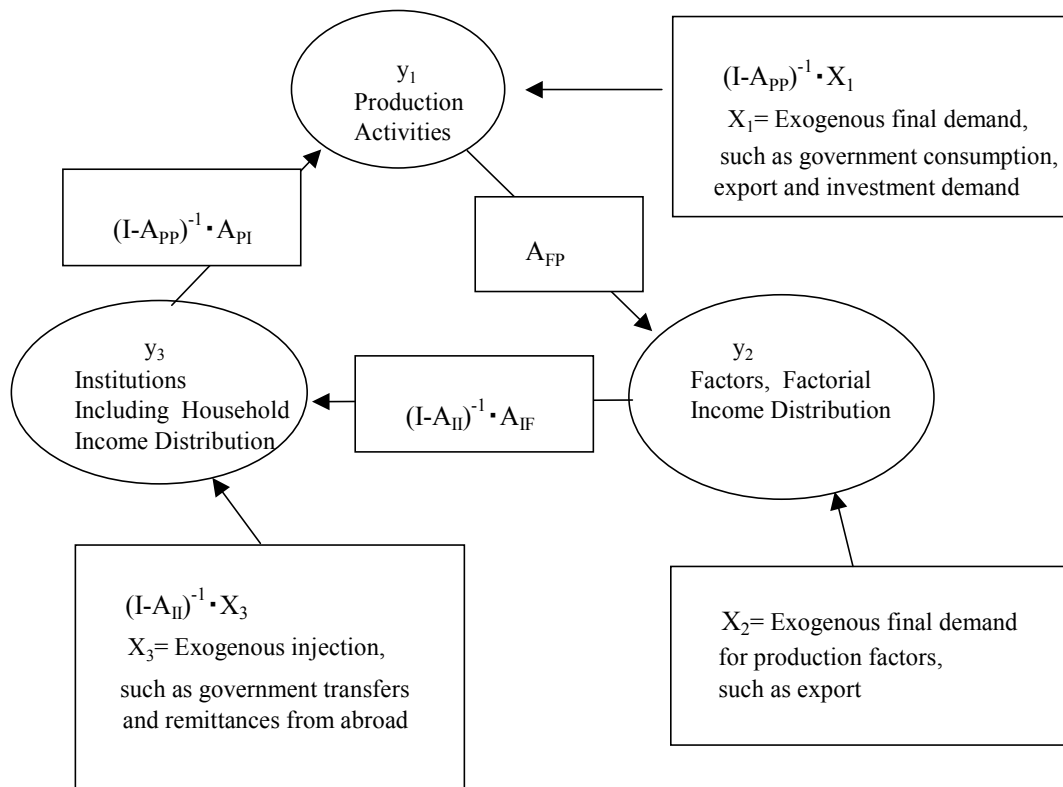
Figure 1: Multiplier process among endogenous SAM accounts

Source: Adopted from Erik Thorbecke(2000) Figure 2a

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