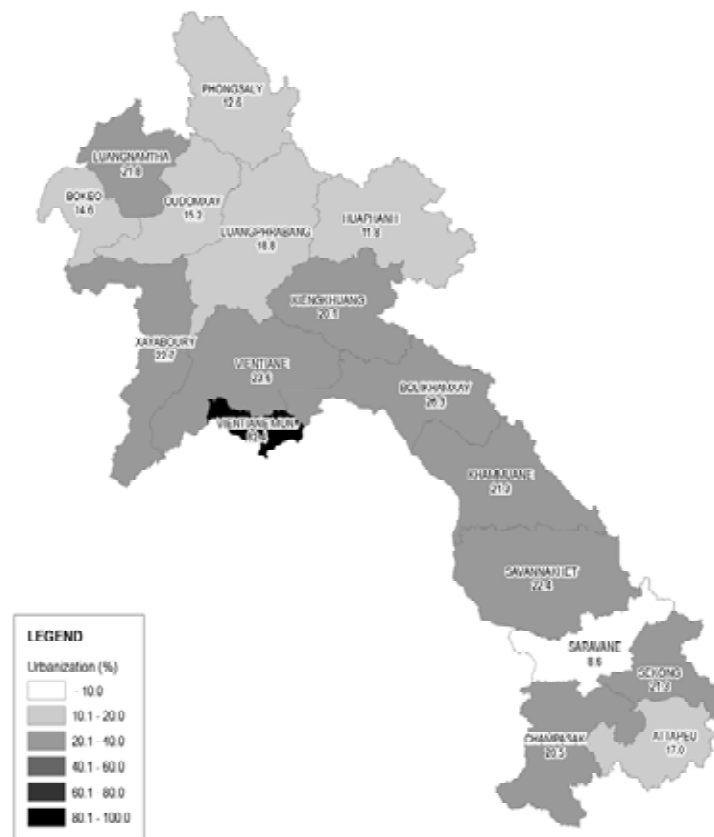


development and the inflow of population from the rural area.



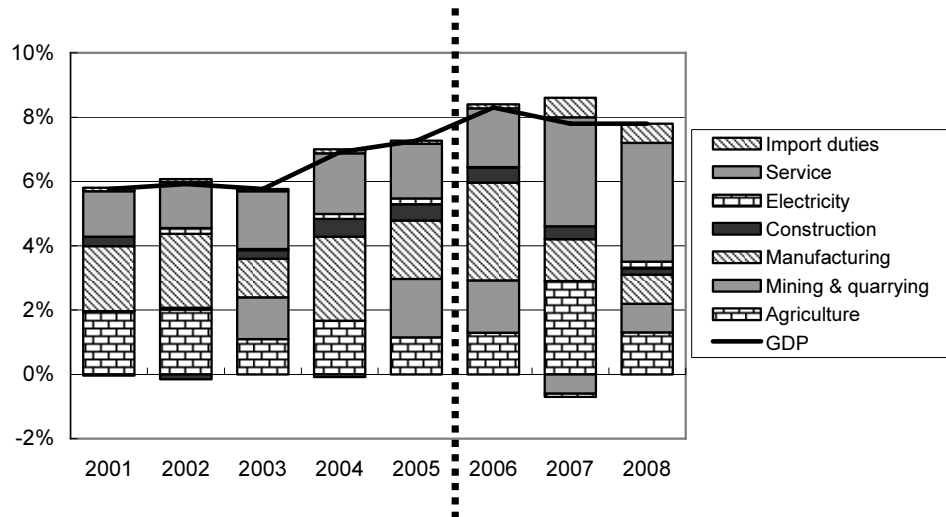
Source: Census 1995 and 2005

Figure 4.3.2 Urbanization Ratio in 2005

4.3.3 Economy

(1) GDP Growth

Figure 4.3.3 indicates GDP growth rate and contribution of industries to GDP growth. GDP data before and after 2006 is not consistent because Department of Statistics, Ministry of Planning and Investment changed the methodology of calculating GDP. The graph shows that manufacturing and mining & quarrying are major contributors to the recent rapid growth until 2006. Out of 8.3% of GDP growth, the sum of manufacturing and the mining & quarrying accounted for 4.6% growth in the year. After 2007, the service sector has become a major contributor to GDP growth.

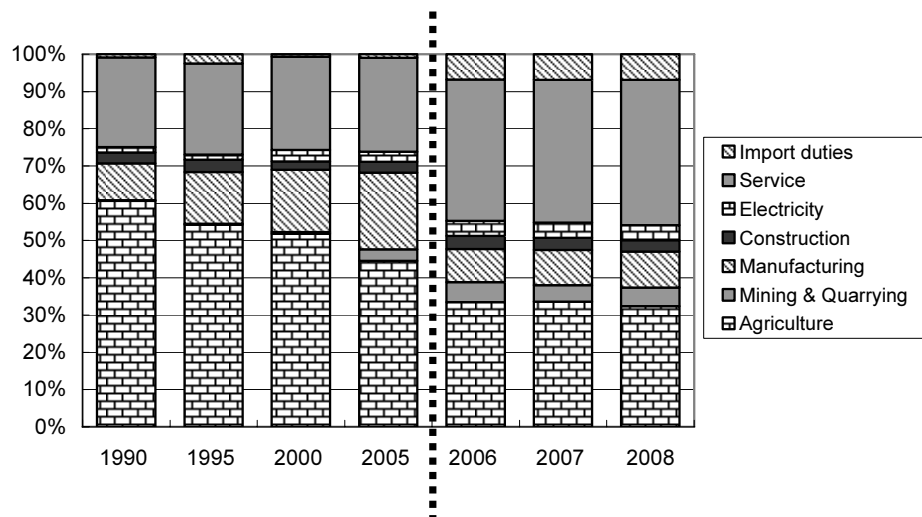


Source: Statistical Yearbook 1975-2005, 2007, DoS

Figure 4.3.3 GDP Growth Rate and Contribution of Industries

Figure 4.3.4 indicates the composition of industry from 1990 to 2008. Like GDP growth rate by industrial sector, industrial share has changed in a discontinuous manner since 2006 due to revision of the calculation method. The percentage of the primary sector recorded 60% in 1990, but it has dropped gradually and recorded 32% in 2007. On the other hand, manufacturing, mining & quarrying electricity have increased their share during the same period.

Share of the tertiary industry has been increasing gradually from 37.9% in 2006 to 39.0% in 2009, and share of the manufacturing industry has also increased from 8.9% in 2006 to 9.6% in 2008. In general, the trend in which the primary sector has consistently dropped its share while the secondary and tertiary sectors have raised theirs, has not changed throughout the survey period from 1990 to 2008.

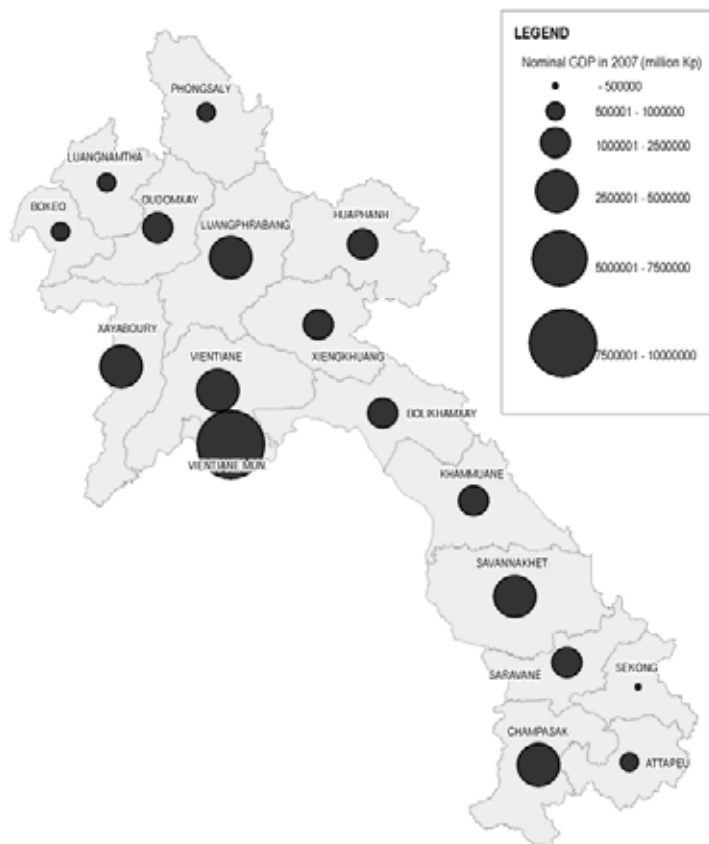


Source: Statistical Yearbook 1975-2005, 2007, DoS

Figure 4.3.4 Change of Industrial Composition

Figure 4.3.5 illustrates provincial share of GDP in 2007. Since official data on Gross Domestic Regional Products was not available, the JICA Study Team estimated the data from household

income by provinces which were surveyed in the Lao PDR Expenditure and Consumption Survey 2002-03 (LECS 3) and number of business entities by provinces in the first Economic Survey in 2006.



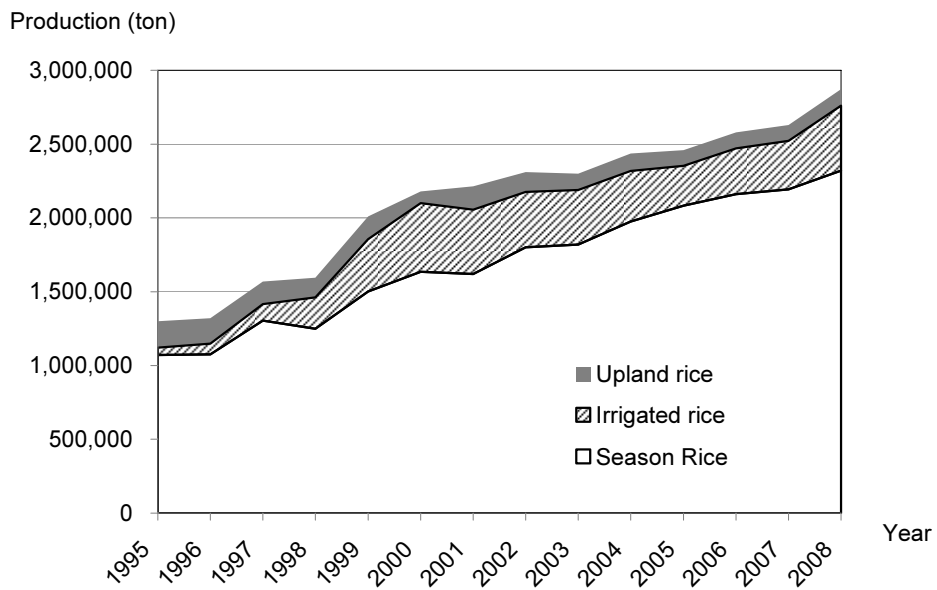
Source: JICA Study Team calculated from Statistical Yearbook 2007, Lao Expenditure & Consumption Survey 2002-03 (LECS 3) and Economic Survey in 2006

Figure 4.3.5 GRDP by Provinces in 2007 (Nominal)

Vientiane Capital Province contributed to 23% of the total GDP, followed by Savannakhet Province (12%), Champasack Province (10%) and Vientiane Province. On the other hand, the proportions contributed by Sekong Province (1%), Attapeu Province (2%) and the Northern provinces (Phongsaly, Luangnamtha, Oudomxay and Bokeo) was estimated as being minimal.

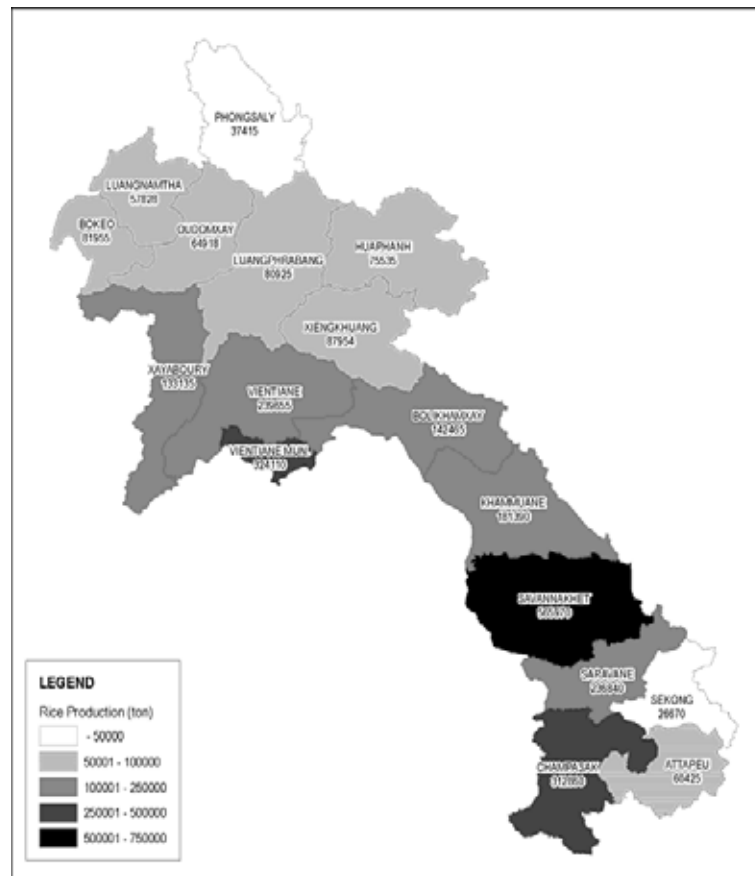
(2) Agriculture

Figure 4.3.6 indicates production growth of rice. Rice production has increased by 5.9% annually between 1995 and 2008. Most of the produced rice is seasonal rice which is cultivated once a year. Production of irrigated rice has not increased significantly. Figure 4.3.7 illustrates rice production by provinces in 2007. Savannakhet Province contributed to 20.9% of the total production, followed by Vientiane Capital (12.0%), Champasack (11.5%), Vientiane (8.8%) and Saravane (8.7%). It is said that Lao PDR has achieved self-reliance as regards rice: however, rice production has not increased in mountainous provinces. Due to undeveloped distribution channels, the northern provinces suffer from lack of rice. On the other hand, the central and southern provinces have too much.



Source: Statistical Yearbook various issues

Figure 4.3.6 Production Volume of Rice since 1995



Note: Sum of season rice, irrigated rice and highland rice

Source: Statistical Yearbook 2007

Figure 4.3.7 Rice Production Volume by Province in 2007

In accordance with economic development, demand on vegetables, fruits and meats is increasing. Production volume of vegetables and beans has increased from 56,000 tons in 1995 to 734,000 tons in 2007. Champasack (18%), Vientiane Capital (15.5%), Vientiane Province (15.4%), Luangprabang (9.5%) and Savannakhet (9.1%) contributed to a high proportion of the vegetable production. This implies vegetables are produced in the suburbs of the urban area. In case of Champasack, vegetables are transported to Vientiane and the north-eastern cities of Thailand under contract farming.

Other major cash crop production involves rubber, pulp, sugarcane, coffee, etc. Rubber plantations which are invested into by Chinese companies are observed in Luangnamtha and Bokeo. The plantations for pulp which are invested into by Japanese, Indian and Vietnamese companies are observed in Khammuane Province and the southern part of Lao PDR. A sugar cane plantation is located in Savannakhet Province to provide raw material to two sugar factories, and its production volume was recorded at 750,000 tons in 2008. The percentage share of sugar cane production in Savannakhet Province reached 81% in the same year. As regards coffee, total production was 31,000 tons in 2008, with 75% of the total produced in Champasack Province.

(3) Manufacturing

Value added manufacturing recorded a 10.4% annual growth between 2000 and 2006, and contributed to 9.6% of the total GDP in 2008. Although the breakdown of the value added to the manufacturing is not available, “manufacture of wearing apparel; dressing and dyeing of fur” (ISIC 18), “manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials” (ISIC 20) and “manufacture of furniture; manufacturing n.e.c.” (ISIC 36) are major items based on the merchandise export amount and number of business enterprises.

Figure 4.3.8 shows the locations of business enterprises, which belong to Level 1 (number of employees is more than 500) and Level 2 (number of employees is between 200 and 500) by province. Out of 1,263 business enterprises, 668 are located in Vientiane Capital (53%), followed by Xayabury, Khammuane, Savannakhet, Luangprabang and Champasack. However, the percentage shares of these provinces are around 5%.

Most business enterprises working in Vientiane Capital deal with apparel and wood/wood products. However, other labor-intensive factories are currently starting operations in the capital. In these factories, labor-intensive production processes in the manufacture of automobiles, electrical equipment, etc are transferred from mother factories in Thailand. It is expected that such factories will increase and follow the apparel and wood/wood products industries in dominance.



Note: Sum of companies classified as Level 1 (number of workers are over 200) and level 2 (number of workers are from 51 to 200)

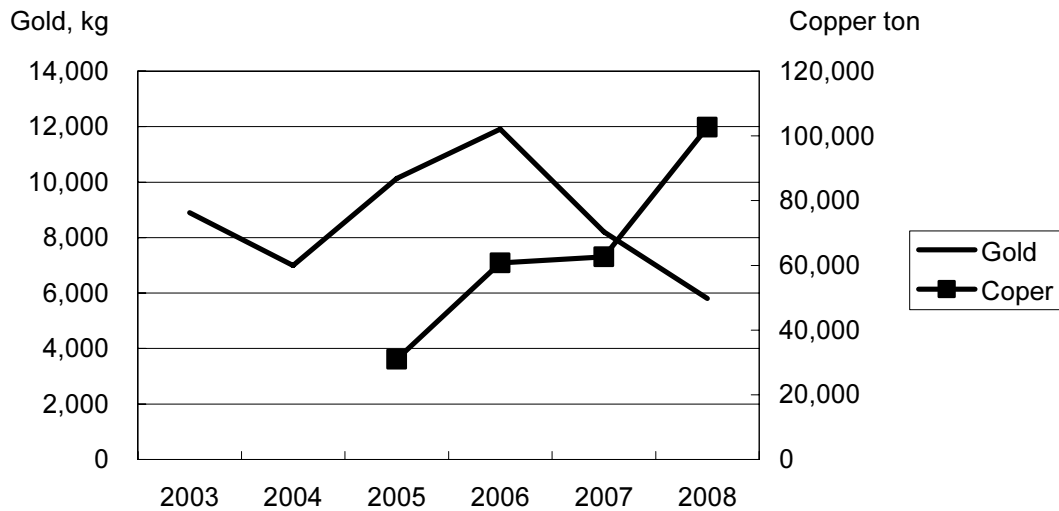
Source: Information from Ministry of Industry and Commerce

Figure 4.3.8 Locations of Level 1 and Level 2 Business Enterprises

(4) Mineral Resources

Gold and copper mining at Sepone and Phou Bia has contributed to the recent economic development. Production of gold and copper started in 2003 and in 2005, respectively. Figure 4.3.9 indicates production volumes of gold and copper from 2003. Gold production from 2003, has been recorded between 6 to 12 tons per year. Since the estimated deposit amount of gold is 46.7 tons at Sepone Mine and 31.1 tons at Phu Bia Mine, these mines will continue to produce the same volume of gold for more than 10 years.

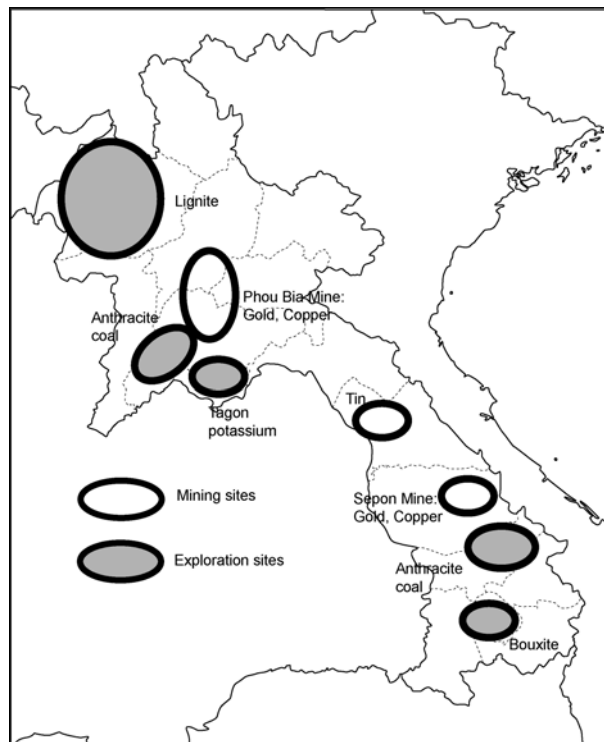
Production of copper at Sepone Mine started in 2005, and the production amount has doubled in 2008 due to commencement of operations at Phu Bia Mine. Together with gold, copper production in the 2 mines has contributed to the rapid economic growth in recent years. Since the estimated deposit amount of copper at Sepone Mine is 1.7 million tons, it will continue to produce the same volume of copper for 30 years.



Source: Statistical Yearbook various issues, DoS

Figure 4.3.9 Production of Gold and Copper

In addition to gold and copper, mineral and non-mineral resources are abundant all over the territory of Lao PDR as illustrated in Figure 4.3.10. The Lao Government provided concessions for exploitation, exploration and prospection to 130 private companies as of September 2009. Development and expansion of these mines will generate future logistics demand.



Source: Concession data of Department of Geology, Ministry of Energy and Mines; Investment Environment in Lao PDR in 2007, Japan Oil, Gas and Minerals National Corporation; Study on Reserve and Development of Coal in Lao PDR, New Energy and Industrial Technology Development Organization

Figure 4.3.10 Major Mining Sites

(5) Hydropower Development

Table 4.3.2 tabulates a list of power plants being constructed or planned. Percentage share of electricity production to the total GDP was 4% in 2008: however, the share will increase dramatically over the coming 5 years. Proportion of value added generated from constructing power plants is 12% and the value added generated from planned power plants is 36% of the GDP in 2008, respectively. In particular, Nam Theun 2 (installed capacity is 1088 MW) which will start operations in December 2009 and Hongsa Lignite (installed capacity is 1800 MW) which is expected to start operations in 2015 will make huge impacts on GDP. In average, the power sector will contribute around 2% to the GDP growth rate annually until 2020.

These hydropower projects are developed as joint ventures between Lao PDR and foreign partners: the proportion of equity by the Lao PDR side lies at only 20 to 30%. This means 70 to 80% of value added will flow out as dividends to foreign shareholders. As a result, the gap between Gross National Income and Gross Domestic Product would be widened. The same situation would occur in the mining industry.

Table 4.3.2 Future Production of Electricity and Contribution to GDP Growth

	Year of Start Operation	No of Power Plants (Units)	Installed Capacity (MW)	Production of Electricity per Year (GWh)	Expected additional value added (million kip in 2002 price)	Proportion to Real GDP in 2008 (%)
Operating Stage		10	669	3,677		
Constructing Stage	Total	8	2,529	11,060	3,141,268	12
	2009	3	1,164	6,259	1,777,685	7
	2010	2	350	645	183,193	1
	2011	2	735	2,616	742,998	3
	2012	1	280	1,540	437,392	2
Planning Stage	Total	14	6,277	34,524	9,805,387	36
	2012	3	144	792	224,944	1
	2013	3	440	2,420	687,330	3
	2014	2	545	2,998	851,352	3
	2015	3	2,468	13,574	3,855,296	14
	2016	2	1,420	7,810	2,218,201	8
	To be determined	1	1,260	6,930	1,968,263	7
Studying	To be determined	45	12,216	67,189	-	-

Source: Data from Powering Progress Web Page (<http://www.poweringprogress.org/>)

4.3.4 Investment and Trade

(1) Domestic Investment

Table 4.3.3 shows the proportion of investment to GDP from FY 2004-05 to FY2008-09. Total investment accounts for 30 to 35% of GDP during the same period. Proportion of Public Investment Projects (PIP) seems to be declining from 11% to around 7%. On the other hand, the percentage of private investment consisting of foreign direct investment and domestic private investment is increasing.

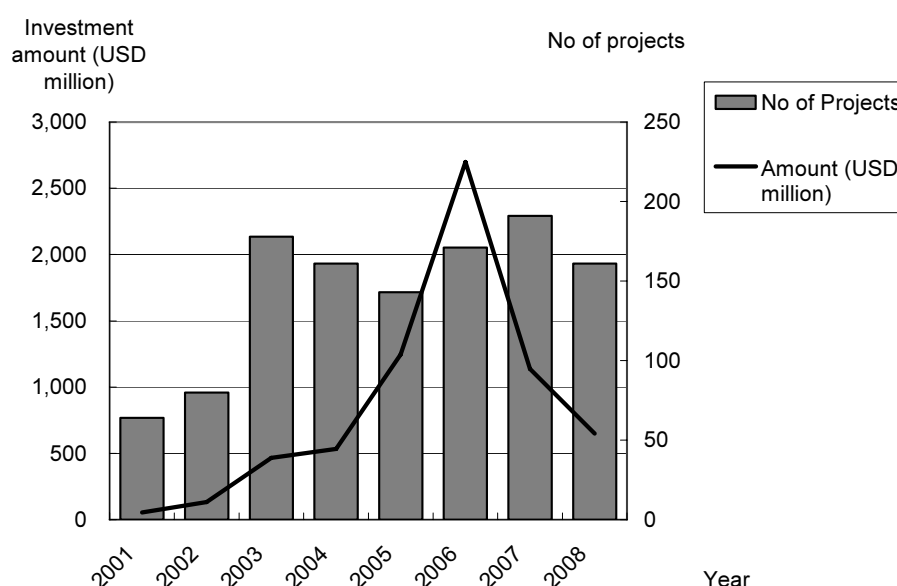
Table 4.3.3 Proportion of Investment to GDP

Fiscal Year	(Unit: Percent)				
	2004-05	2005-06	2006-07	2007-08 (Plan)	2008-09 (Plan)
Total Investment	29.5	32.8	35.8	32.0	32.0
Public Investment Program	11.4	11.5	6.9	8.0	6.6
Private Investment (Foreign Direct Investment and Private Investment)	15.1	21.4	28.9	24.0	25.4

Source: National Socio-Economic Development Plan 2007-08 and 2008-09, MPI

(2) Foreign Direct Investment

Figure 4.3.11 shows the number and amount of Foreign Direct Investments (FDI) from 2001 to 2008 (application bases). FDI has accelerated since 2003 in terms of number and amount, and the investment amounts were recorded at more than 1 billion USD from 2005 to 2007 due to huge investment in electricity. In 2008 the investment amount dropped to USD 650 million but the number of FDI projects remained at a record high (161 projects in 2008).



Source: Data from Investment Promotion Department, MPI

Figure 4.3.11 Number and Amount of FDI

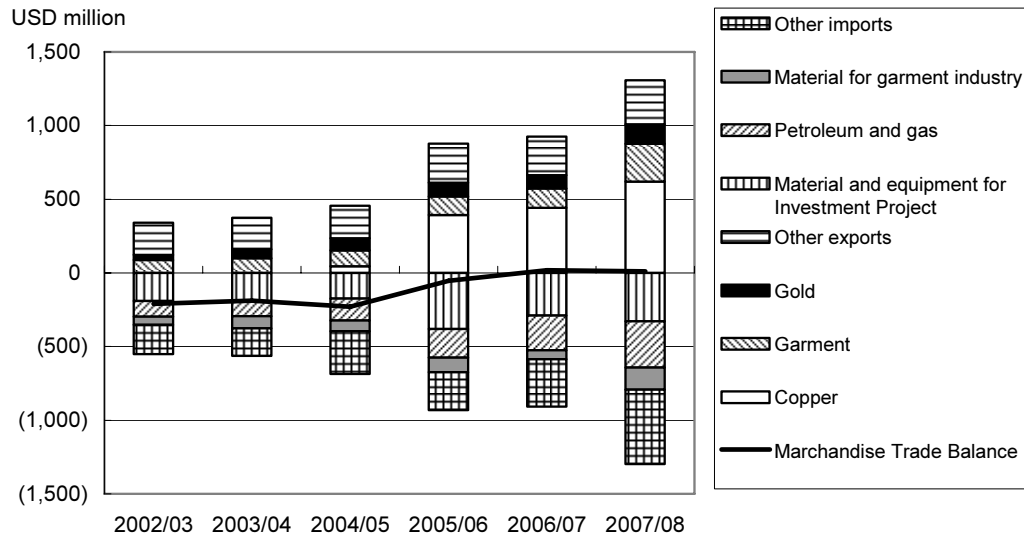
As regards the accumulated FDI amount from 2001 to 2008, electricity accounted for 47% of the total amount, followed by agriculture (14%), mining (11%), and manufacturing (9%). In terms of the number of FDI projects in the same period, manufacturing accounted for 19%, followed by agriculture (17%), service (16%) and mining (14%). The percentage share of electricity is only 4%. As regards FDI amount by country of origin, Thailand contributed to 28% of the total, followed by China (23%) and Vietnam (14%). These 3 countries contributed to two thirds of the total FDI amount. In terms of the number of FDI projects, China contributed to 44% of the total projects, followed by Thailand (31%) and Vietnam (25%).

The Ministry of Industry and Commerce compiled destinations of FDI projects in the secondary sector (ISIC 15 to 40) until 2008. Out of 246 FDI projects, 135 projects were invested in Vientiane

Capital, followed by Huaphanh (14), Champasack (14), Vientiane (13) and Luangnamtha (13).

(3) Merchandise Trade

Figure 4.3.12 illustrates change of merchandise trade in recent years. Trade volume of imports and exports has increased by 3.8 times and 2.3 times respectively over the recent six years. Lao PDR recorded a merchandise trade deficit until FY2005/06 which turned into a surplus since FY2006/07 due to the rapid growth of copper exports. As regards imports, the volume of petroleum and gas is increasing, and import items are more diversified in recent years.



Source: Data from Ministry of Industry and Commerce

Figure 4.3.12 Merchandise Trade and Its Major Items

Table 4.3.4 indicates the change in trade volumes with major trade partners. As for exports, 67% of the total exports were taken in by Thailand, Vietnam Australia and the EU in FY 2007/08. Major export items to Thailand, Vietnam and China were copper, electricity, agriculture products and wood products. Lao PDR exported gold to Australia and garment products to the EU, respectively.

Table 4.3.4 Trade Volumes with Major Trade Partners

(Unit: USD million)

Export	2006/07		2007/08	
Thailand	284	31%	383	29%
Vietnam	112	12%	148	11%
Australia	86	9%	134	10%
EU	154	17%	354	27%
Import	2006/07		2007/08	
Thailand	602	66%	984	76%
Vietnam	134	15%	109	8%
China	86	9%	96	7%

Source: Data from Ministry of Industry and Commerce

As regards imports, 76% of total volume came in from Thailand while 15% came in from

Vietnam and China combined in FY 2007/08. Lao PDR imports many kinds of items ranging from material for industrial activities to daily goods from these countries.

4.4 Overall Development Perspectives of Lao PDR and GMS

4.4.1 Economic Development

Section 3.2 of Chapter 3 analyses the development potential of Lao PDR from the perspectives of population, urbanization, industrial development, agricultural development and mineral resource development. Figure 4.4.1 summarizes development framework and possible utilization of potential resources in the future, of which main points are highlighted as follows:

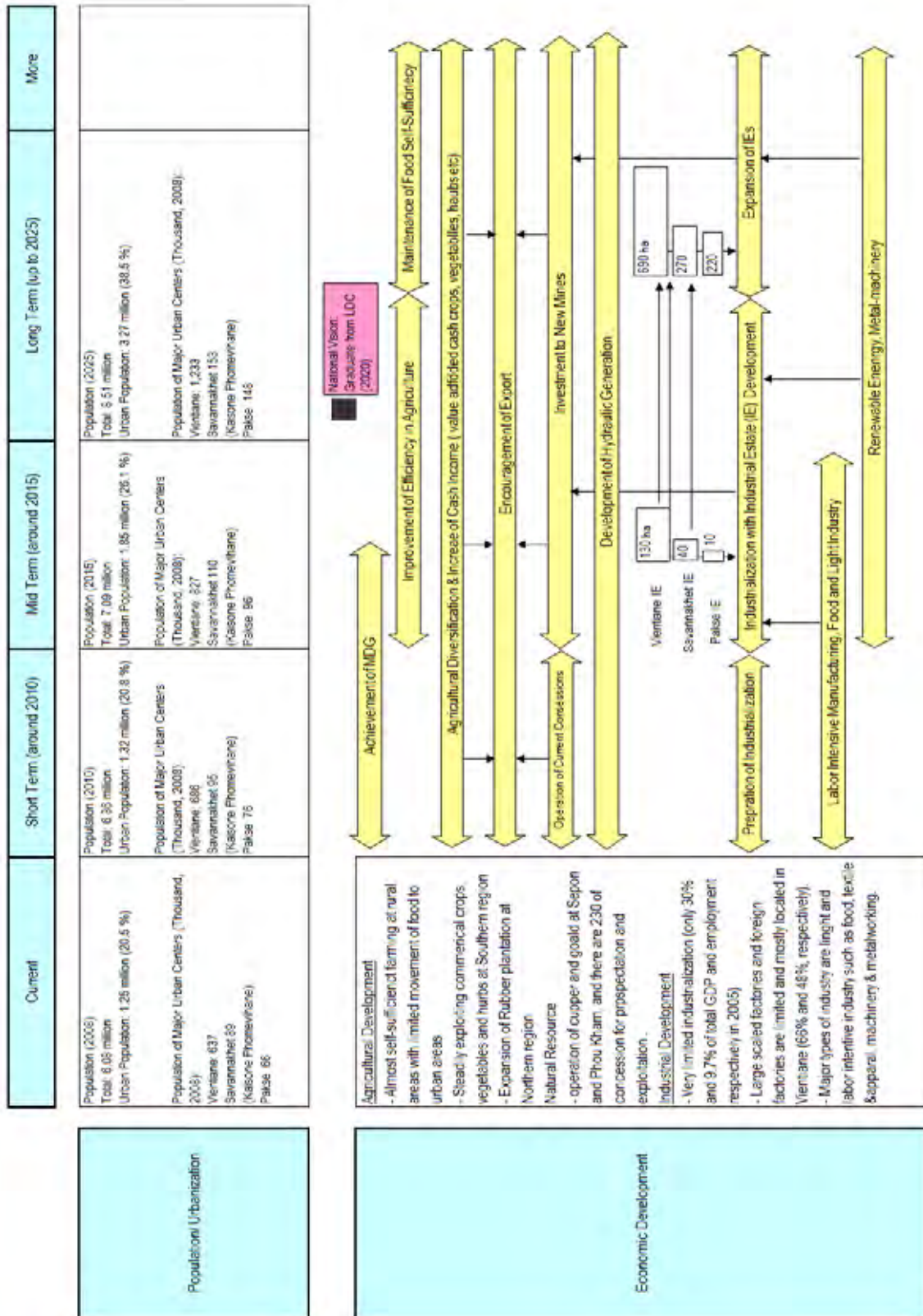
- Population will continuously increase. Urban areas will receive migration from rural areas, resulting in a disproportionate increase in urban populations, particularly for Vientiane, Savannakhet and Pakse.
- Agricultural products will be more diversified in mountainous areas in Lao PDR. In particular, production of commercial crops such as coffee, vegetables, fruits and herbs will increase.
- Mineral resources will be increasingly exploited in accordance with increased investment.
- Industrialization will proceed based on industrial parks in Vientiane, Savannakhet, Pakse and possibly Luangnamtha.

4.4.2 Framework on Regional Trade and Logistics in GMS/ASEAN

Section 3.1 of Chapter 3 analyses the regional framework regarding logistics, transport and trade in GMS and ASEAN. Figure 4.4.2 summarizes them as assumptions, of which the main points are highlighted as follows:

(1) CEPT under AFTA

ASEAN Free Trade Agreement (AFTA) was established in 1992 to reduce tariffs on most goods to less than 5% within 15 years from 1993. Common Effective Preferential Tariff (CEPT) was a tool to realize AFTA. ASEAN countries steadily cleared milestones and currently, the 6 more advanced countries (Singapore, Thailand, Malaysia, Indonesia, Philippines and Brunei) have achieved 0% tariffs for 76.1% of target goods and 5% tariffs for 98.7% of target goods in 2007, while CLMV countries (Cambodia, Lao PDR, Myanmar and Viet Nam) have achieved 0% tariffs for 16.9% of target goods and 5% tariffs for 83.1% of target goods in the same year. Therefore, it is confidently expected that all target goods under CEPT will reach 0% tariffs by 2015.



Source: JICA Study Team

Figure 4.4.1 Assumptions on Future Socio-Economic Conditions of Lao PDR

Realization of CEPT is supposed to strongly support international division of labor in particular in

manufacturing sector. Manufacturers will follow “selection and concentration policy” to re-organize and relocate factories. In this regard, logistics will be one of the key issues to realize “re-organization and relocation of factories under international division of labor”. Logistics in GMS may require supporting it from the perspective of provision of stable, punctual and least cost logistics system.

(2) National Single Window (NSW) and ASEAN Single Window (ASW)

ASEAN agreed to introduce ASEAN Single Window (ASW) in 2005 by “Agreement to establish and Implement the ASEAN Single Window”. ASW is the system to enable realization of 1) single submission of data and information, 2) single and synchronous processing of data and information, and 3) single decision-making for customs release and clearance. Each member country is required to establish national single window (NSW), which is an overall one stop service of customs in each member country, and which can be a bridge system to connect all NSWs in ASEAN countries. ASW is realized after completion of NSW in member countries.

Currently, some advanced countries such as Singapore and Malaysia have completed establishing the NSW. Lao PDR and Cambodia have just established national committees to discuss the NSW with target year to introduce NSW set at 2015. In addition, there is an augment on how to coordinate with “privacy” in the ASW system. The JICA Study Team accordingly assesses that NSW and ASW will be introduced in the long term.

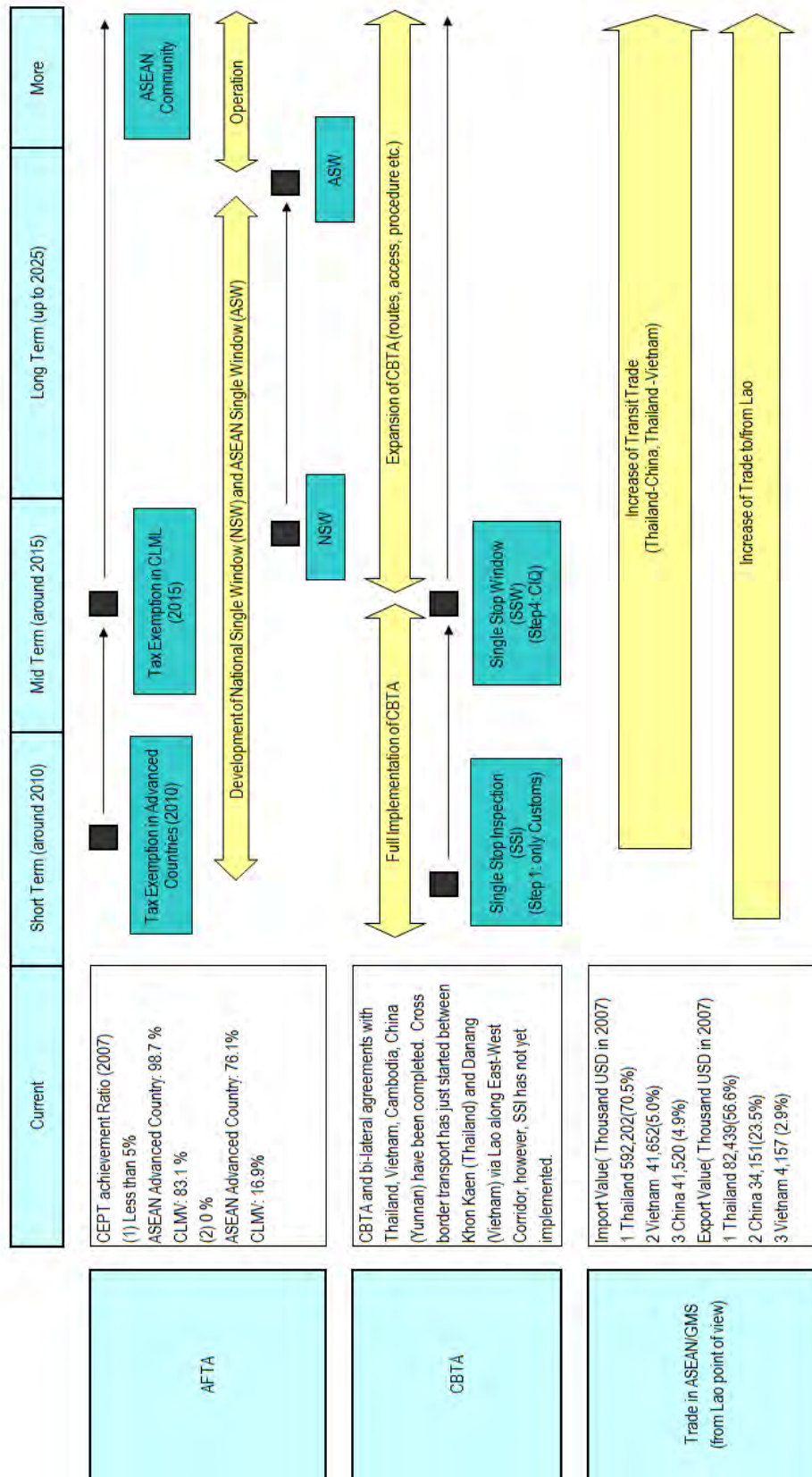
(3) CBTA

The CBTA agreement has already been signed by the GMS countries, but implementation has only partially started among 3 countries, namely Lao PDR, Viet Nam and Thailand by June 2009 without necessary single stop service facilities at Common Control Areas (CCA). GMS countries seem to be very keen to realize CBTA: hence the JICA Study Team assesses that full implementation of CBTA will be completed in the medium-term around the year 2015. After full implementation of CBTA, GMS countries may continue to accelerate free transport in the GMS. Following the trend of free transport, GMS countries may target to abolish truck quota system in an earlier period of the long term, and then cabotage may be realized in a later period of the long term.

(4) Trade Volume in Indochina

Trade volume in GMS will gradually increase in accordance with maturity of regional economic cooperation and integration based on the advancement of division of labor and share of market in GMS.

In the particular case of Lao PDR, trade with Thailand will continuously increase, then trade with China and Viet Nam will follow suit in the short term; especially for northern Lao based on the expected road improvement projects.



Source: JICA Study Team

Figure 4.4.2 Assumptions on Future Situation regarding Logistics in Lao PDR

4.5 Socio-Economic Framework

4.5.1 Population Framework

(1) Future Population until 2025

There are 2 future population projections available in Lao PDR. The first one was prepared by the Steering Committee of the Population and Housing Census (hereinafter referred to as the “Steering Committee”), while the second one was prepared by Population Division of United Nations (hereinafter referred to as “Population Division”).

The Steering Committee prepared two scenarios: normal scenario with parameters indicated as shown in the above table and Constant Valuable Scenario in which basic parameters remain constant after 2006. The other projection, prepared by Population Division is a part of “World Population Prospects: The 2008 Revision”, which is published on the Web page (<http://www.un.org/esa/population/unpop.htm>). This projection consists of the 4 scenarios: low variant, medium variant, high variant and constant-fertility variant.

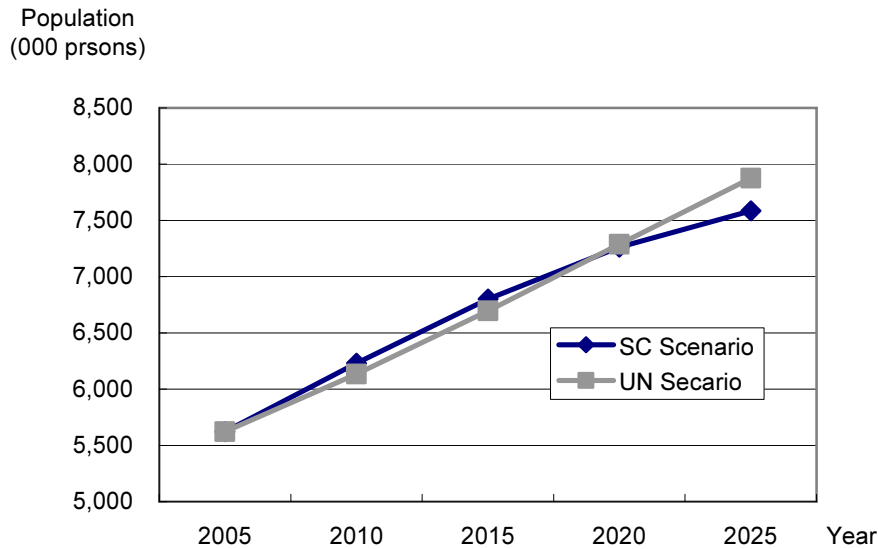
The Steering Committee’s projection covers only until 2020; therefore, it is necessary to extend the projection until 2025 under the consistent premises. On the other hand, population of recent years is not consistent with the real population in the Population Division’s projection. It is necessary to re-calculate population projection by using the census data in 2005 and the same parameters.

Table 4.5.1 and Figure 4.5.1 indicate population projections re-calculated by the JICA Study Team, with 2 scenarios: normal scenario by the Steering Committee (SC Scenario) and Medium variant scenario by the UN Population Division (UN Scenario).

Table 4.5.1 Population Projections until 2030

	Scenarios	2005	2010	2015	2020	2025
Population (000 persons)	SC Scenario	5,622	6,231	6,802	7,262	7,586
	UN Scenario	5,622	6,133	6,696	7,286	7,874
Annual average population growth rate (%)	SC Scenario		2.1	1.8	1.3	0.9
	UN Scenario		1.8	1.8	1.7	1.6

Source: JICA Study Team



Source: JICA Study Team

Figure 4.5.1 Population Projection Scenarios

In UN scenario, TFR will drop by 0.8 points, from 3.5 in 2005-10 to 2.7 in 2020-25. Annual growth rate will also drop from 1.8 to 1.6%, with population reaching 7.8 million in 2025. In SC scenario, annual growth rate will drop rapidly from 2.1% in 2010 to 0.9% in 2030 due to rapid decrease of the TFR, which will be 2.1 in 2020. Projected population under this scenario is larger than that under the UN scenario until 2020; after which, the projected populations are less. Population in 2025 is 7.6 million in this scenario.

Of the 2 population growth scenarios, the JICA Study Team selected the UN scenario as the optimum scenario. Considering the stage of economic development of Lao PDR in 2025, the assumption under the SC scenario that TFR would drop to 2.1 in 2020 seems to be premature. Besides, the discontinuity of growth ratio after 2020 seems to be drastic. On the other hand, the rate of decline of population growth rate and population growth observed in Figure 4.5.1 for the UN scenario looks natural and the most likely outcome.

(2) Urban Population

In order to distribute future populations into provinces in a logical manner, the JICA Study Team utilized the following methodology:

- In the first step, total population was divided into urban and rural populations.
- In the second step, urban population until 2025 was estimated.
- At the third step, urban and rural populations were broken down to provincial level.

JICA Study Team estimates the urban proportion will increase to 40% of the total in 2025. According to FAO statistics, arable land per rural inhabitant is 0.19 ha, which is a lower level than Thailand, Cambodia and Myanmar (Table 4.5.3). Due to demographic pressure, shift of population from rural areas to urban areas will continue. In addition to that, it is necessary to increase workforce who will engage in the secondary sector to achieve higher economic growth which is analyzed in the section 5.3.2. And more rural villages will change to urban villages due to economic development and provision of infrastructure/social services. This estimation is also

similar to the projection of “World Urbanization Prospects described in Section 3.2.2, which describes that percentage of urban population will increase from 27% in 2008 to 49% in 2025.

Table 4.5.2 Urban Population and Rural Population

(Unit: 000 persons)

Year	Total Population	Urban Population	Rural Population
1995	4,575	782	3,793
2005	5,622	1,523	4,092
2015	6,696	2,204	4,491
2025	7,874	3,149	4,724

Source: Census 1995 and 2005; JICA Study Team

Table 4.5.3 Arable Land per Rural Inhabitant in 2004

	Arable land per rural inhabitant (ha)
Lao PDR	0.19
Thailand	0.37
Vietnam	0.10
Cambodia	0.32
Myanmar	0.28

Source: State of Food and Agriculture, Food and Agriculture Organization of the United Nations

(3) Population Growth by Province

Table 4.5.4 indicates population by provinces up to 2025. The projection was calculated by breaking down urban and rural populations to provincial level, respectively.

In Vientiane Capital, population will amount to 1.2 million in 2025, an increase by 1.8 times in 20 years. Vientiane Capital will be followed by Savannakhet (1.1 million), Champasack (0.9 million) and Vientiane (0.6 million). Future population will be concentrated in plain region in Vientiane Capital and along Mekong River and NR-13. On the other hand, population increase will be limited in mountainous provinces.

Table 4.5.4 Population by Provinces up to 2025

Province	1995	2005	2015	2025
Vientiane Capital	524	692	927	1,244
Phongsaly	153	166	202	220
Luangnamtha	115	145	201	268
Oudomxay	210	265	291	331
Bokeo	114	145	157	205
Luangprabang	365	407	470	504
Huaphanh	245	281	314	315
Xayabury	292	339	380	441
Xiengkhuang	210	241	291	331
Vientiane	331	417	492	567
Borikhamxay	164	225	268	315
Khammuane	272	337	380	441
Savannakhet	672	826	983	1,134
Saravane	256	324	358	394
Sekong	64	85	112	126
Champasack	501	607	760	913
Attapeu	87	112	112	126
Total	4,575	5,615	6,696	7,874

Source: JICA Study Team

4.5.2 Economic Framework

(1) Three Development Scenarios

In order to set GDP growth projection, JICA Study Team prepared the following 3 GDP development scenarios: (i) high growth scenario, (ii) moderate growth scenario and (iii) low growth scenario as indicated in Table 4.5.5. The growth rate in each scenario changes over the 3 periods 2009-10, 2011-2020 and 2021-2025. Due to the Global Financial Crisis since October 2008, it is projected that the world GDP growth will be limited in 2009 and 2010. After 2011, most countries including Lao PDR are expected to return to their original economic growth curves.

In general, the GDP growth rate will be saturated in accordance with maturation of economic activities. That is why GDP growth rate in 2021-25 will be more moderate than the growth rate in 2011-2020.

Table 4.5.5 3 GDP Growth Scenarios until 2030

Scenario	(Unit: percent)			
	2009	2010	2011-20	2021-25
High growth scenario	5.5	6.0	9.0	8.5
Moderate growth scenario	5.5	6.0	7.5	7.0
Low growth scenario	5.5	6.0	6.0	5.5

Source: JICA Study Team

In the high growth scenario, GDP growth rates will accelerate to 9.0% in 2011-20 and drop to 8.5% in 2021-25. In the recent 5-year development plans, the Lao PDR Government raised target GDP growth rate from 7% in the fifth 5-year plan (2001-2005) to 7.5% in the sixth 5-year plan (2006-2010). As described in section 3.2.3, GDP growth rate was recorded at 8.3% in 2006 and 7.9% in 2007 and 2008; meeting the expectations of the government. Therefore, the Government will set higher target in the coming 5-year development plan (2011-2015). In this scenario, hydropower projects which will be implemented on schedule and development of new large-scale copper and gold mines like Sepone and Phu Bia will accelerate economic development.

In the moderate growth scenario, GDP growth rate will measure 7.5 % in 2011-15, and fall to 7.0 % in 2021-25. In this scenario, some of the power plant projects currently being planned will not have been carried out, and some of new large-scale mining site illustrated in Figure 2.3.10 will not have been developed. As regards development of other industries such as agriculture, manufacturing and service industries, the moderate growth scenario will have almost the same level of performance as that of the high growth scenario.

Growth rates in the moderate scenario are consistent with GDP projections by donors. Table 4.5.6 indicates GDP growth projection from 2008 to 2013 by the World Bank Vientiane Office. The GDP growth ratio was estimated at 5.0% and 6.5% in 2009 and 2010. It will accelerate to more than 7% after 2011 in this projection. Services (around 4%), electricity (2-3%) are expected to lead the economic growth.

Table 4.5.6 Projection of GDP Growth by World Bank

	(Unit: percent)					
	2008	2009	2010	2011	2012	2013
GDR growth rate	7.0	5.0	6.5	7.2	7.4	7.6

Source: Lao PDR Economic Monitor June 2009, World Bank Vientiane Office

The International Monetary Fund (IMF) conducted the Article IV consultation, and reported the results in October 2008. The GDP projected here is potential economic development in case the Global Financial Crisis does not occur. Under such assumption, 7-8% GDP growth is expected until 2013. Out of the 7-8% GDP growth, contribution of resource projects, which consist of operation of new hydropower plants and production expansion of new mining sites, are expected to contribute 1-2% during the period.

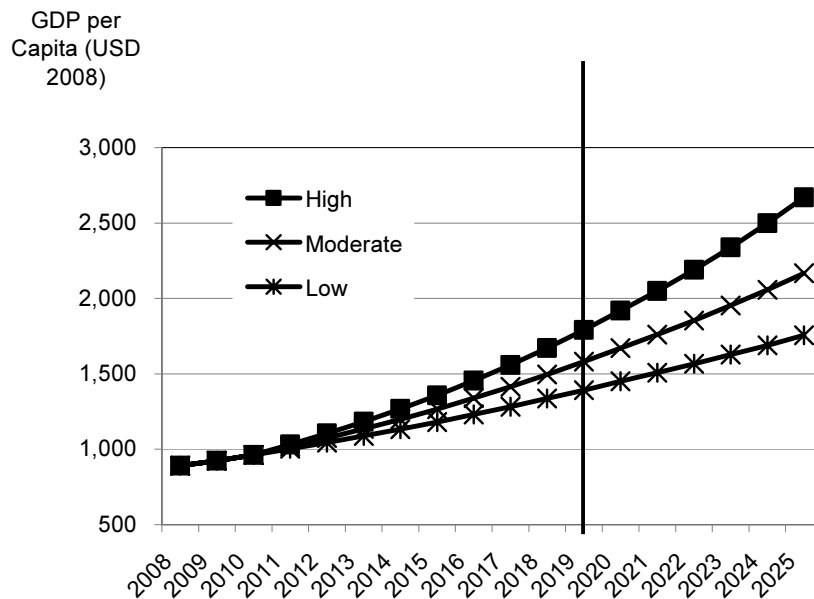
Table 4.5.7 Projection of Future GDP Growth until 2013 (as of July 2008)

	2008	2009	2010	2011	2012	2013
GDR growth rate	7.5	7.5	7.5	8.0	8.0	7.1
GDP growth rate excluding resource projects	4.6	5.5	5.8	5.9	6.1	6.1

Source: 2008 Article IV Consultation Report, International Monetary Fund

In the low growth scenario, GDP growth rates will be 6.0% in 2011-20, and fall to 5.5% in 2021-2025. The growth rates under this scenario are the lowest in terms of economic performance after 1990. The probability that Lao PDR’s economic performance would follow the low growth scenario is low; however, it would occur in case the Lao Government does not conduct any reforms to attract FDI and stimulate economic activity, or in case FDI is limited because of prolonged and deepened stagnation of the economy.

Even if Lao PDR were to follow the low growth scenario, it would still achieve the target of the national vision 2020 i.e., graduation from LDC in terms of income per capita. As indicated in Figure 4.5.2, GDP per capita of the minimum scenario would reach USD 1,450 in 2020. The values for high growth scenario and moderate growth scenario are USD 1,920 and USD 1,671, respectively. In order to graduate from class of LDC, GNI per capita must exceed USD900.



Source: JICA Study Team

Figure 4.5.2 Change of GDP per Capita in the 3 Scenarios

(2) Selection of the Optimum Scenario

The JICA Study Team selected the moderate growth scenario as optimum scenario based on past performance, consistency of GDP growth projections by donors and investment amounts necessary to achieve each GDP growth target.

Table 4.5.8 Investment amounts and Percentage share in GDP

	Investment Amount (billion kip in 2008)			Percentage in GDP (%)		
	High	Moderate	Low	High	Moderate	Low
2009	11,263	11,263	11,263	23	23	23
2015	30,058	23,372	17,429	38	32	25
2020	46,248	33,553	23,324	38	32	25
2025	65,678	43,923	27,943	36	29	23

Source: JICA Study Team

Table 4.5.8 indicates investment amounts and percentage share of investment in GDP in each growth scenario. Investment amounts were calculated on premise that incremental capital-output ratio is 4.2, the same value as for the 6th 5-year plan (2006-2010). Percentage share of investment was recorded at 36-38% for high growth scenario, 29-32% for moderate growth scenario and 23-25% for low growth scenario. In the 6th 5-year plan, average percentage share of investment is set at 32%, and expected investment amounts to 16,189 billion kip in FY2008-09. In the FY 2008-09, 14% of total investment is expected from foreign funds (grant and loan), and 33% is expected from foreign direct investment. It is impossible to maintain such high percentages in the situation where investment amount increases by 3-4 times in the future.

In the optimum scenario, each industry will have the following performance.

- Agriculture: Production of cereal crops like rice will increase to uphold self-sufficiency in terms of the nation's food. Production of cash crops such as vegetables, fruits and plantation will increase across the country.
- Manufacturing: Manufacturing of garments and wood & wood products will spread to major towns such as Savannakhet and Pakse, and other cities. In Vientiane, new labor-intensive factories dealing in automobile and electronic equipment assembly will increase.
- Mining: Major mines such as Sepone and Phu Bia will expand their production capacity, and some of new mining sites such as those producing anthracite coal and potassium will start operations.
- Power plants: All construction of power plants completed as scheduled. Some planned power plants will be carried out but other plants will be terminated.
- Investment and trade: FDI will increase smoothly with balanced growth of mining, power plants, plantation and manufacturing. Merchandise trade will be balanced due to steady growth of exports consisting of electricity, manufactured goods and mining, and imports of various goods.

(3) Industrial Composition and Growth Rates of Sectors

Percentage share of each economic sector was 32% for agriculture, 28% for industry and 40% for service in 2008. In accordance with acceleration of economic development, agriculture will lose its share; on the other hand, the industry and service sectors will generally raise their shares. Past experiences in the surrounding countries show the same trend. The JICA Study Team projected that the percentage shares of the sectors would change to 20%, 41% and 39% in 2020, and 20.0%, 35.0 and 45.0% in 2025, for the agriculture, industry and service sectors respectively (Table 4.5.9).

Table 4.5.9 Change In Sectoral Apportionment of GDP

(Unit: percent)

	GDP at Factor Cost (bill kip)	GDP Growth Rate	Agriculture	Industry	Service
2008	43,125	7.8	32	28	40
2015	69,236	7.5	24	34	39
2020	99,397	7.5	20	41	39
2025	139,409	7.0	17	45	38

Source: Statistical Yearbook 2008; JICA Study Team

Table 4.5.10 indicates annual growth rates of agriculture, industry and service sectors. The growth rate for the agriculture sector will change from 1.6% in 2009-10, to 3.3% in 2011-20, and 3.6% in 2021-25. The growth rates for the secondary sector would vary as follows: 9.0% in 2009-10, 10.8% in 2011-20 and 9.6% in 2021-25. The growth rates for tertiary sectors will be 5.5% in 2009-10, 7.3% 2011-20 and 6.4% in 2021-35.

Table 4.5.10 Growth Rates of Industries

(Unit: percent)

	Agriculture	Industry	Service
2009-10	1.6	9.0	5.5
2011-20	3.3	10.8	7.3
2021-25	3.6	9.6	6.4

Source: JICA Study Team

(4) Provincial GRDP

Official data on regional or provincial Gross Regional Domestic Products (GRDP) is not prepared in Lao PDR. Therefore, JICA Study Team estimated the provincial GRDP by use of “The Household Lao PDR Social and Economic Indicators Lao Expenditure and Consumption Survey 20002/03” (hereinafter referred as “LECS 3”) and “Report of Economic Census, 2006”.

Table 4.5.11 indicates GRDP by provinces in 2008, 2015 and 2025. Figures in 2008 were calculated by the methodology mentioned above. Vientiane Capital contributes to 23% of GDP, followed by Savannakhet (12%) and Champasack (10%). The figures in 2015 and 2025 were determined from future development potential, population growth and so on.

The 5th to 7th columns in Table 4.5.11 indicate GRDP per capita measured in US dollars in 2008. The GDP per capita in Vientiane Capital will exceed USD 2,000 in 2015 and USD 3,500 in 2025. GDP per capita figures in Vientiane Province, Xayabury, Luangnamtha and Champasack will exceed national average GDP per capita (USD 2,168) in 2025. On the other hand, GDP per capita in Saravane, Xiengkhuang and Huaphanh will continue to be lower than the national average.

Table 4.5.11 Changes in GRDP and GRDP per Capita

Province	GRDP (billion kip in 2008)			GRDP per capita (USD in 2008)		
	2008	2015	2025	2008	2015	2025
Lao PDR	46,215	74,196	149,397	891	1,266	2,168
Phongsaly	896	1,484	2,988	579	841	1,549
Luangnamtha	1,118	2,226	5,976	789	1,266	1,913
Oudomxay	1,533	2,226	4,482	642	875	1,549
Bokeo	972	1,484	2,988	747	1,081	1,668
Luangprabang	3,448	5,194	8,964	925	1,264	2,032
Huaphanh	1,703	2,226	2,988	669	811	1,084
Xayabury	3,054	5,194	10,458	994	1,563	2,710
Vientiane Capital	10,574	17,807	37,349	1,585	2,194	3,568
Xiengkhuang	1,653	2,226	2,988	739	875	1,032
Vientiane	3,961	6,678	14,940	1,030	1,552	3,011
Borikhamxay	1,851	2,968	5,976	888	1,266	2,168
Khammuane	2,407	3,710	7,470	786	1,116	1,936
Savanakhet	5,499	8,904	16,434	720	1,035	1,656
Saravane	1,607	1,484	2,988	549	709	1,301
Sekong	450	742	1,494	552	758	1,355
Champasack	4,736	8,904	19,422	828	1,227	2,243
Attapeu	736	742	1,494	751	758	1,355

Source: JICA Study Team

4.6 SWOT Analysis

SWOT (Strength, Weakness, Opportunity and Threat) of Logistics in Lao was reviewed from the perspective of the development goal of “Realization of Land linked-country”. Table 4.6.1 shows the summary of the SWOT analysis.

Table 4.6.1 Summary of SWOT Analysis

<p>Strength</p> <ul style="list-style-type: none"> • Location of Lao PDR in GMS (Center of GMS) • Progressive position in CBTA agreement with neighboring countries 	<p>Opportunity</p> <ul style="list-style-type: none"> • Deepening of economic integration • Expansion of market in GMS/ASEAN • Re-organization of production system in ASEAN by multi-national enterprises (progress of intra-industry trade) • Development of high value added agriculture and industrialization in Lao PDR
<p>Weakness</p> <ul style="list-style-type: none"> • Small sizes of population and domestic market • Differences in economic development and economic scale between Lao PDR and neighboring countries 	<p>Threat</p> <ul style="list-style-type: none"> • Limited economic benefits from economic integration of GMS/ASEAN (Lao PDR passing)

Source: JICA Study Team

4.6.1 Strength

Strength of Lao logistics system comes from mainly geographical advantages and past efforts in CBTA and infrastructure development which are expected to generate sound basis to encourage logistics in Lao.

(1) Location of Lao PDR in GMS (Center of GMS)

Lao PDR shares borders with 5 neighboring countries and connects to all neighboring countries by roads. Since it is located in the center of the Indochina region or Greater Mekong Sub-region (GMS), most of the shortest routes connecting GMS countries pass through Lao PDR. It is an indigenous endowment for Lao PDR to play an important role in international logistics in GMS.

(2) Progressive position in CBTA agreement with neighboring countries

GMS/ ASEAN countries have made continuous efforts to establish a regional economic cooperation framework in order to eliminate barriers among the countries. CEPT under AFTA will abolish customs barrier among ASEAN countries, AIA (ASEAN Investment Agreement) will abolish barriers to foreign investment in ASEAN, while CBTA is an attempt at easing physical barriers to cross-border transport among GMS countries. These regional frameworks contribute to the integration of GMS/ ASEAN market and ensure easier accessibility to markets and users in other member countries. Lao PDR is the only country which has CBTA agreements with all neighboring countries and is in a progressive position as far as CBTA is concerned in the Indochina region. Such a situation will help logistic companies in passing through the regions.

4.6.2 Opportunity

GMS/Indochina region is a promising region in the world, especially in terms of economic growth and market growth based on population growth and urban development coupled with deepening of the economic integration. Economic development in Lao PDR is also accelerating in production of

high-value added agricultural products and industrialization. These changes would serve as an “Opportunity” for logistics in Lao.

(1) Deepening of economic integration

ASEAN member states intend to deepen economic integration by 2015. Original 6 member states had already achieved tariff targets set in CEPT by 2002, while the other 4 member states (Lao PDR, Cambodia, Vietnam and Myanmar) intend to realize the targets by 2010. The final target of AFTA is the elimination of tariffs. The original member states will eliminate the tariffs by 2010, while the other states will eliminate them by 2015.

ASEAN member states also aim to establish ASEAN Community consisting of ASEAN Security Community, ASEAN Economic Community and ASEAN Social and Cultural Community by 2015. These activities will accelerate active exchange of goods and personnel in this region.

(2) Expansion of markets in GMS/ASEAN

ASEAN and GMS is one of the most promising regions which will continue economic growth in near future. Population is expected to grow continuously while the growth rates will gradually peter out. Expansion of economy as well as population will positively affect the increase in trade and consumption. As a result, logistics volume in the region is expected to increase in the future. In addition, progress of economic growth will require higher level of production and logistics to minimize those costs at same quality and service level. In this regard, logistics may require more sophisticated technology such as Just-in-time (JIT), supply chain management and inventory management within GMS or Lao. It is, in contrast, an opportunity for logistics sector to expand its business.

The economic growth will affect the increased urban population in such a way that it will be absorbed to provide labour in the non-agricultural sectors. Socio-economic framework implies that urban population in Lao will increase to 47% of total population in 2025 from 27% in 2008. Expansion of urban population will lead to increase in demand of goods, in particular consumer goods and will require higher services. Logistics may require more sophisticated technology as mentioned above. This also presents an opportunity for the logistics sector.

(3) Re-organization of production system in ASEAN by multi-national enterprises (progress of intra-industry trade in ASEAN)

In ASEAN countries, AFTA and CEPT will promote intra-industry trade in manufacturing production system. “Selection and Concentration Policy” to re-organize and relocate factories is currently a popular strategy for global manufacturers in order to minimize production cost. Consequently, Lao is expected to increase industrial production given its low land and labor costs as well as its strategic location in the GMS. For this purpose, logistics sector will be one of key factors necessary for success by providing stable, punctual and cost-competitive logistics system. It is thus a big opportunity for logistics business to expand both service variety and volume.

(4) Development of high value added agriculture and industrialization in Lao PDR

Diversification of agricultural products is one of the important agricultural development policies in Lao aimed at increasing farmers’ incomes. In order to reflect the policy, plantation of commercial crops as well as field and tree crops such as vegetables, fruits and herbs will gradually increase in

terms of cultivation area and production volume, especially in the southern region. There is an initial movement to introduce contract farming systems invested by Thai firms under CEPT and AIA, which target the Thai market. These agricultural products for export will require more efficient transport with adequate facilities and will present another business opportunity for the logistics sector in Lao PDR.

The same phenomenon has been observed in the manufacturing sector. Due to the low cost of labor and land and GSP, FDI into manufacturing industry of Lao PDR has been observed. Such conditions will also support demand for logistics in the country.

4.6.3 Weakness

The weaknesses in the Lao logistics system result from structural problems which consist of problems in infrastructure, market, logistics industry and administration. The following problems can be pointed out as the weaknesses:

(1) Small sizes of population and domestic market

Lao PDR is an undeveloped country in manufacturing and service sectors because of limited population; therefore, domestic transport demand is very limited to date. Small freight transport demand negatively affects transport costs due to lack of return-cargo from Lao PDR on one hand, and small logistics industry on the other hand.

(2) Differences in economic development and economic scale between Lao PDR and neighboring countries

Lao PDR's neighbours, in particular, China, Thailand and Vietnam have large-scale and advanced economies. The logistics industry as well as other industries in these countries are more developed than those in Lao PDR as well as other industries. In such a situation, there is a possibility that logistics businesses in Lao PDR would not be able to compete with foreign logistics businesses, such that the logistics market would be taken over by foreign logistics businesses.

4.6.4 Threat

Although GMS/Indochina region has enormous potential that would encourage the logistics sector, there are several obstacles to maximization of strengths and opportunities: these are referred to as "Threats" to logistics in Lao.

(1) Limited economic benefits from economic integration of GMS/ASEAN (Lao Passing)

Economic cooperation and market integration will generate benefits in GMS as a whole by improving optimum resource utilization through free trade and free transport in GMS. It is achieved based on realizing "win-win" relation among member states. If unbalanced benefits among member states occur or some member states feel like they are "losing" under the economic cooperation, this would harm their motivation towards economic cooperation in the GMS. In this regard, it is essential that adequate and balanced benefits of economic cooperation are generated throughout the GMS.

4.6.5 Results of SWOT Analysis

From the analysis of logistics market of Lao PDR, the following ideas were identified.

- Considering the GMS as a single market and a single production network, it is necessary to reflect on the role of Lao PDR and the role of the logistics industry in Lao PDR. It is also necessary to imagine that Lao PDR and the logistics industry in Lao PDR will contribute to economic development of GMS and that the GMS will be established as a economic center in the world.
- Since the domestic market in Lao PDR is very small, it is necessary to recognize the entire GMS region as a potential market for Lao PDR, and consider developing logistics business by Lao enterprises in GMS.
- Prepare the next framework after AFTA/CEPT and CBTA which will activate free movement of personnel, goods and money in GMS.
- Industrial development which aims at the Lao domestic market and ignores advantages of Lao PDR and production linkage with neighboring countries will face limitations.

CHAPTER 5 FREIGHT DEMAND ANALYSIS

5.1 Summary of Results of Traffic Survey

5.1.1 Outline of Traffic Survey

For the estimation of current freight volume and distribution, the field survey was conducted at 8 locations as shown in Figure 5.1.1. The field survey comprised of a vehicle count survey and roadside truck-driver interview survey.

For the vehicle count survey, vehicles were classified into 15 vehicle types, namely: 1) Motorcycle, 2) Tuk Tuk, Sontheo, 3) Passenger cars including pick-ups, 4) Medium bus, 5) Large bus, 6) 2-axle light trucks, 7) 2-axle heavy trucks, 8) 3-axle trucks, 9) 4-axle trucks, 10) Dump trucks, 11) Articulated trucks, 12) Tankers, 13) Trailers, 14) Agricultural tractor and 15) Other trucks such as Army trucks.

The roadside interview survey was a sample survey focusing on only trucks (vehicle types 7 – 13). It included queries on origin and destination, departure and estimated arrival time, type and packaging of commodity/cargo.

According to an interview with customs officer before the start of field survey, loading of trucks at customs is basically not possible on weekends. The field survey at customs was therefore planned and performed only on weekdays. At other survey locations, namely the provincial boundary on national road, the field survey was carried out on 5 days consisting of 3 weekdays, Saturday and Sunday.

Table 5.1.1 Field Survey Locations and Schedule

Survey Location	Survey Period	Day							
		Mon	Tue	Wed	Thu	Fri	Sat	Sun	
1 Friendship Bridge	6:00 - 22:00	-	12-May	13-May	14-May	-	-	-	
2 Savannakhet Customs	6:00 - 22:00	-	26-May	27-May	28-May	-	-	-	
3 Van Tao Customs	8:00 - 16:00	-	26-May	27-May	28-May	-	-	-	
4 NR-13S: Ban Hay Toll Gate	5:00 - 5:00 (24h)	-	12-May	13-May	14-May	-	16-May	17-May	
5 NR-13S: Xaybangphay Toll Gate	6:00 - 22:00 (16h)	-	26-May	27-May	28-May	-	30-May	31-May	
6 NR-13S: Huaysao Toll Gate	6:00 - 22:00 (16h)	-	26-May	27-May	28-May	-	30-May	31-May	
7 NR-10: Thangon Toll Gate	6:00 - 22:00 (16h)	-	12-May	13-May	14-May	-	16-May	17-May	
8 NR-13N: Nabon Toll Gate	5:00 - 5:00 (24h)	-	12-May	13-May	14-May	-	16-May	17-May	

Source: JICA Study Team



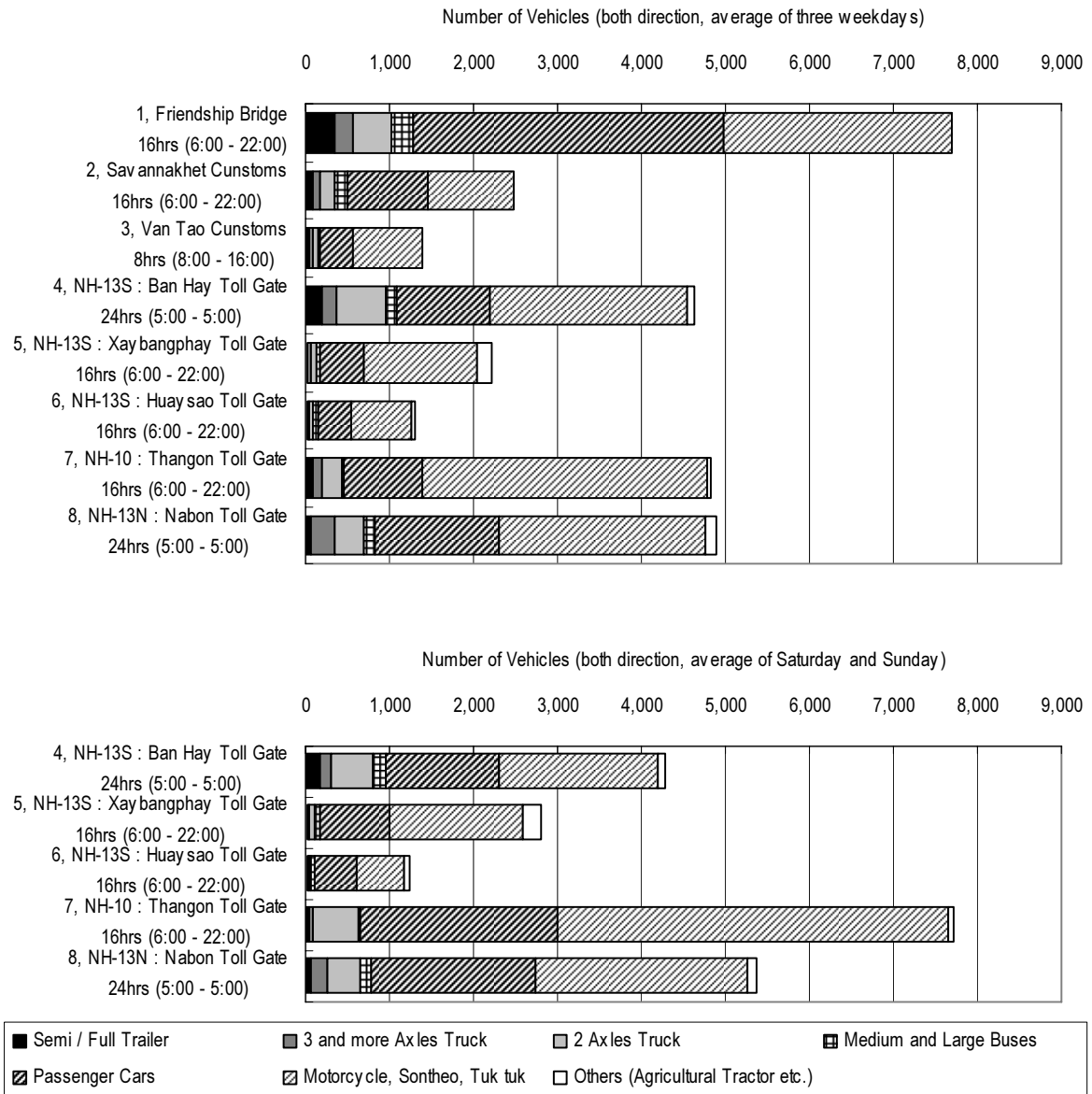
Figure 5.1.1 Field Survey Locations

5.1.2 Results of Vehicle Count Survey

Figure 5.1.2 shows the average vehicle count survey results for weekdays and holidays at the various survey locations. At the Friendship Bridge, the largest numbers of vehicles were observed and were dominated by motorcycles / songtheo/ tuk tuk (35%), and passenger cars including pick-ups (48%). The number of trucks was more than 1,000 vehicles / day in both directions at the Friendship Bridge, but the share of trucks was only 13%.

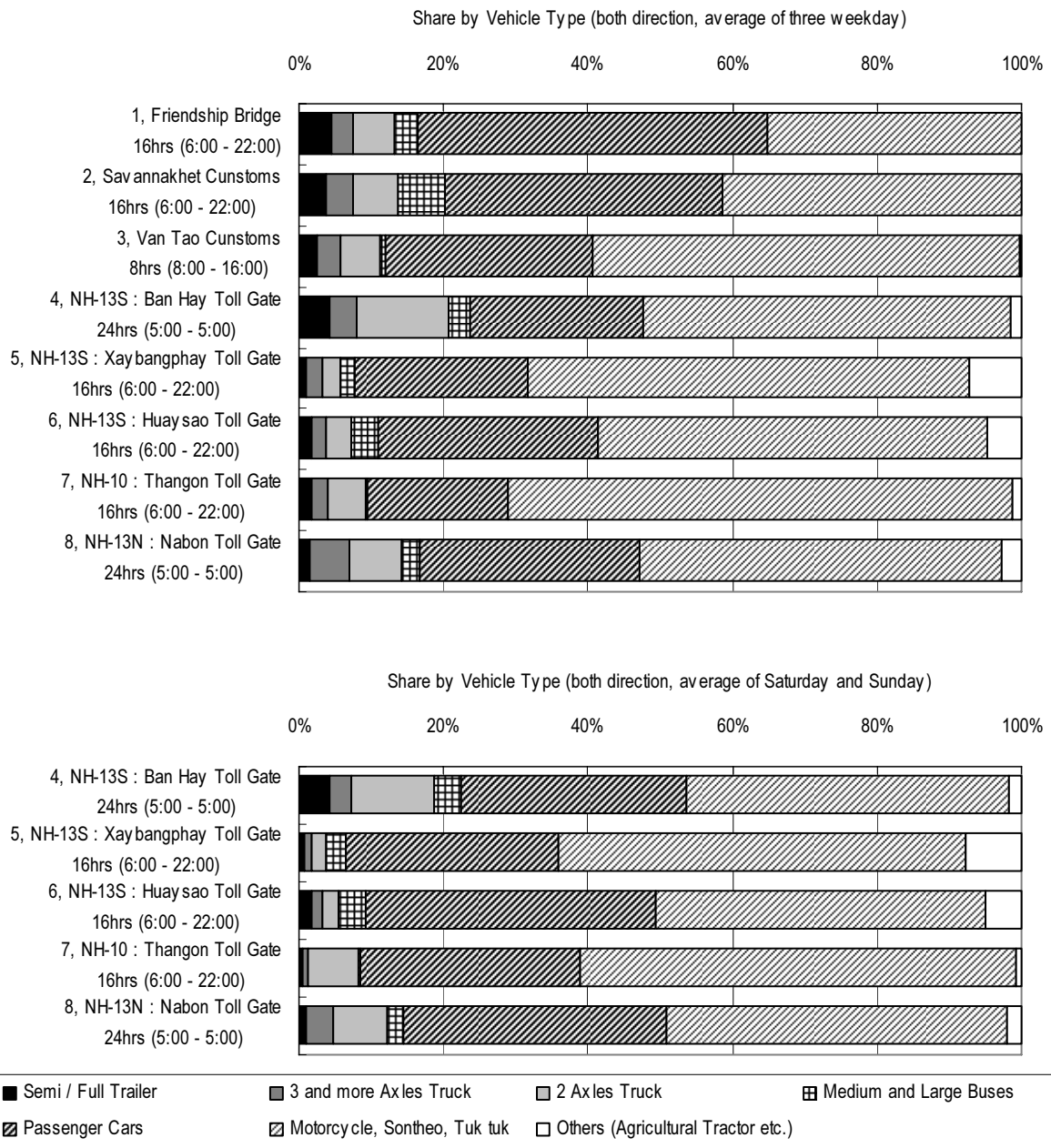
The number of trucks at the Location No.4, Ban Hay Toll Gate on NR-13S, was about 960 vehicles / day, which accounted for 20% of vehicles at the location.

Traffic volume and vehicle composition on holidays showed little disparity with weekday figures, with the exception of Location No.7, Thangon Toll Gate on NR-10. The NR-10 is an access road for Nam Ngum Dam and Dansavanh Resort; therefore traffic volume during holidays is larger than that for weekdays.



Source: JICA Study Team

Figure 5.1.2 Results of Vehicle Count Survey



Source: JICA Study Team

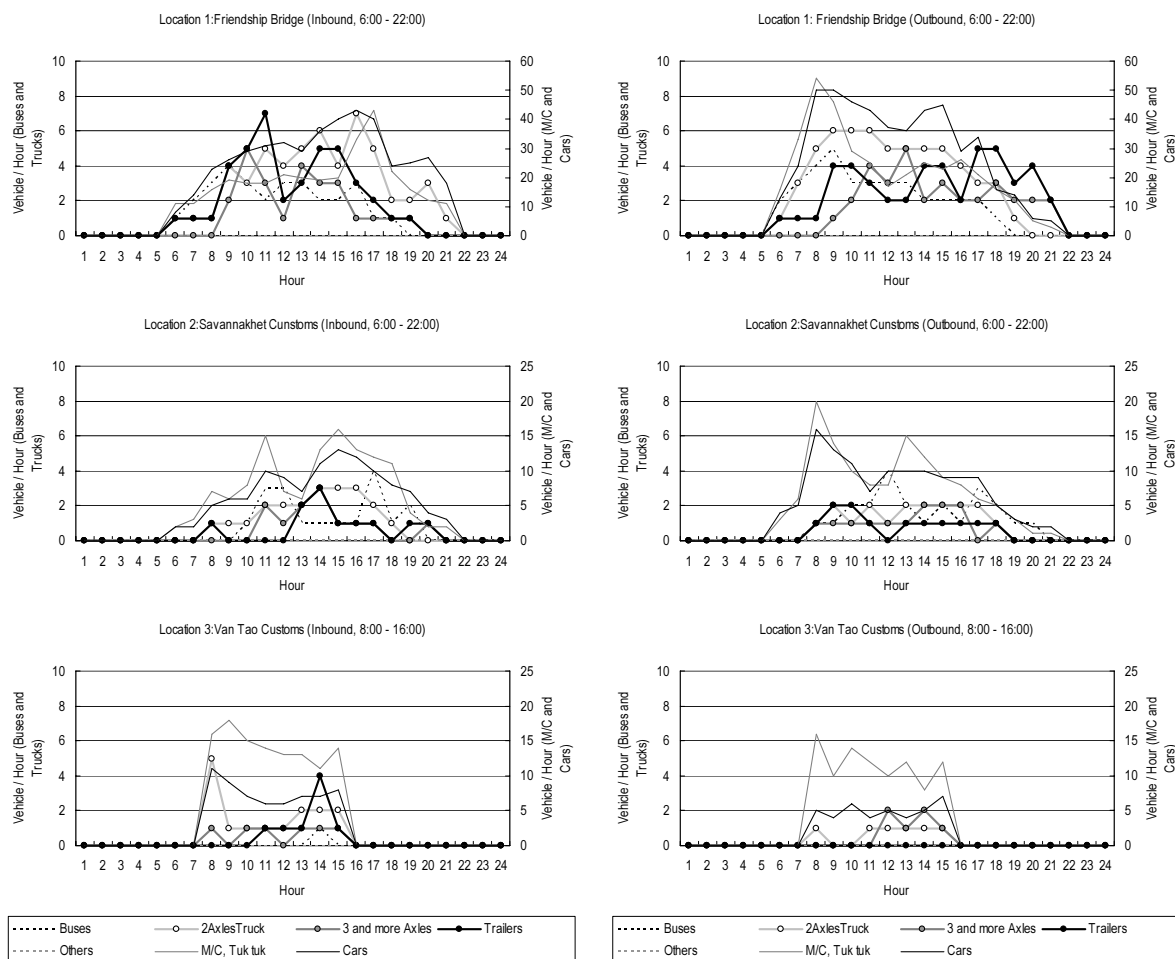
Figure 5.1.3 Vehicle Composition by Survey Location

Figures 5.1.4 and 5.1.5 show average hourly fluctuation by survey location and direction for weekdays and holidays respectively. At international borders such as Friendship Bridge and Savannakhet, trips by motorcycles or cars from Lao PDR to Thailand (outbound) indicate a morning peak at 8:00 a.m. Conversely, trips from Thailand to Lao PDR show a remarkable evening peak.

At Friendship Bridge, 2-axle trucks show similar tendency to motorcycles and passenger cars, because 2-axle light-trucks of weight less than 2 tons, which account for 85% of 2-axle trucks, are used not only for transportation of goods but also as passenger cars. In contrast, heavy trucks, including trucks with more than 3 axles and semi/full trailers, show a contradictory pattern. The inbound traffic (from Thailand to Lao PDR) has its peak in the morning while the outbound traffic (from Lao PDR to Thailand) has its peak in the evening.

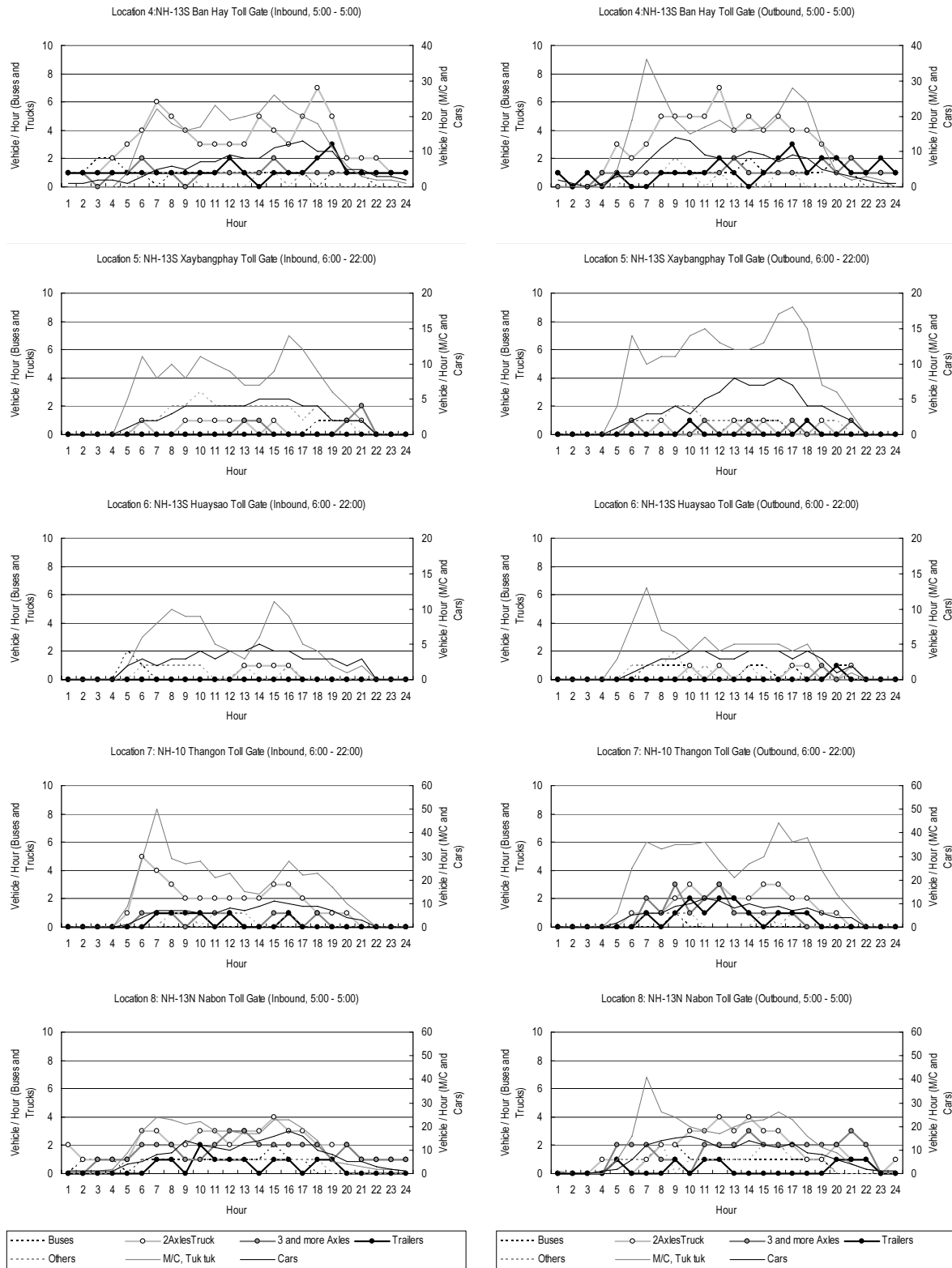
As regards truck volume at other survey locations, there isn't any remarkable hourly fluctuation.

As mentioned above, NR-10 serves a special function as an access road to the tourist resort. As a result, the inbound traffic has a morning peak and outbound traffic has an evening peak on weekdays, with the reverse being true on holidays.



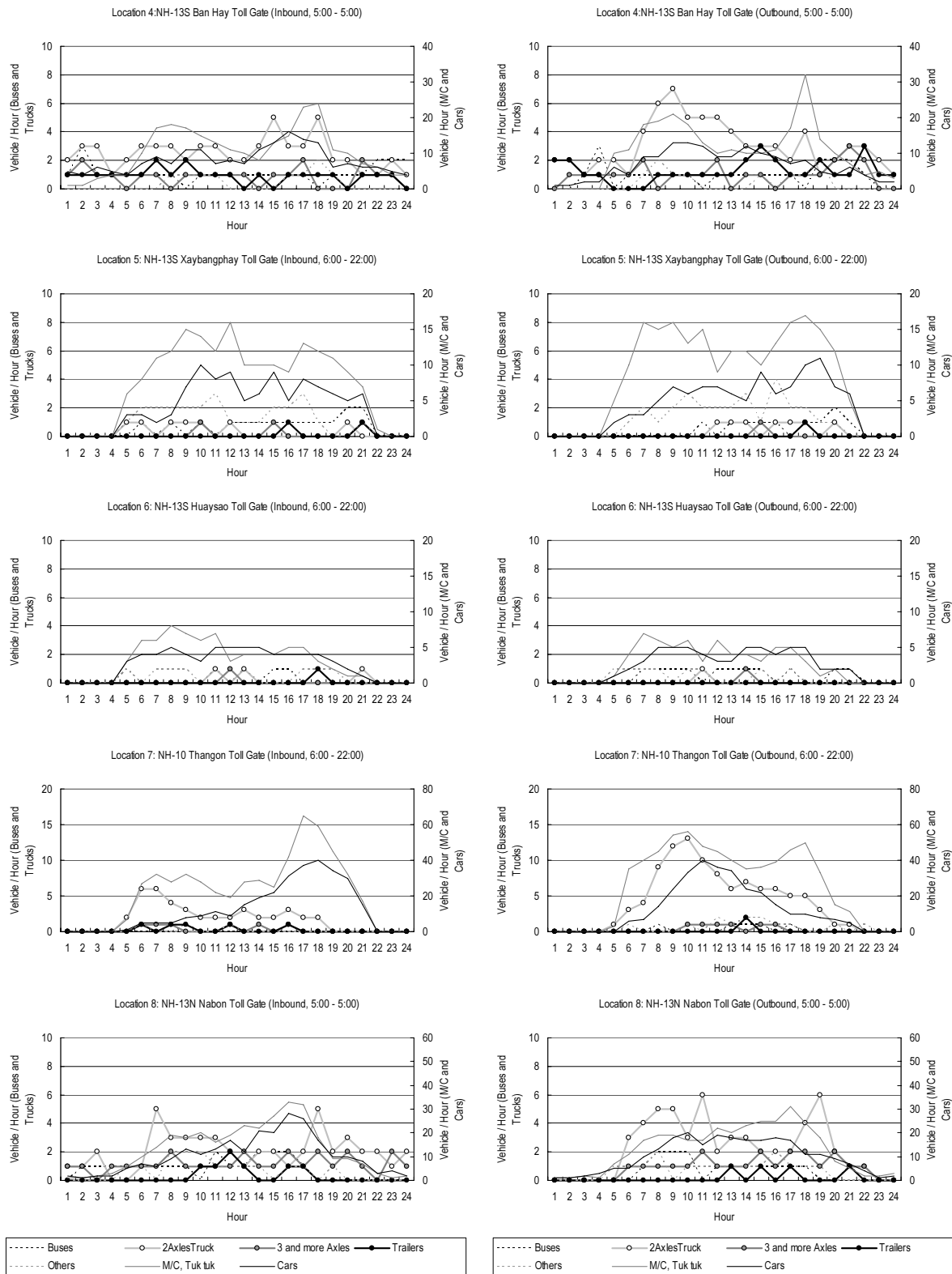
Source: JICA Study Team

Figure 5.1.4 Hourly Fluctuation (Average for 3 Weekdays)



Source: JICA Study Team

Figure 5.1.4 Hourly Fluctuation (Average for 3 Weekdays) cont'd



Source: JICA Study Team

Figure 5.1.5 Hourly Fluctuation (Average for Saturday and Sunday)

Table 5.1.2 Average Daily Truck Volume on Weekdays and Weekends

Location		2 Axles	3 Axles and more	Semi/ Full Trailer	Total (Vehicles/day)
4: NR-13S (Ban Hay Toll Gate)	(a) Weekday	589	177	191	957
	(b) Sat & Sun	525	159	209	893
	(b)/(a)	0.89	0.90	1.09	0.93
5: NR-13S (Xaybangphay Toll Gate)	(a) Weekday	63	55	27	145
	(b) Sat & Sun	59	29	27	115
	(b)/(a)	0.94	0.53	0.97	0.79
6: NR-13S (Huaysao Toll Gate)	(a) Weekday	51	26	28	106
	(b) Sat & Sun	28	21	25	73
	(b)/(a)	0.54	0.80	0.86	0.69
7: NR-10 (Thangon Toll Gate)	(a) Weekday	291	114	104	509
	(b) Sat & Sun	582	61	38	680
	(b)/(a)	2.00	0.53	0.36	1.34
8: NR-13N (Nabon Toll Gate)	(a) Weekday	349	275	72	696
	(b) Sat & Sun	406	194	57	657
	(b)/(a)	1.16	0.71	0.78	0.94
Total	(a) Weekday	1,343	647	423	2,413
	(b) Sat & Sun	1,599	464	354	2,417
	(b)/(a)	1.19	0.72	0.84	1.00

Source: JICA Study Team

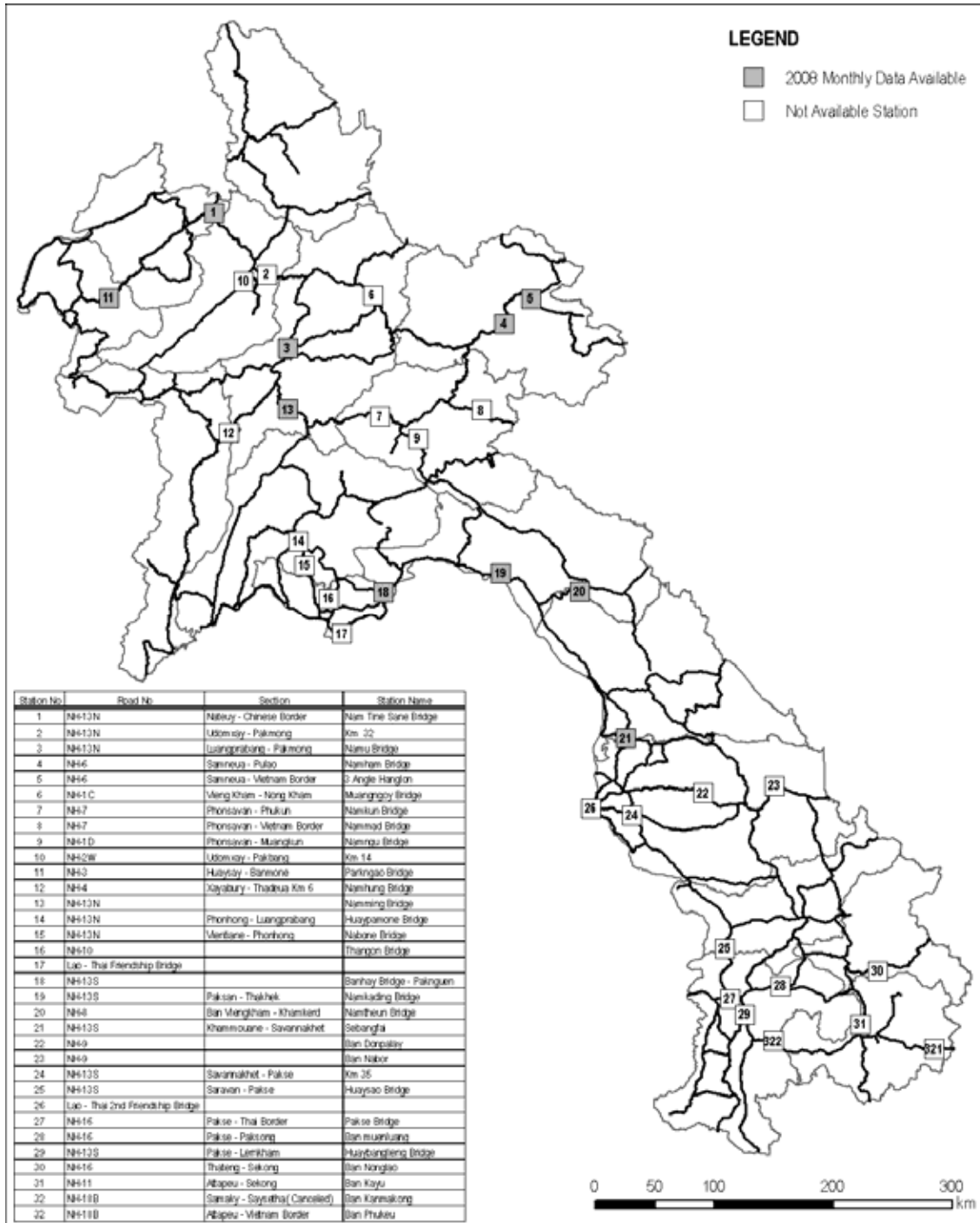
5.1.3 Monthly Fluctuations in Vehicle Volume

In order to ascertain monthly fluctuations in freight volume, the tollgate fee collection data was useful. There are 32 toll-gates for the collection of the road maintenance fund at the provincial boundaries on national highways in Lao PDR as shown in Figure 5.1.6. At these toll-gates, monthly fare revenues and number of vehicles under 6 vehicle-type classifications as shown in Table 5.1.3, are reported and stored in a database at MPWT. Unfortunately, there are quite a number of errors and missing data in the database. Therefore, the monthly fluctuation was analyzed based on an effective sample in 2008.

Table 5.1.3 Vehicle Classification by Fare Table as of 2008

No	Vehicle Types
01	Tuk Tuk
02	Sedan, Jeep, Pick-up, Bus, Van
03	Sontheo, Van, Bus(Below7 Seats)
04	Bus(8-35Seats),Light Truck (Below 7 Tons)
05	Bus(Over 36 Seats),Heavy Truck(Over7 Tons)
06	Heavy Truck 18-22 Wheels (Trailer, Backhoe, Special Transportation)

Source: MPWT

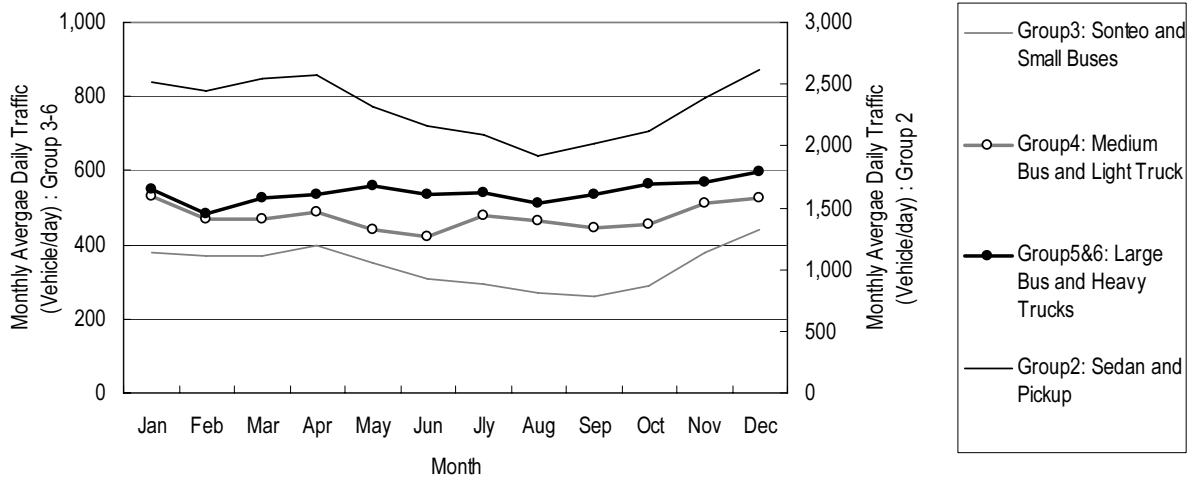


Source: MPWT

Figure 5.1.6 Locations of Toll Gates

Figure 5.1.7 shows monthly traffic volume by vehicle class as a total of data available for 10 tollgates. The fluctuation in heavy vehicles (Group 5 and 6) including medium and large buses is not sharp in comparison to passenger cars (Group 2) and small buses (Group 3). Figure 5.1.8 shows a ratio of monthly average daily traffic volume in May, 2008 by toll-gate. There is little disparity among toll-gates regarding passenger cars. However, disparities at the toll-gates are more pronounced for buses and trucks (Group 3 and more) because of small traffic volumes. Based on an average of total traffic volume at the 10 toll-gates, an adjustment factor to convert

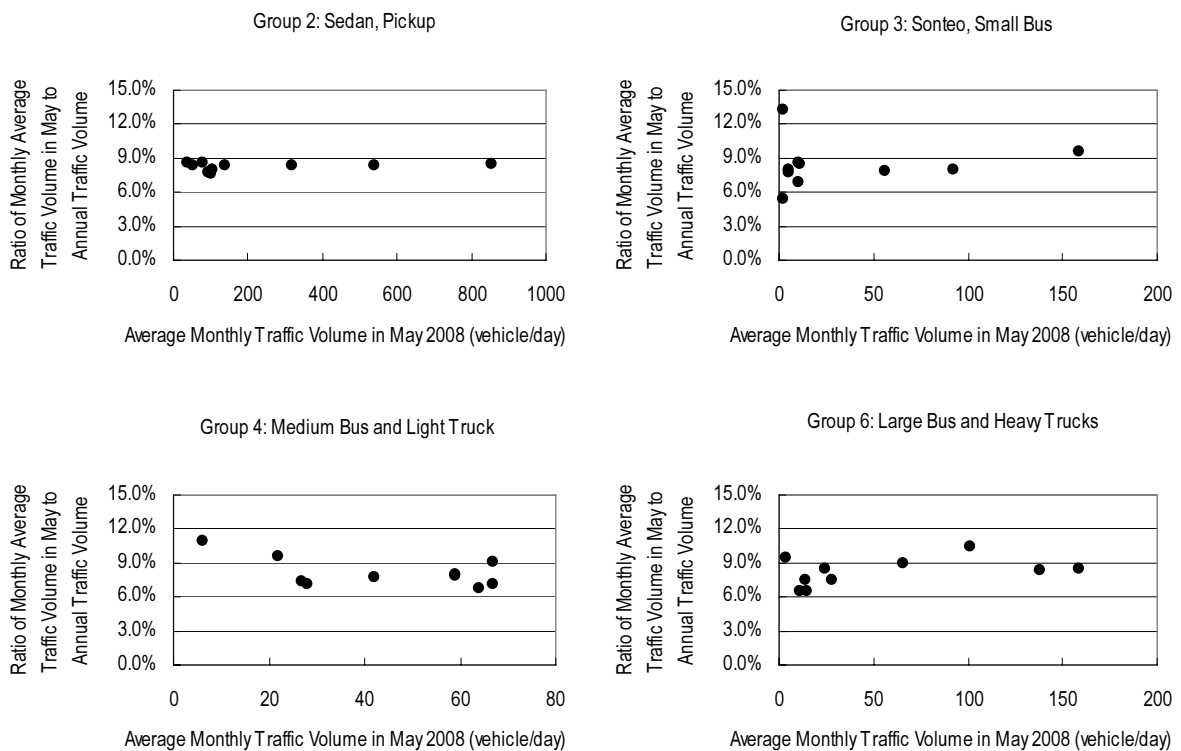
traffic volume in May to Annual Average Daily Traffic (AADT) is calculated as shown in Table 5.1.3.



Notes: Traffic volume is a total of available 10 Toll Gates

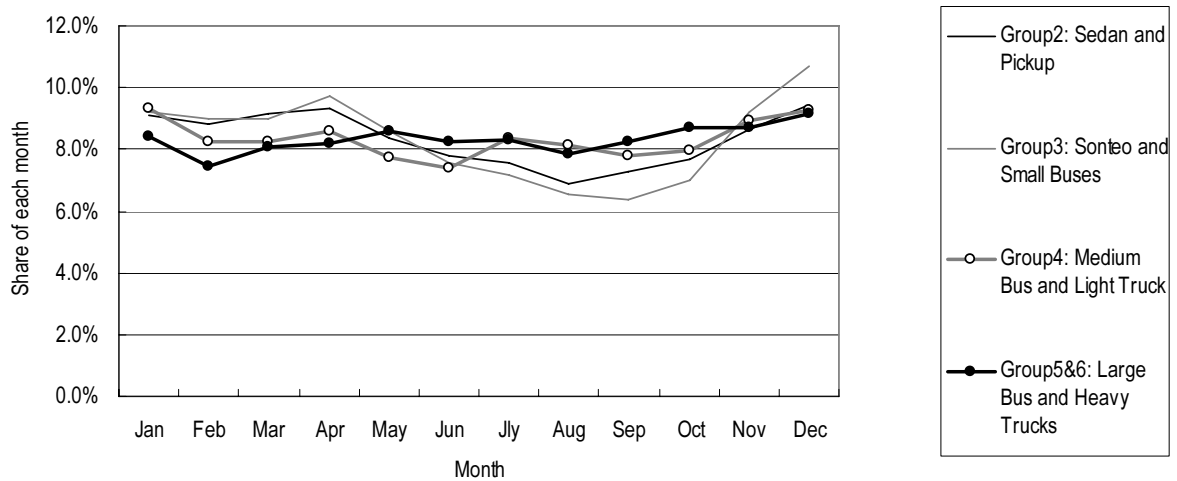
Source: JICA Study Team

Figure 5.1.7 Traffic Volume Fluctuation by Vehicle Class in 2008



Source: JICA Study Team

Figure 5.1.8 Ratios of Average Monthly Traffic Volume in May for the 10 Available Toll Gates



Source: JICA Study Team

Figure 5.1.9 Monthly Fluctuation by Vehicle Class in 2008

Table 5.1.4 shows the adjustment factors for the conversion to AADT volume.

Table 5.1.4 Monthly Fluctuation of Traffic Volume and Adjustment Factor for AADT in 2008

	Sedan, Jeep, Pickup	Sonteo, Bus (below 7 seats)	Bus (8-35 seats), Light truck (below 7 tons)	Bus (over 36 seats), Heavy truck (over 7 tons), trailers etc.
Jan	9.1	9.2	9.3	8.4
Feb	8.8	9.0	8.2	7.4
Mar	9.2	9.0	8.2	8.1
Apr	9.3	9.7	8.6	8.2
May	8.3	8.6	7.7	8.6
Jun	7.8	7.6	7.4	8.3
July	7.6	7.2	8.4	8.3
Aug	6.9	6.6	8.1	7.9
Sep	7.3	6.4	7.8	8.2
Oct	7.7	7.0	8.0	8.7
Nov	8.6	9.2	9.0	8.7
Dec	9.4	10.7	9.3	9.1
Total (%)	100.0	100.0	100.0	100.0
Adjustment Factor for May to AADT	1.00	0.97	1.08	0.97

Source: JICA Study Team

5.1.4 Results of Roadside Interview Survey

Table 5.1.5 shows sample rate by survey location. Expansion factors by survey location, direction and type of truck are defined based on the sample rate respectively.

Table 5.1.5 Sample Ratio by Survey Location

Location	Day	Dir	No. of Vehicles (Count)			No. of vehicles in Sample (Interview)			Sample Rate		
			2 Axles	3 Axles and more	Trailers	2 Axles	3 Axles and more	Trailers	2 Axles	3Axles and more	Trailers
1	Weekday	1	643	317	504	26	99	136	4.0%	31.2%	27.0%
		2	679	375	532	119	101	118	17.5%	26.9%	22.2%
2	Weekday	1	247	124	155	57	76	88	23.1%	61.3%	56.8%
		2	213	144	128	19	115	113	8.9%	79.9%	88.3%
3	Weekday	1	175	69	96	26	31	10	14.9%	44.9%	10.4%
		2	61	66	9	29	40	3	47.5%	60.6%	33.3%
4	Weekday	1	887	274	276	113	94	75	12.7%	34.3%	27.2%
		2	881	256	296	83	92	96	9.4%	35.9%	32.4%
	Sat & Sun	1	490	145	175	45	41	60	9.2%	28.3%	34.3%
		2	560	173	242	37	21	33	6.6%	12.1%	13.6%
5	Weekday	1	110	84	25	47	51	16	42.7%	60.7%	64.0%
		2	78	81	57	33	46	36	42.3%	56.8%	63.2%
	Sat & Sun	1	57	38	33	16	18	17	28.1%	47.4%	51.5%
		2	61	20	20	12	13	8	19.7%	65.0%	40.0%
6	Weekday	1	60	36	34	58	35	29	96.7%	97.2%	85.3%
		2	93	43	51	83	30	28	89.2%	69.8%	54.9%
	Sat & Sun	1	31	22	24	30	8	20	96.8%	36.4%	83.3%
		2	24	20	25	18	11	16	75.0%	55.0%	64.0%
7	Weekday	1	489	136	95	135	36	3	27.6%	26.5%	3.2%
		2	383	206	218	45	54	38	11.7%	26.2%	17.4%
	Sat & Sun	1	357	68	57	88	20	8	24.6%	29.4%	14.0%
		2	806	53	19	65	18	5	8.1%	34.0%	26.3%
8	Weekday	1	592	426	129	120	128	51	20.3%	30.0%	39.5%
		2	455	399	88	100	128	16	22.0%	32.1%	18.2%
	Sat & Sun	1	389	213	69	152	102	41	39.1%	47.9%	59.4%
		2	423	175	44	89	91	18	21.0%	52.0%	40.9%
Weekday Total			6046	3036	2693	1093	1156	856	18.1%	38.1%	31.8%
Total of Sat and Sun			3198	927	708	552	343	226	17.3%	37.0%	31.9%

Note: Weekday is total of three weekdays and Holiday is total of Saturday and Sunday.

Source: JICA Study Team

The following analysis of the results of the roadside interview survey was based on the data expanded by expansion factor and calibrated with expanded truck OD and vehicle count survey results.

Table 5.1.6 shows empty truck ratio for international cross-border points and domestic locations. At the Lao-Thai Friendship Bridge and Savannakhet customs, 95% of outbound trucks (from Lao PDR to Thailand) are empty while 15.8% of inbound trucks (from Thailand to Lao PDR) are empty.

Table 5.1.6 Empty Truck Ratios

Location	Category	2 axles	3 Axles and more	Trailer	Total
Lao-Thai Friendship Bridge	Inbound (Import)	19.7%	9.1%	16.2%	15.8%
	Outbound (Export)	99.2%	91.3%	88.1%	94.5%
Savannakhet customs	Inbound (Import)	16.8%	10.6%	30.7%	21.5%
	Outbound (Export)	94.6%	98.1%	87.6%	94.5%
Vangtao customs	Inbound (Import)	40.2%	38.7%	70.0%	47.1%
	Outbound (Export)	7.5%	14.9%	14.3%	12.8%
Domestic	Weekday	41.5%	33.2%	50.6%	40.8%
	Holiday	49.3%	35.8%	48.7%	47.1%

Source: JICA Study Team

Note: Empty truck ratio in Japan is about 30% in 2006 (statistics of automobile transport in FY2006) and 37% in PRC in 2002 (statistics from logistics in China in 2002).

Table 5.1.7 shows average net loading ratio (excluding empty truck) by type of commodity and truck.

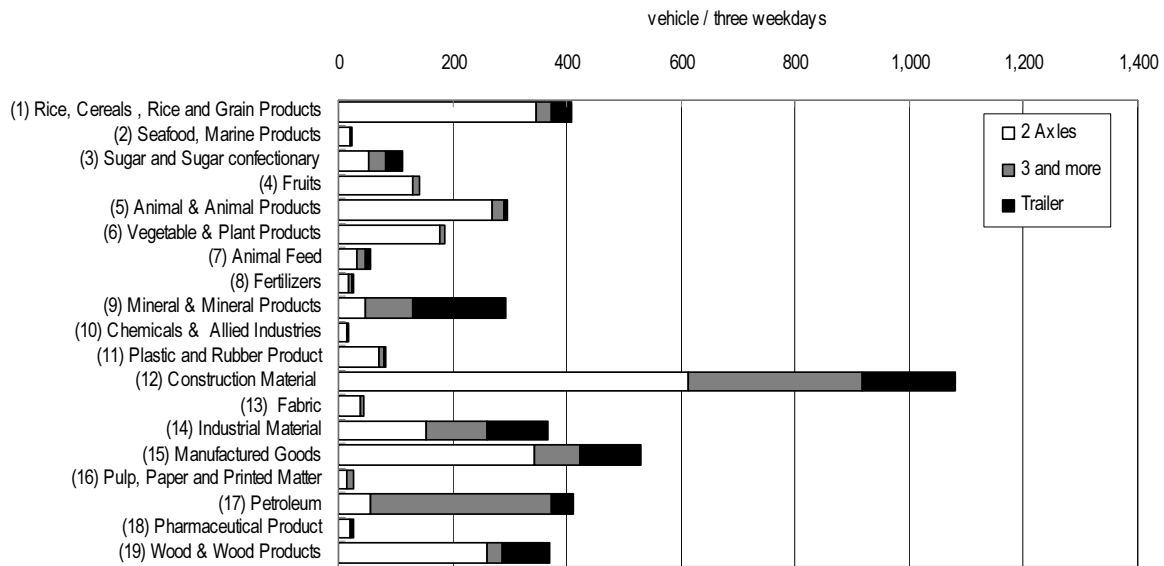
Table 5.1.7 Loading Ratio by Type of Commodity and Truck

Commodity	Average of International			Average of Domestic		
	2 Axles	3 and more	Trailer	2 Axles	3 and more	Trailer
Rice & Cereals	81%	91%	80%	78%	79%	83%
Animal Products	96%	96%	88%	86%	95%	88%
Sugar & Sugar Confectionary	94%	100%	100%	76%	94%	67%
Fruits & Vegetables	99%	100%	100%	81%	95%	100%
Animal Feeds & Fertilizers	100%	83%	100%	81%	78%	100%
Mineral & Construction Material	100%	63%	81%	86%	88%	80%
Chemical & Plastic & Industrial Materials	86%	94%	80%	75%	85%	91%
Manufactured Goods	92%	91%	95%	80%	93%	89%
Petroleum	100%	93%	88%	77%	93%	75%
Wood Products	100%	96%	95%	89%	85%	84%

Source: JICA Study Team

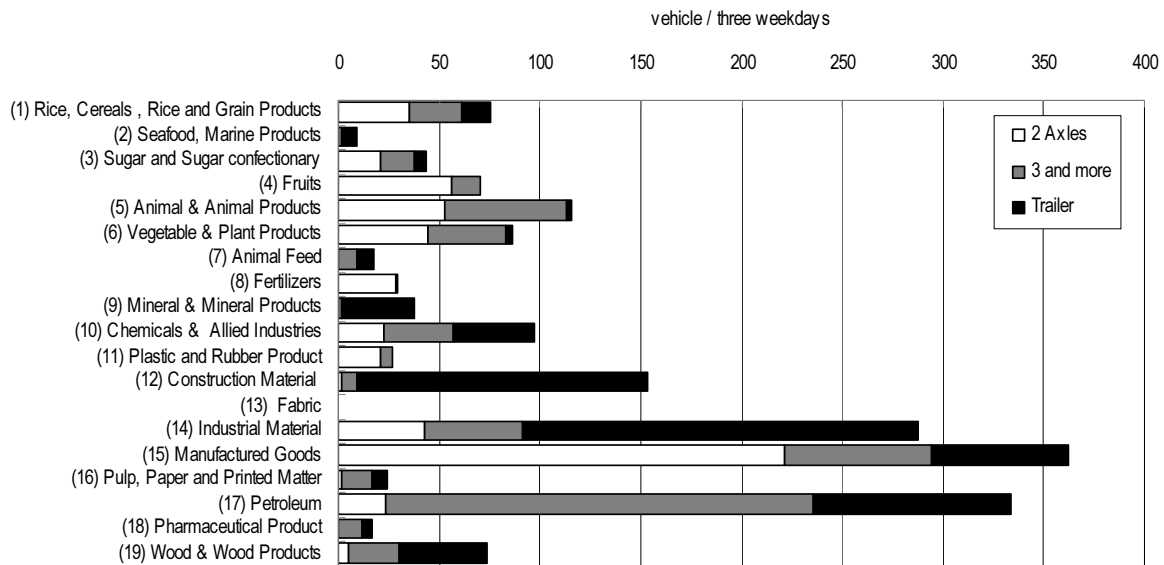
Note: Loading ratio in Japan is 84% (more than 10 tons), 77% (4– 10 tons truck), 68% (2 – 4 tons truck) and 55% (less than 2 tons) in 2005 (data from 4th survey on goods and supplies movement in Tokyo metropolitan area).

Figure 5.1.11 and 5.1.12 show number of trucks by type of carrying commodity in three weekdays of domestic and international respectively.



Source: JICA Study Team

Figure 5.1.11 Number of Trucks by Commodity Carried (Domestic)



Source: JICA Study Team

Figure 5.1.12 Number of Trucks by Commodity Carried (International)

Figure 5.1.13 shows composition of type of packaging by commodity with number of trucks expanded to 3-weekday volumes. The portion of trucks carrying container is about 8%, with 53% of the containers measuring 40ft as shown in Figure 5.1.13.

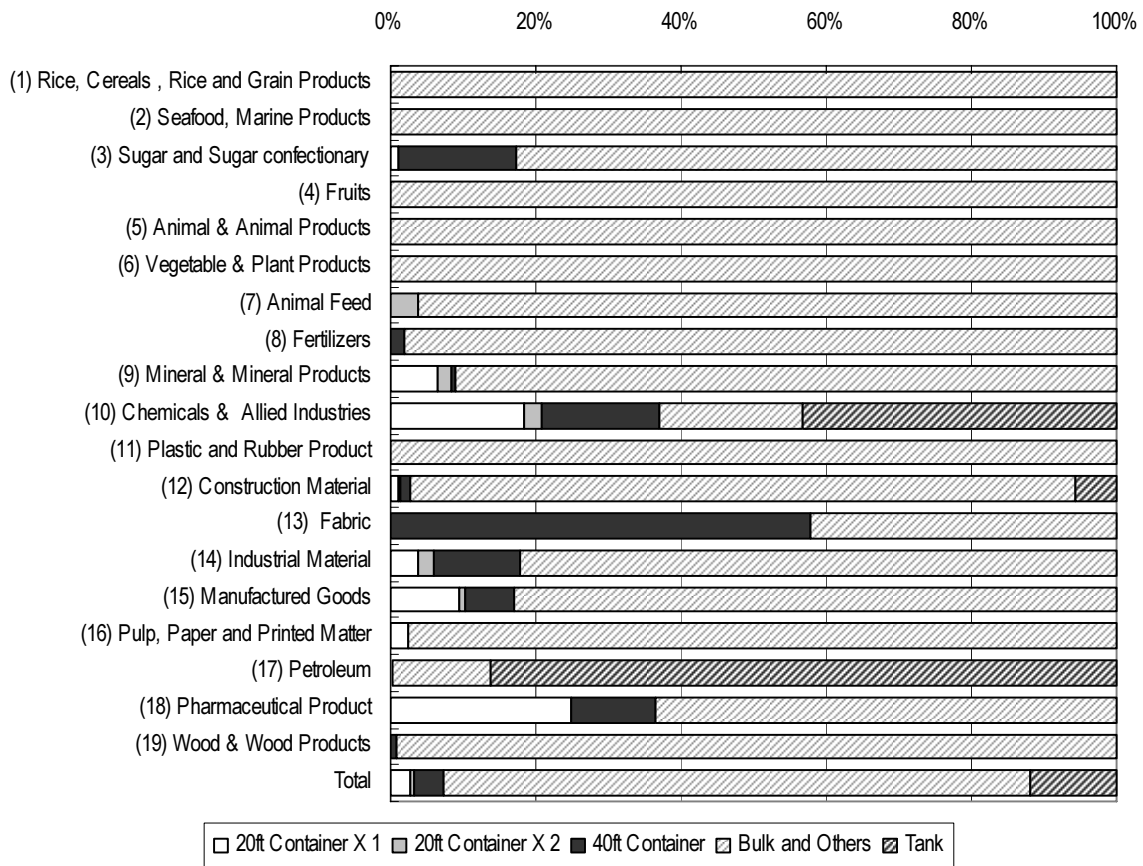
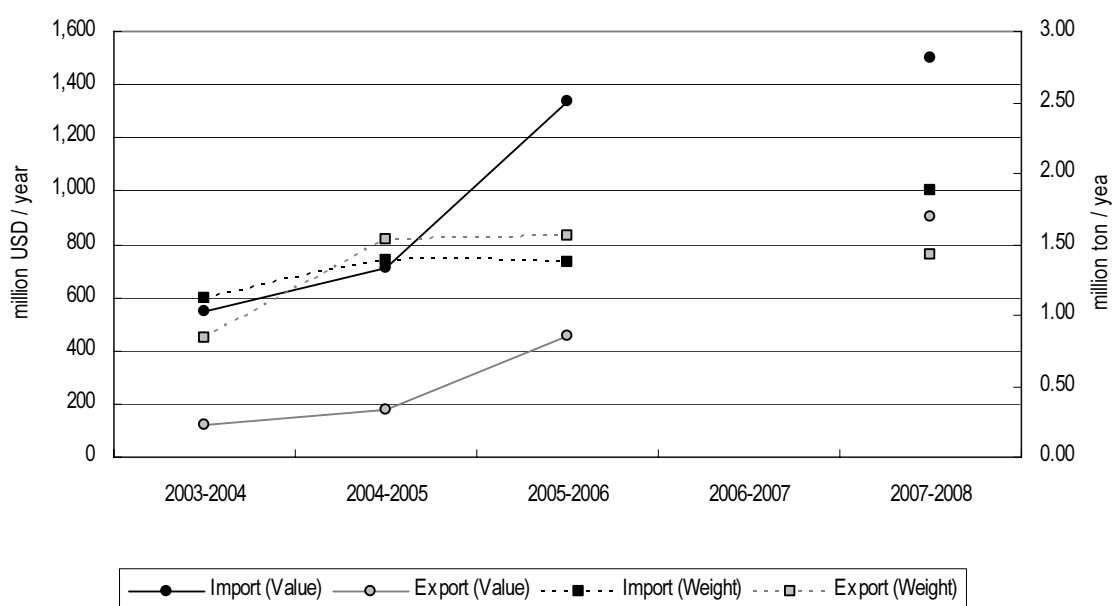


Figure 5.1.13 Type of Packaging by Commodity (Vehicle / 3 weekdays)

5.1.5 Customs Data

The Customs Department has introduced the “C2000 System” which stores data on declaration-based types of commodity (HS 8 digit) such as volume in kg, value in Kips and USD, and whether it’s for import, export or transit and customs. By analyzing this data, the prevalent trends of trade relevant to Lao PDR can be discerned.

Figure 5.1.14 shows annual import and export volume in Lao PDR over the recent 4 year period.



Source: C2000 Database

Note: Some monthly data are missing in Oct. 2006 – Sep. 2007 Data

Figure 5.1.14 Declaration-based Import / Export Volume

Table 5.1.8 shows declaration based trade volume in 2007-2008. The trade in Lao PDR is dominated by trade with other GMS countries (excluding Myanmar).

Table 5.1.8 Trade Volume relevant to Lao PDR

		GMS Country	Outside GMS	Total (All Countries)	Share of GMS
Volume in million tons / year	Import to Lao	1.82	0.10	1.92	95.0%
	Export from Lao	1.41	0.02	1.43	98.9%
	Transit (from)	0.11	0.01	0.12	92.0%
Volume in million USD / year	Import to Lao	1,291	207	1,498	86.2%
	Export from Lao	822	78	900	91.3%
	Transit (from)	86	118	204	42.0%
Average Unit Price (USD / ton)	Import to Lao	708.3	2,169.9	781.1	-
	Export from Lao	581.1	4,790.2	629.1	-
	Transit (from)	758.8	12,130.3	1,664.2	-

Source: C2000 Database (Oct. 2007 – Sep. 2008)

Note1: GMS Countries consist of Vietnam, Thailand, Cambodia and the whole of China (PRC).

Note2: Exports to markets outside GMS are dominated by gold (48.4 million USD), coffee (18.2 million USD) and refined copper (8.6 million USD).

Note3: Transit goods from countries outside GMS are dominated by cigarettes from Indonesia (81.3 million USD), ethyl alcohol or spirit (25.6 million USD) from Singapore at customs in Savannakhet.

Table 5.1.9 shows trade matrices relevant to Lao PDR in 2007-2008. Imports and exports in Lao PDR are dominated by Thailand. Major transit cargo through Lao PDR is from Thailand to Vietnam.

Table 5.1.9 Trade in GMS relevant to Lao PDR

Million USD	LAO PDR	VIETNAM	THAILAND	CAMBODIA	CHINA (PRC)	TOTAL
LAO PDR		98.7	476.8		14.7	590.2
VIETNAM	80.5		14.6			95.1
THAILAND	1091.4	184.8			1.2	1277.4
CAMBODIA			0.1			0.1
CHINA (PRC)	118.3		3.4			121.7
TOTAL	1290.2	283.5	494.9	0	15.9	2084.5

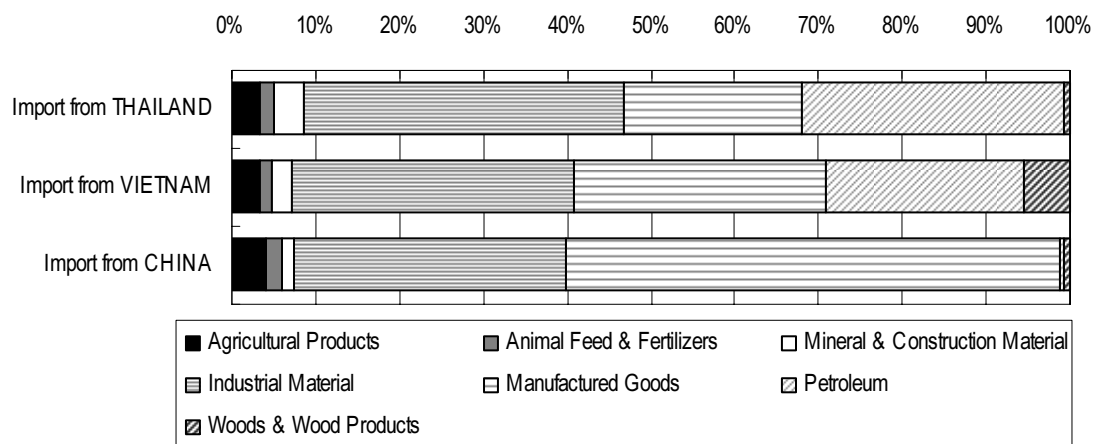
Source: C2000 Database (Oct. 2007 – Sep. 2008)

Figures 5.1.15 to 5.1.16 show declared value based commodity composition relevant to Lao PDR and other GMS countries.

Imports from Thailand consist of industrial material (38%), petroleum (31%) and manufactured goods (21%).

About 70% of exports to Thailand are industrial material (ex. refined copper). Export to Vietnam is dominated by manufactured goods (declare price based).

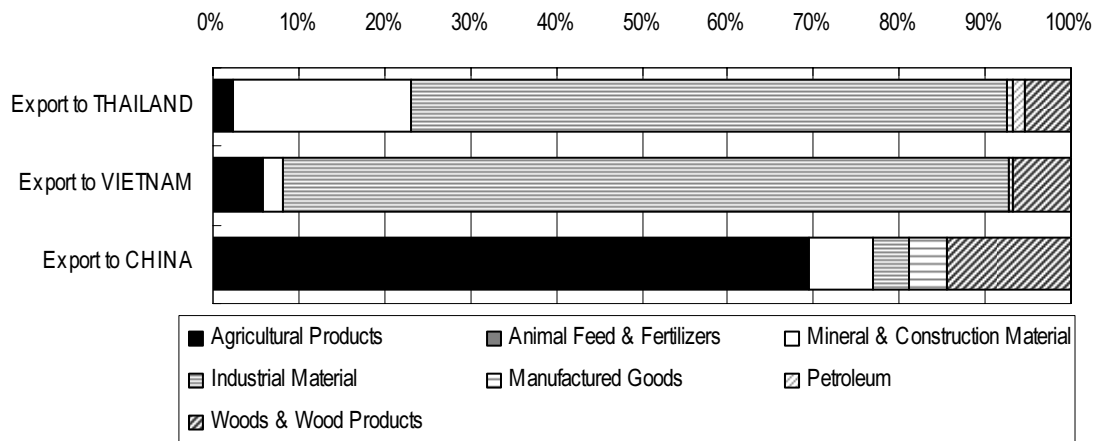
About 60% of transit freight from Thailand is agricultural products (75% is tobacco). Freight from China (to Thailand) is dominated by manufactured goods.



Source: C2000 Database (Oct. 2007 – Sep. 2008)

Note: Value (USD) based

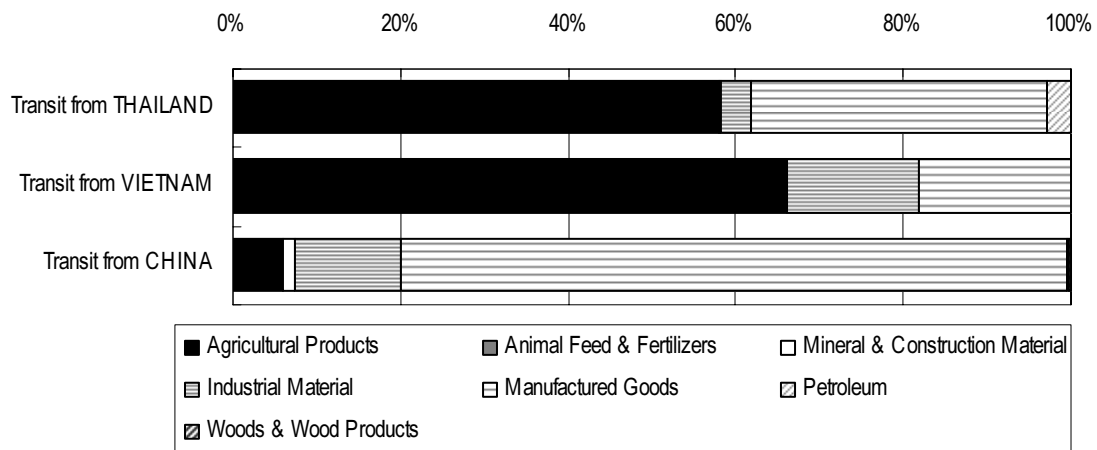
Figure 5.1.15 Commodity Composition of Imports to Lao PDR from GMS Countries



Source: C2000 Database (Oct. 2007 – Sep. 2008)

Note: Value (USD) based

Figure 5.1.16 Commodity Composition of Exports from Lao PDR to GMS Countries

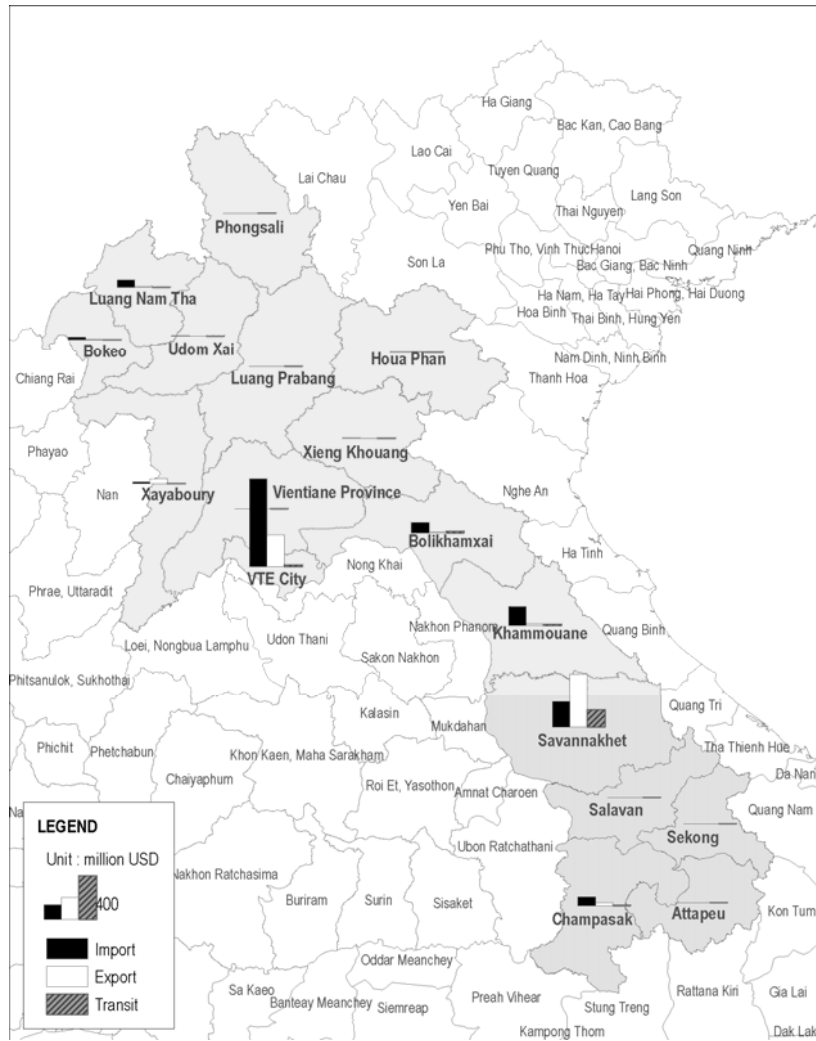


Source: C2000 Database (Oct. 2007 – Sep. 2008)

Note: Value (USD) based

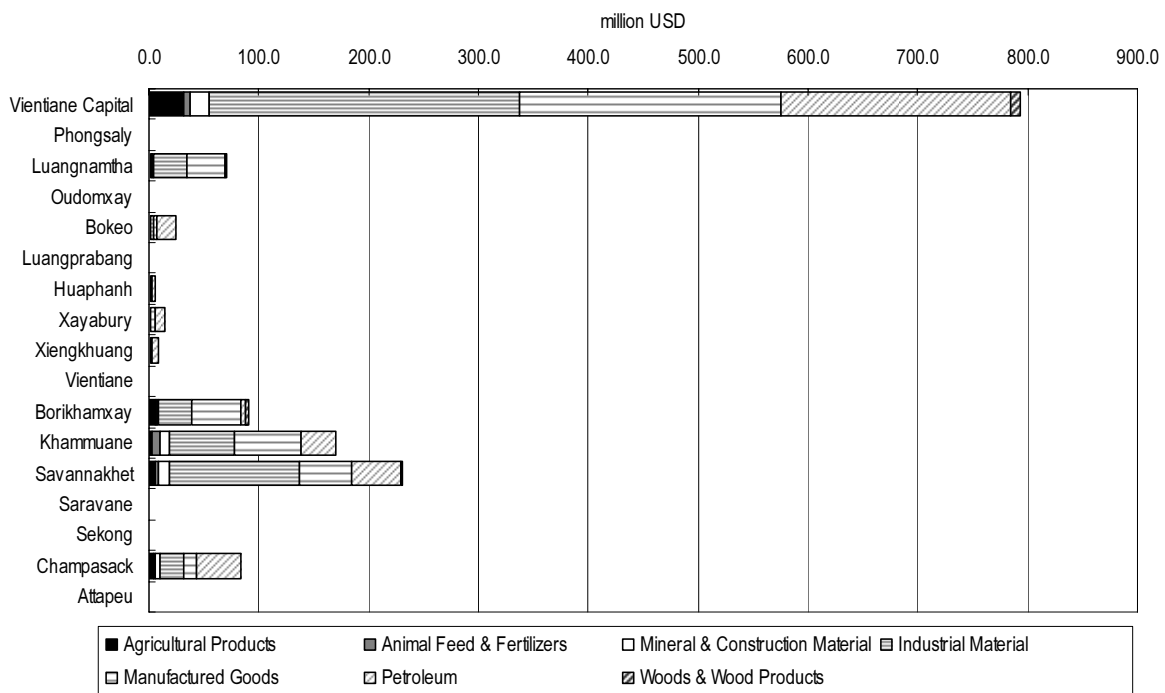
Figure 5.1.17 Commodity Composition of Transit Freight through Lao PDR from GMS Countries

Figure 5.1.18 shows trade volume in 2007-2008 by custom location (province). 53% of import volume in Lao PDR is concentrated at customs in Vientiane Capital. 53% of export volume is concentrated at customs in Savannakhet.



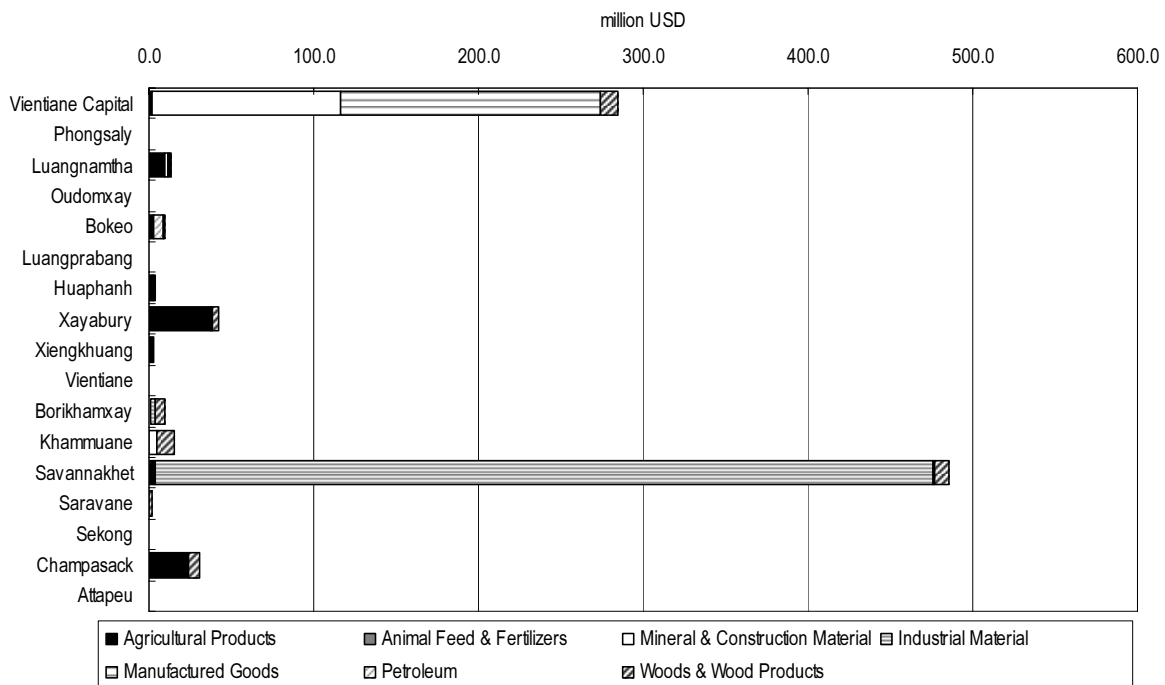
Source: C2000 Database (Oct. 2007 – Sep. 2008)

Figure 5.18 Trade Volume by Province in Lao PDR



Source: C2000 Database (Oct. 2007 – Sep. 2008)

Figure 5.1.19 Imports by Commodity and Province (Custom)



Source: C2000 Database (Oct. 2007 – Sep. 2008)

Figure 5.1.20 Exports by Commodity and Province (Custom)

Table 5.1.10 shows the import volumes of 3 major customs in Vientiane Capital in weight. Almost

all commodities, except petroleum, are through Thanaleng or Lao-Thai Friendship Bridge customs and Thanaleng's share of import cargo in Vientiane Capital is 23%.

In regard to export cargo in Vientiane Capital, Lao-Thai Friendship Bridge and Wattay International Airport customs account for almost 100% of volume.

Table 5.1.10 Import Volume by Customs in Vientiane Capital

1,000 tons / Year	Thanaleng	Wattay International Airport	Lao-Thai Friendship Bridge	Other Customs in Vientiane Capital
1) Rice & Cereals	4.7 (12.0%)	0.0 (0.0%)	34.4 (87.8%)	0.1 (0.2%)
2) Animal Products	5.1 (12.4%)	0.0 (0.0%)	36.2 (87.3%)	0.1 (0.3%)
3) Sugar & Sugar Confectionary	13.1 (77.9%)	0.0 (0.0%)	3.7 (22.1%)	0.0 (0.0%)
4) Fruits & Vegetables	0.2 (1.5%)	0.0 (0.0%)	9.6 (95.4%)	0.3 (3.1%)
5) Animal Feeds & Fertilizers	21.2 (74.9%)	0.0 (0.0%)	7.1 (24.9%)	0.1 (0.2%)
6) Mineral & Construction Materials	59.3 (39.0%)	0.0 (0.0%)	92.6 (61.0%)	0.0 (0.0%)
7) Chemical & Plastic & Industrial Materials	45.5 (26.4%)	0.2 (0.1%)	126.6 (73.4%)	0.1 (0.1%)
8) Manufactured Goods	54.6 (32.2%)	2.2 (1.3%)	112.0 (66.2%)	0.5 (0.3%)
9) Petroleum	0.2 (0.1%)	0.0 (0.0%)	25.8 (9.5%)	245.2 (90.4%)
10) Wood Products	8.8 (55.0%)	0.0 (0.1%)	7.2 (44.7%)	0.0 (0.2%)
Total	212.6 (23.2%)	2.5 (0.3%)	455.0 (49.6%)	246.5 (26.9%)

Source: C2000 Database (Oct. 2007 – Sep. 2008)

Table 5.1.11 Import Value by Customs in Vientiane Capital

Million USD / Year	Thanaleng	Wattay International Airport	Lao-Thai Friendship Bridge	Other Customs in Vientiane Capital
1) Rice & Cereals	1.51 (9.1%)	0.00 (0.0%)	15.11 (90.8%)	0.0 (0.1%)
2) Animal Products	2.15 (47.4%)	0.01 (0.1%)	2.27 (50.2%)	0.1 (2.2%)
3) Sugar & Sugar Confectionary	3.71 (70.9%)	0.00 (0.0%)	1.51 (29.0%)	0.0 (0.1%)
4) Fruits & Vegetables	0.13 (2.6%)	0.03 (0.7%)	4.59 (93.8%)	0.1 (2.9%)
5) Animal Feeds & Fertilizers	3.82 (62.3%)	0.00 (0.0%)	2.30 (37.5%)	0.0 (0.2%)
6) Mineral & Construction Materials	8.10 (45.8%)	1.41 (8.0%)	8.17 (46.2%)	0.0 (0.0%)
7) Chemical & Plastic & Industrial Materials	60.47 (21.4%)	24.10 (8.5%)	197.18 (69.9%)	0.2 (0.1%)
8) Manufactured Goods	102.72 (43.0%)	23.10 (9.7%)	112.30 (47.1%)	0.5 (0.2%)
9) Petroleum	0.44 (0.2%)	0.02 (0.0%)	3.66 (1.8%)	204.2 (98.0%)
10) Wood Products	3.23 (34.4%)	0.17 (1.8%)	5.99 (63.6%)	0.0 (0.2%)
Total	186.28 (23.5%)	48.84 (6.2%)	353.07 (44.5%)	205.2 (25.9%)

Source: C2000 Database (Oct. 2007 – Sep. 2008)

Based on the declared volume in weight by C2000 data and observed loading ratios at the site, maximum loading capacity by type of truck and type of commodity was defined as shown in Table 5.1.12.

Table 5.1.12 Estimated Loading Capacity in Weight (ton)

Commodity	2 Axles	3 Axles and More	Trailer
1) Rice & Cereals	1.19	4.69	10.39
2) Animal Products	0.83	3.18	6.49
3) Sugar & Sugar Confectionary	1.07	2.91	6.88
4) Fruits & Vegetables	0.93	4.03	8.21
5) Animal Feeds & Fertilizers	1.21	4.78	11.45
6) Mineral & Construction Materials	1.86	6.13	13.21
7) Chemical & Plastic & Industrial Materials	1.32	4.52	9.48
8) Manufactured Goods	1.47	5.45	10.71
9) Petroleum	1.39	5.32	9.24
10) Wood Products	1.25	4.51	9.91

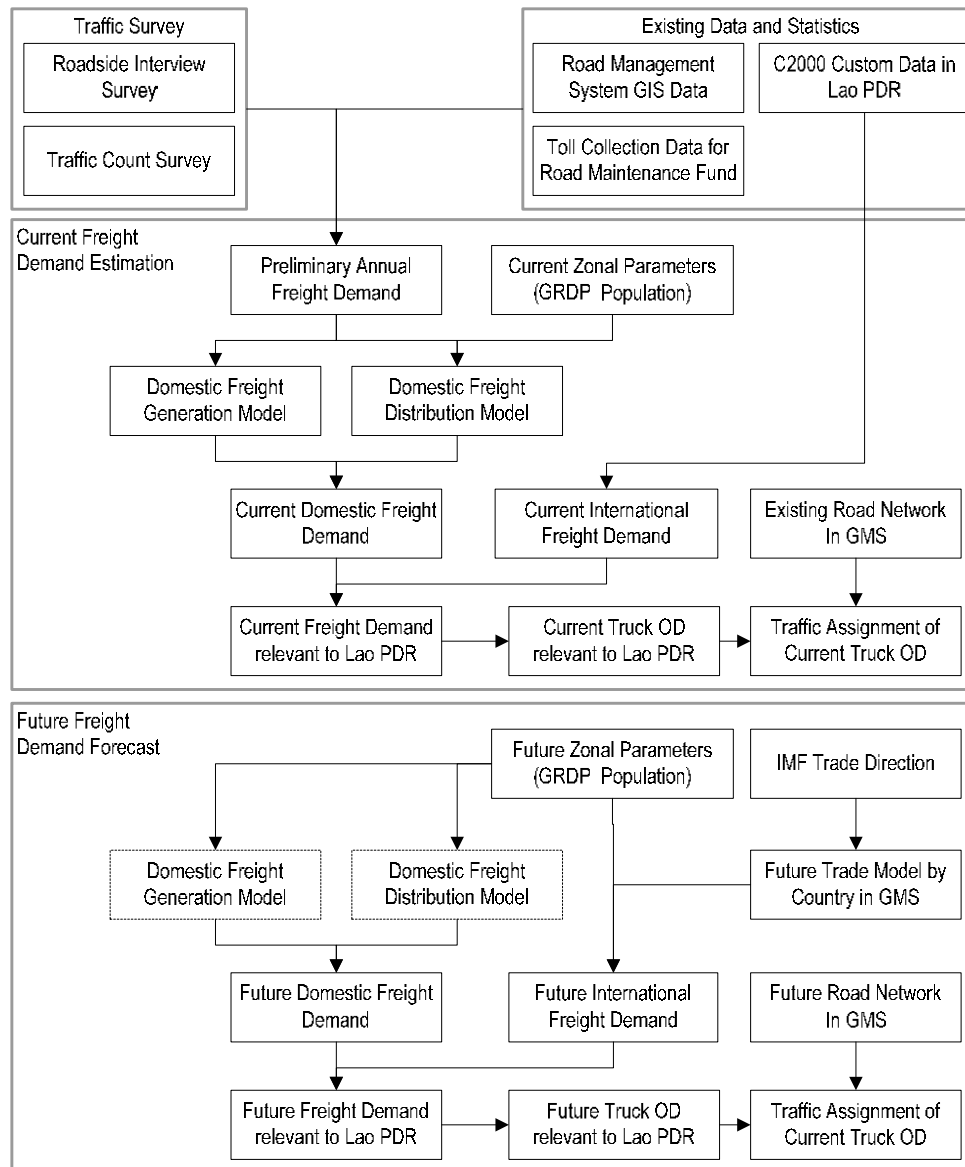
Source: JICA Study Team

5.2 Methodology of Freight Demand Forecast

In 2006, Asian Development Bank (ADB) conducted “GMS Transport Sector Strategy Study (TSSS)” to develop vision and comprehensive strategy for the GMS transport network towards an eventual GMS-wide multimodal transport network. In this study, i) existing transport network was developed and traffic and freight demand in 2004 were estimated based on existing transport sector studies in GMS, ii) traffic and freight demand forecast models were developed, iii) future traffic and freight demand in 2015 was forecasted by models, iv) existing transport sector plans were evaluated, and v) strategies and action plans were proposed.

In considering freight demand in Lao PDR, import / export and transit freight volumes relevant to other GMS countries dominated 96% of total freight volume in tons as of 2008. Existing and future freight volumes relevant to other GMS countries were estimated efficiently using ADB’s TSSS models and network. For the estimation of current domestic freight demand and distribution in Lao PDR, the freight demand forecasting model was developed based on the results of roadside interview survey, traffic count survey and existing statistics and information.

Figure 5.2.1 shows a workflow for freight demand modeling and forecasting. The results of the freight demand forecast modeling, which comprised of freight generation model, freight distribution model and freight assignment model, is detailed in the Appendix.



Source: JICA Study Team

Figure 5.2.1 Work Flow for Freight Demand Modeling and Forecast

5.3 Summary of Results of Freight Demand Forecast

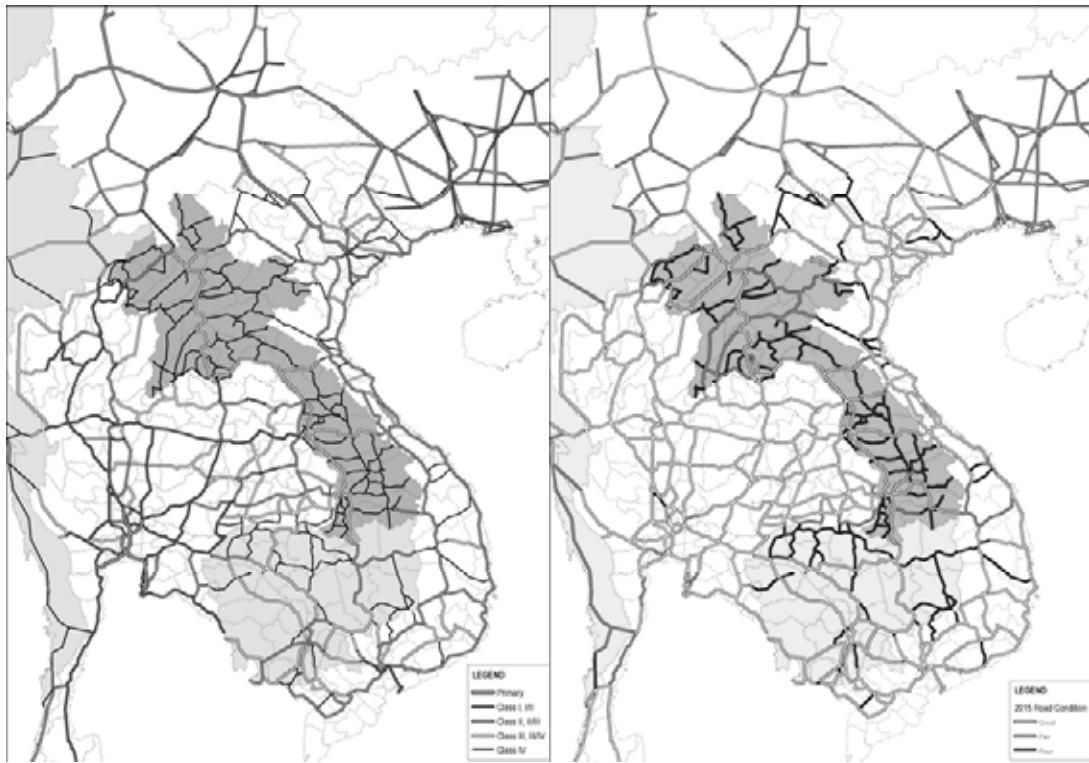
5.3.1 Future Road Network

The future road network in GMS was built based on the ADB TSSS network. Network parameters such as a capacity, free flow speed were defined by road class, topology and road condition. Figure 5.3.1 shows future road classes in 2015 while Figure 5.3.2 shows the road classes in 2025.

Future road class was defined based on the ADB TSSS network while road conditions in Lao PDR were acquired from the national highway master plan by MPWT.

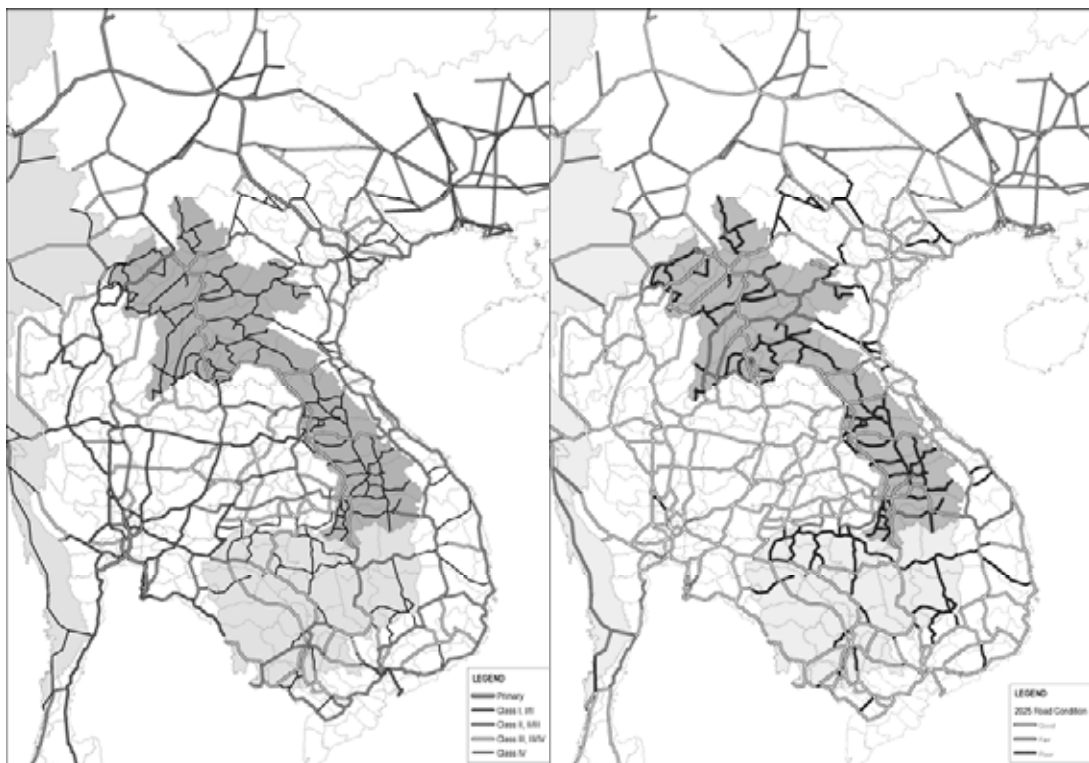
According to the National Highway Master Plan, future road improvement plan is focused mainly in the northern region of Lao PDR. As a consequence, the forecasted travel time by traffic

assignment reduces in the northern region of Lao PDR as shown in Figures 5.3.4 and 5.3.5.



Source: JICA Study Team

Figure 5.3.1 Future Road Network in 2015



Source: JICA Study Team

Figure 5.3.2 Future Road Network in 2025



Source: JICA Study Team

Figure 5.3.3 Travel Time from Vientiane Capital to Provincial Center

5.3.2 Truck Assignment

Existing and forecasted future truck OD was assigned to road network respectively by JICA STRADA software. Traffic Volume of other modes such as motorcycles, passenger cars and buses was estimated based on ADB’s TSSS OD as shown below:

- 2009 OD: Estimated by annual growth rate by ADB’s 2004 and 2015 OD matrices
- 2015 OD: ADB’s TSSS 2015 OD matrices
- 2025 OD: Estimated by growth factor (GDP growth factor X Population growth factor by country) and ADB’s 2015 OD matrices.

Existing and future OD matrices consist of 9 modes as shown in Table 5.3.1.

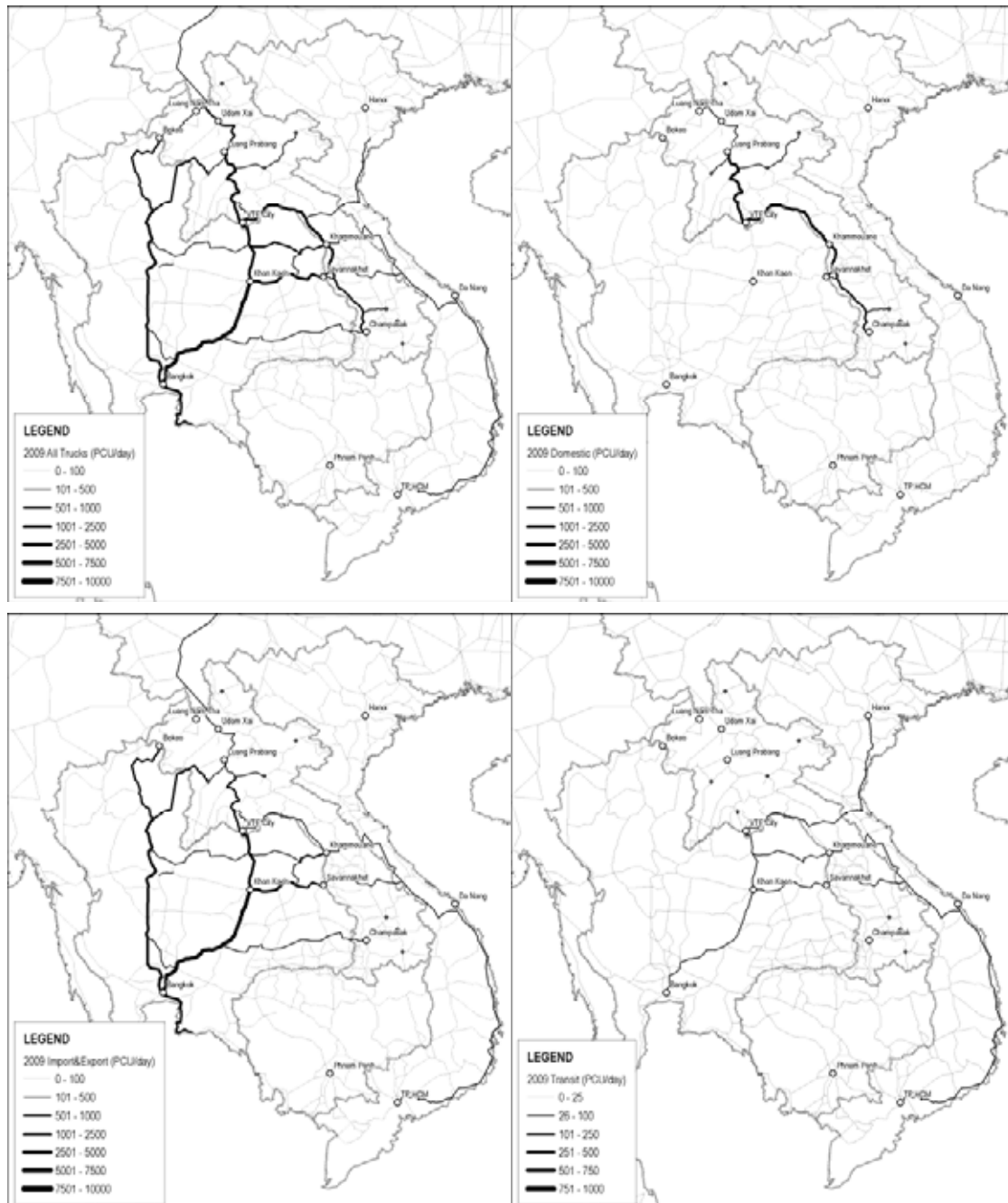
Table 5.3.1 Vehicle Types in OD Matrices for Traffic Assignment

Mode		Unit	PCU	Occupancy
1	Motorcycle	Passengers / day	0.30	1.50
2	Passenger Car	Passengers / day	1.00	2.50
3	Bus	Passengers / day	2.00	30.00
4	2-Axle Truck with Cargo	Vehicles / day	1.80	1.00
5	3-Axle and more Rigid Trucks with Cargo	Vehicles / day	2.00	1.00
6	Trailer with Cargo	Vehicles / day	2.50	1.00
7	2-Axle Empty Truck	Vehicles / day	1.80	1.00
8	Empty 3-Axle and more	Vehicles / day	2.00	1.00
9	Empty Trailer	Vehicles / day	2.50	1.00

Source: JICA Study Team

(1) 2009 Existing

Figure 5.3.4 shows results of traffic assignment of annual average truck volumes in 2009.

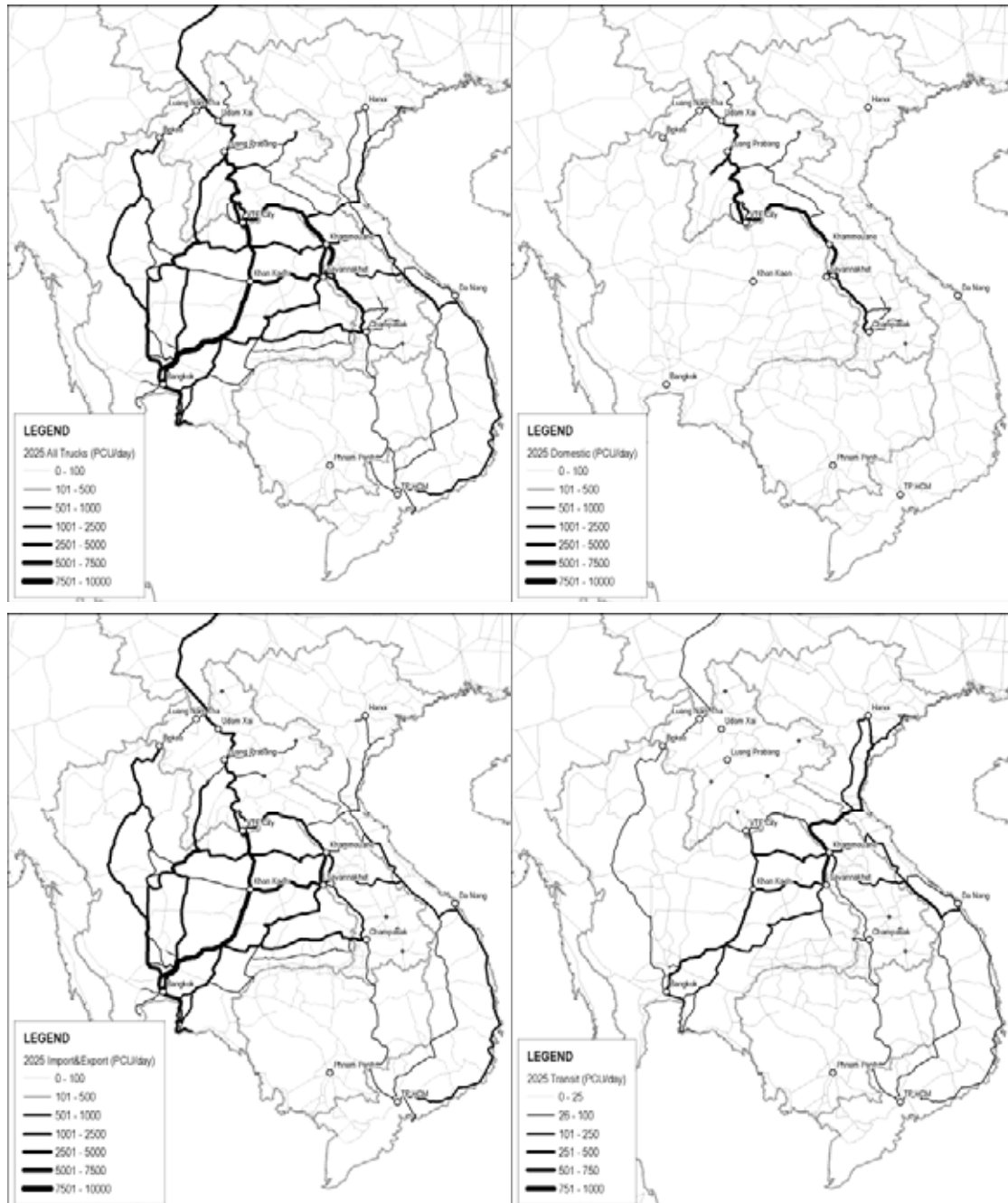


Source: JICA Study Team

Figure 5.3.4 Truck Assignment Results for 2009

(2) Base Case in 2025

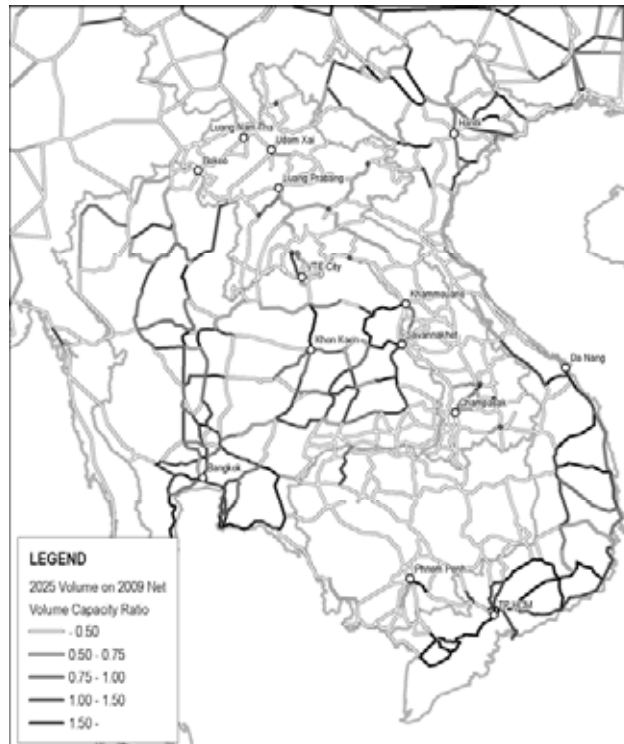
Figure 5.3.5 shows results of future traffic assignment in 2025.



Source: JICA Study Team

Figure 5.3.5 Truck Assignment Results for 2025

Figure 5.3.6 shows results of traffic assignment of 2025 volume on the 2009 road network. The volume capacity ratio of almost all roads in Lao PDR is less than 1.0, with the exception of NR-13 between Vientiane Capital and Vientiane Province.



Source: JICA Study Team

Figure 5.3.6 Truck Assignment of 2025 Volume on 2009 Network

Table 5.3.2 Evaluation Index

Item	Vehicle*km			Vehicle*hour			Assigned Volume (Vehicles/day)		
	2009	2015	2025	2009	2015	2025	2009	2015	2025
2Axles (Loaded)	667,979	990,798	1,834,653	11,338	16,577	33,088	1,226	1,722	3,148
3Axles and More (Loaded)	580,321	863,473	1,630,079	8,998	13,544	27,492	884	1,253	2,364
Trailer (Loaded)	504,995	803,147	1,655,325	7,654	12,567	28,023	794	1,210	2,472
2Axles (Empty)	587,440	890,347	1,643,081	9,820	14,664	29,059	1,029	1,470	2,687
3Axles and More (Empty)	506,727	790,142	1,521,152	7,629	12,138	25,158	717	1,026	1,973
Trailer (Empty)	504,814	873,924	1,735,085	7,656	13,249	29,699	796	1,218	2,486

Item	Average Travel Distance (km)			Average Travel Time (hours)			Average Travel Speed (km/h)		
	2009	2015	2025	2009	2015	2025	2009	2015	2025
2Axles (Loaded)	545	575	583	9.2	9.6	10.5	58.9	59.8	55.4
3Axles and More (Loaded)	656	689	690	10.2	10.8	11.6	64.5	63.8	59.3
Trailer (Loaded)	636	664	670	9.6	10.4	11.3	66.0	63.9	59.1
2Axles (Empty)	571	606	611	9.5	10.0	10.8	59.8	60.7	56.5
3Axles and More (Empty)	707	770	771	10.6	11.8	12.8	66.4	65.1	60.5
Trailer (Empty)	634	718	698	9.6	10.9	11.9	65.9	66.0	58.4

5.4 Potential Freight Demand within GMS

5.4.1 Methodology of Potential Freight Demand Forecast

As described above, the future demand of the transit cargo via Lao PDR was estimated based on the current transit volume, which was obtained from the customs data (C2000). In this respect, the

current (and future) transit volume might be underestimated due to various reasons: the lack of transport service, infrastructure and facilities and underestimated industrial development potential in neighboring countries all contribute to misjudging the transit volumes from/to neighboring countries such as Thailand, Vietnam and China. Besides, transit cargo between Thailand and Vietnam is currently transported by sea transport and would shift to land transport modes, when the road infrastructure is developed and the customs procedures are facilitated. Accordingly, the following discussion attempts to forecast the potential transit cargo within the GMS. The methodology applied for this demand forecast is summarized below:

- The same socio-economic framework for the freight demand forecast, discussed in the previous sections, was employed for this demand forecast of the potential transit cargo.
- At the initial stage of the freight demand forecast, future trade volume of the neighboring countries, i.e., Thailand, Vietnam and Yunnan, was estimated by the regression model, employing GDP as the explanatory variable.
- Then, the freight distribution pattern of the potential transit cargo was reasonably assumed, based on the trends of the trade volume within the GMS. For instance, Yunnan currently trades 31% of its exports and 5% of its import cargo with the GMS and its trade with the GMS was assumed to increase to 50% of its exports and 10% of its import cargo by the year 2025. The transit cargo demand between Thailand and northern Vietnam was separately estimated based on the economic activities in northern Vietnam relative to the whole Vietnam and was assumed to shift its transport mode for the trade from sea transport to land transport modes.
- Finally, the transit cargo volume of the manufactured goods was estimated based on the current composition of the manufactured goods against all commodities.

5.4.2 Summary of Results of Potential Freight Demand Forecast

As a result of the freight demand forecast exercise, the potential transit cargo between Thailand, northern Vietnam and Yunnan in 2025 was estimated and summarized as shown in Table 5.4.1.

Table 5.4.1 Potential Transit Cargo Volumes between Thailand, Northern Vietnam and Yunnan in 2025

From	To	Potential Transit Cargo Volumes (tons/year)
Thailand	Yunnan	714,000
Yunnan	Thailand	1,224,000
Thailand	Northern Vietnam	2,661,000
Northern Vietnam	Thailand	867,000

Source: JICA Study Team