Ministry of Public Works and Transport
Lao Peoples Democratic Republic (Lao PDR)

THE COMPREHENSIVE STUDY ON LOGISTICS SYSTEM IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

FINAL REPORT

Volume 4: Feasibility Study on Champasack Logistics Park

January, 2011

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

INTERNATIONAL DEVELOPMENT CENTER OF JAPAN (IDCJ)
NIPPON KOEI

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PREFACE

Lao PDR is located at the center of Greater Mekong Sub-region (GMS). This preferable location currently provides Lao PDR with strategic advantages to transform itself from a “land-locked” to a “land-linked” country, particularly due to globalization in trade and transport and regional economic integration. In this respect, Lao PDR faces a great opportunity to become a regional logistics hub in the GMS and ASEAN region. In cognizance of these situations, the Lao Government has embraced the transformation into a “land linked country” as a major policy essential to the country’s aspirations of graduating from a developing country.

However, there are still several constraints in logistics in Lao PDR; in particular the insufficient logistics system. The current logistics system in Lao PDR still falls below international standards in terms of efficiency, reliability and cost due to unsatisfactory performance by inadequate infrastructure and immature domestic logistics industry.

In this regards, the Japan International Cooperation Agency (JICA) decided to conduct the Comprehensive Study on Logistics System in Lao PDR. JICA selected and dispatched the Study Team between March 2009 and November 2010.

The Study Team held discussions with the concerned officials in the Government of Lao PDR and conducted field surveys in the study area. Upon returning to Japan, the Study Team conducted further studies and prepared this final report.

It is my hope that this report will contribute to development in the Lao PDR, and to the enhancement of a friendly relationship between our two countries. Finally, I wish to express my sincere appreciation to all the people for their generous cooperation with the Study Team.

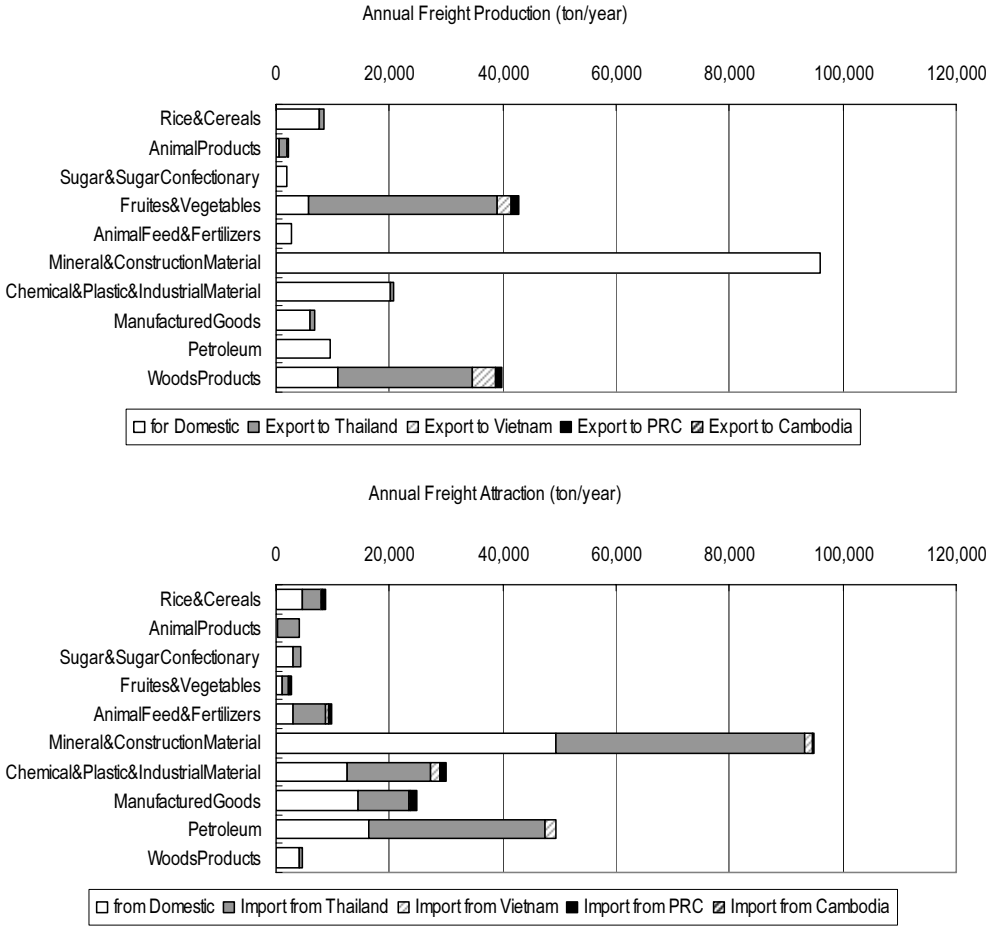
January 2011

Kiyofumi KONISHI,
Director General
Economic Infrastructure Department
Japan International Cooperation Agency

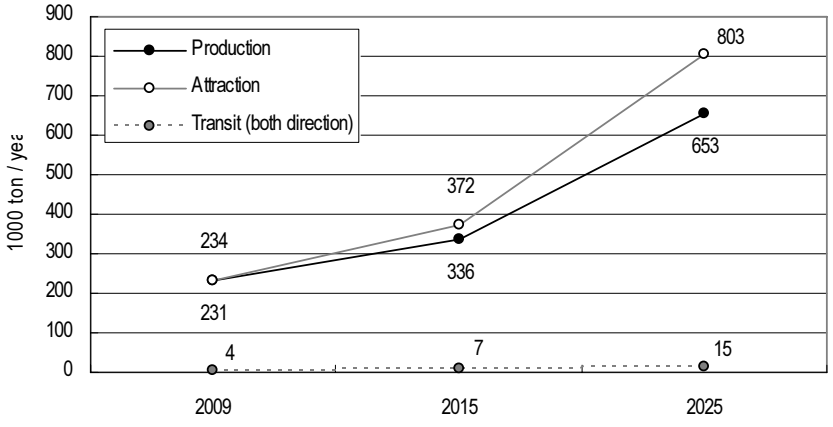
Study Area Map

Images of Champasack Logistics Park

Project Name	Champasack Logistics Park (CLP)
Current Logistics in Champasack	Freight production in Champasack is about 231,000 tons per year in 2009. 19% of total production volume is vegetables and fruits. Freight attraction in 2009 is about 234,000 tons per year and consists of imports from Thailand (49%) and domestic cargo (47%). Major freight attraction commodity is construction materials such as cement and ceramic products.
Freight Demand	Future freight production is expected to reach 653,000 tons per year while freight attraction is expected to reach 803,000 tons per year in 2025.

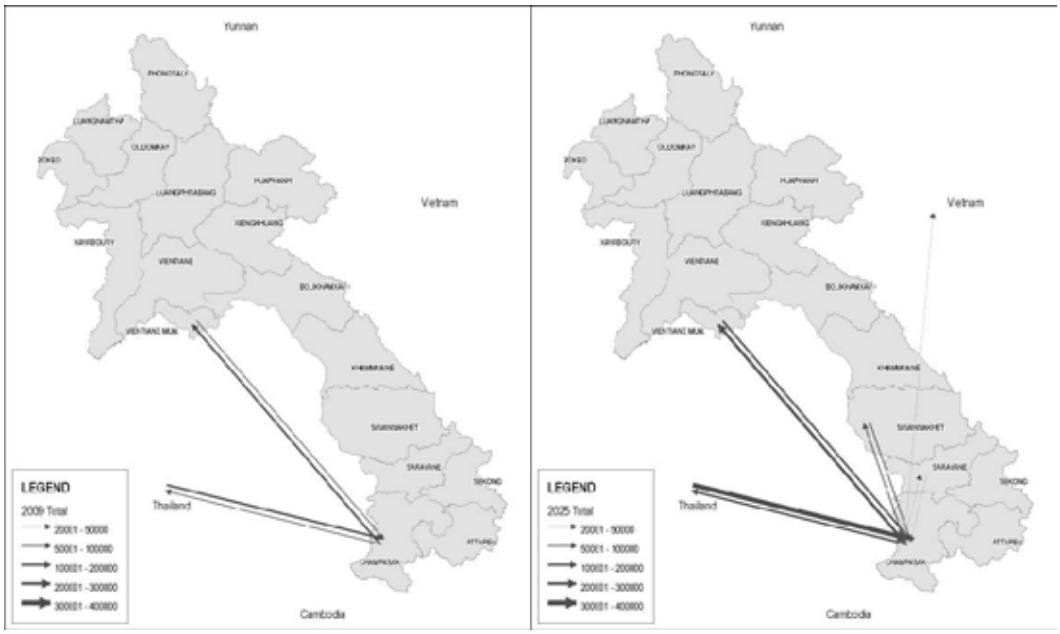


Current Freight Generation Volume in Champasack



Forecasted Freight Generation in Champasack

Freight Demand



Forecasted Freight Distribution to/from Champasack

Logistics Strategy

Development of the logistics in Lao PDR can be achieved by application of 3 key strategies: (i) Integration of Cargo Flow, (ii) Business Stimulation, (iii) Market Expansion. To realize these strategies, Champasack is expected to become one of the international logistics hubs in Lao PDR, providing up-to-date logistics park and sufficient road infrastructure, to combine and integrate cargo flows to generate scale merits for Lao PDR, by utilizing geographic and economic advantages of Lao PDR.

Functions and Services Provided at CLP

The CLP is expected to provide the following functions and services.

- Interface with Thailand for import/export cargo
- Integration of cargo flow to and from the surrounding provinces
- Trans-shipment and Consolidation
- Distributive processing for the goods imported from Thailand

Handling Volume at CLP

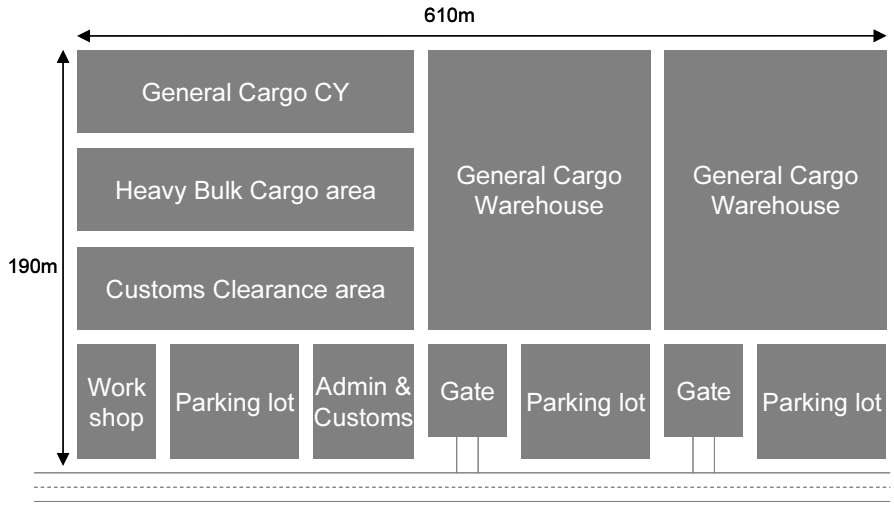
Based on this future freight demand, the volume of cargo handled at the CLP was estimated for target years 2015 and 2025 and summarized in the following table.

Daily Cargo Demand in CLP (Unit: 000tons/year)

Package Type	2015	2025
Container	16.5	94.4
General Cargo	77.6	199.6
Heavy Bulk	12.3	1.7
Liquid Cargo	0.0	0.0
Total	106.4	295.8

Facility Plan at CLP

The facilities proposed at the CLP include (i) Customs clearance area, (ii) Heavy bulk cargo area, (iii) General cargo CY area, (iv) General cargo warehouse area, (v) Parking lots, (vi) Administration and customs office, (vii) Operator office, (viii) Maintenance workshop. The area required for the CLP was calculated as 11.6 ha.

	 Layout Plan of CLP
Project Cost of CLP	Project cost of the CLP consists of construction cost, administration cost, consultant cost and contingency and was estimated at 14.8 million USD (as of November 2009).
Economic Benefit	CLP is a viable project from the perspective of the national economy. The EIRR which is 12.5% exceeds the opportunity cost of capital (12%). Creation of value added at SLP, opportunity cost of cargos, and opportunity cost of vehicles (trucks and trailers) are identified as economic benefit in the analysis.
Financial Appraisal	The Project FIRR and FIRR for CLP-MC are 9.1% and 12.2%, respectively: these figures are high enough to attract participation of the private sector. In order to secure participation of private sector, Lao PDR Government should prepare measures to mitigate project risks. The FIRR for project owner is 7.8%: the project would be financially feasible if soft loan such as yen loan were used for the project.

The Comprehensive Study on Logistics System in Lao People's Democratic Republic

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List of Abbreviation

Abbreviations	Name
ADB	Asian Development Bank
AFTA	ASEAN Free Trade Agreement
ASEAN	Association of Southeast Asian Nations
CBTA	Cross Border Transport Agreement
CCA	Common Control Area
CIQ	Custom, Immigration and Quarantine
CLP	Champasack Logistics Park
CLP-MC	Champasack Logistics Park Management Company
CY	Container Yard
DPA	District Protected Area
DPRA	Development Project Responsible Agency
DPWT	Department of Public Works and Transport
ECC	Environmental Compliance Certificate
EDL	Enterprise D'electricite du Lao
EIA	Environment Impact Assessment
EIRR	Economic Internal Rate of Return
EMDP	Ethnic Minority Development Plan
EMP	Environmental Management Plan
ESDF	Education Sector Development Framework 2009 - 2015
ETL	Enterprise of Telecommunications Lao
EXIM	Export and Import
FEU	Forty-foot Equivalent Unit
FIRR	Financial Internal Rate of Return
FTL	Full Truck Load
FTZ	Free Trade Zone
GDP	Gross Domestic Product
GMS	Great Mekong Sub region
GRDP	Gross Regional Domestic Product
ICD	Inland Container Depot
ICEM	International Centre for Environmental Management
IEE	Initial Environmental Evaluation
IMF	International Monetary Fund
IRR	Internal Rate of Return
ISA	Initial Social Assessment
IUCN	International Union for Conservation of Nature
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
JIT	Just In Time
JPY	Japanese Yen
LAK	Laos Kip
LCL	Less than Container Load
LMA	Land Management Authority
LNLS	Laos National Logistics Strategy
MAF	Ministry of Agriculture and Forestry

Abbreviations	Name
MOF	Ministry of Finance, Lao PDR
MOIC	Ministry of Industry and Commerce
MPI	Ministry of Planning and Investment
MPWT	Ministry of Public Works and Transport
MRC	Mekong River Committee
msl	meters above sea level
NBCA	National Biodiversity Conservation Area
NLMA	National Land Management Authority
NPA	National Protected Area
NPC	Nam Papa Champasack
NPS	Nam Papa Savannakhet
NR	National Road
O&M	Operation and Maintenance
OD	Origin and Destination
PAP	Project Affected Person
PI	Public Involvement
PMO	Prime Minister Office
PPA	Provincial Protected Area
PRC	People's Republic of China
PUUDA	Pakse Urban Development Authority
RP	Resettlement Plan
SA	Social Assessment
SCF	Standard Conversion Factor
SEZ	Special Economic Zone
SLP	Savannakhet Logistics Park
SPEZ	Specific Economic Zone
STEA	Science, Technology and Environmental Agency
STENO	Science, Technology and Environment Organization
STM	Synchronous Transport Module
TEU	Twenty-foot equivalent unit
THB	Thai Baht
TOR	Terms of Reference
USD	United States Dollar
UXO	Unexploded Ordnance
VLP	Vientiane Logistics Park
WB	World Bank
WREA	Water Resource and Environment Administration

CHAPTER 1 INTRODUCTION

1.1 Introduction

Regional economic integrations have been gradually advanced in GMS regions and ASEAN countries. Cross border transport has been more active as a result of cross border facilitation, expansion of markets and advancement of international divisions of labor. These advancements seem to provide Lao PDR a great opportunity towards realising the national development policy of transforming the country from a "Land-locked Country" to "Land-linked Country". It is greatly expected that certain developments focusing on developing international logistics business in the GMS region will be realised. Meanwhile, industrialization in Lao PDR has lagged behind neighboring countries in spite of her abundant natural resources and relatively low-cost labor. However, the completion of several key infrastructures and international agreements such as ASEAN Free Trade Agreement (AFTA) in ASEAN and Cross Border Trade Agreement (CBTA) in GMS gradually stimulate regional investment and movement of peoples and goods, which is greatly expected to promote horizontal division of labor and production in GMS regions.

Lao PDR could realize its potential for future development given its strategic geographic location in GMS as well as the benefits accrued from cross border agreements with surrounding countries. However in order to enjoy future development, Lao PDR has to address several constraints, such as limited capacity in investment capital, technologies and human resources; these are limited to a small domestic market. Consequently, there are more strategic opportunities within the GMS market such that Lao PDR would be better off prioritising the quest for GMS market rather than fostering the domestic market.

Based on these considerations, Laos National Logistics Strategy (LNLS) proposes the following basic strategy:

- To harness more business opportunities within the GMS, Lao PDR should take the leading role in the next step of economic integration of GMS countries in the pursuit of GMS regional single market with more seamless and barrier-free borders.
- To take advantage of the situation in which Lao trucks are able to conduct business in any of the surrounding countries, Lao PDR should promote logistics industries by promoting relocation of foreign transport and logistics businesses in Lao PDR as well as encourage the strengthening of domestic logistic businesses by exploiting advantages of cross border agreements and its strategic location in GMS.
- Lao PDR should also give high priority to human resource development in logistics and related sectors so as to spread benefits of logistics business promotion over logistics related and supporting businesses.

Champasack Province, one of the largely populated provinces in the country, functions as a focal point in the southern region of Lao PDR in terms of economic activities and logistics. It has various geological and topographical characteristics which contribute to high agricultural productivity in crops such as coffee and vegetables in the Bolaven Plateau. It shares borders with Thailand and Cambodia and international trade, especially to/from Thailand, has been very active, mainly involving exports of agricultural products. One of the significant characteristics in terms of international trade is that export and import cargo through Champasack Province is observed as being very balanced in its volume, unlike other provinces. This significantly reduces the transport cost by reducing one-way traffic of international cargo. Champasack Logistics Park (CLP), accordingly, is a key facility towards realizing the afore-mentioned basic strategies of the LNLS. CLP upgrades (1) interface function of international trade, (2) incubation function of logistics businesses in Lao PDR, and (3) hub function of domestics transport.

To delineate more clearly and materialize the development concept mentioned above, explored in the Lao National Logistics Strategy (LNLS), this feasibility study on Champasack Logistics Park (CLP) was undertaken.

1.2 Structure of this Report

The overall objective of the Comprehensive Study on Logistics System in Lao PDR (the Study) is to improve the international and domestic logistics system in Lao PDR. The major focal points of this particular study are: (1) to prepare national logistics strategy, consisting of national logistics strategy and logistics strategy in major regional cities, (2) to carry out a feasibility study on the logistics parks in Vientiane, Savannakhet and Champasack, which will serve as the hub of logistics activities and network in Lao PDR.

The Study produced Inception Report, Progress Report, Interim Report and Draft Final Report as intermediate outputs of the Study: with a Final Report produced as the final output. This report is the Final Report of the Study. This Final Report consists of four volumes as listed below:

Volume1: National Logistics Strategy

Volume 2: Feasibility Study on Vientiane Logistics Park

Volume 3: Feasibility Study on Savannakhet Logistics Park

Volume 4: Feasibility Study on Champasack Logistics Park

This Final Report Volume 4 expounds on the Feasibility Study on Champasack Logistics Park.

CHAPTER 2 CURRENT LOGISTICS IN CHAMPASACK

2.1 Overview of Socio-economic Characteristics in Champasack

2.1.1 Demography

Table 2.1.1 shows district populations in Champasack Province. The population in Champasack Province reached 642,000 in 2008 which accounted for 10.7% of the national population. Annual population growth rate was recorded as 1.9% between 1995 and 2008.

Table 2.1.1 1995-2008 District Populations in Champasack Province

	Population (Persons)			Percentage Share (%)		
	1995	2005	2008	1995	2005	2008
Champasack Province	501,387	607,370	642,642	11.0	10.8	10.7
Pakse	65,220	78,669	83,239	13.0	13.0	13.0
Sanasomboon	55,716	62,238	65,853	11.1	10.2	10.2
Bachiangchaleunsook	34,354	48,743	51,574	6.9	8.0	8.0
Paksxong	44,518	64,145	67,871	8.9	10.6	10.6
Pathoomphone	43,142	51,370	54,354	8.6	8.5	8.5
Phonthong	73,704	85,188	90,137	14.7	14.0	14.0
Champasack	49,242	55,403	58,612	9.8	9.1	9.1
Sukhuma	38,051	49,670	52,555	7.6	8.2	8.2
Moonlapamok	32,228	38,525	40,763	6.4	6.3	6.3
Khong	65,212	73,419	77,684	13.0	12.1	12.1
National Population	4,574,858	5,621,982	6,000,379	11.0	10.8	10.7

Source: Statistical Yearbook of Champasack Province 2008

13% of the provincial population belonged to Pakse District. The most populated district is Phonthong, but its percentage share has been decreasing gradually from 14.7% in 1995 to 14.0% in 2008. The percentage shares increased in Bachiangchareusouk, Pakxong (Bolaven Plateau) and Sukhuma districts whereas they dropped in Sanasomboon, Pathoomphone, Champasack, Moonlapamok and Khong during the same period.

2.1.2 Economy

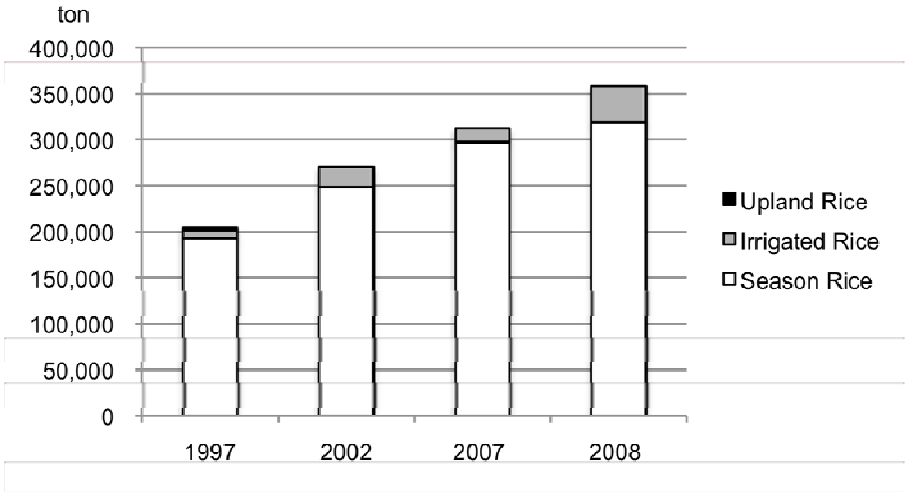
(1) Industrial Composition

According to the latest provincial statistics, the nominal GRDP of Champasack Province was 4,696 billion kip in 2008. It accounted for 10% of the national GDP. Provincial statistics also reported that the percentage shares of industries were 32% for the primary industry, 26% for the secondary industry and 42% for the tertiary industry in 2008.

(2) Agriculture

Champasack Province has abundant agricultural products such as rice, vegetables and coffee beans. The production of the forest industry is also at a relatively high level compared to other regions in Lao PDR.

Figure 2.1.1 shows rice production in 1997, 2002, 2007 and 2008. Rice production was recorded at 360,000 tons in 2008, and it has increased by 1.5 times over the last decade. Champasack's percentage share of rice production in Lao PDR was 12%, and it ranked in 3rd position after Savannakhet and Vientiane Capital. 89% of the total rice production is cultivated as seasonal rice, which is a higher percentage than that for Savannakhet Province (80%).

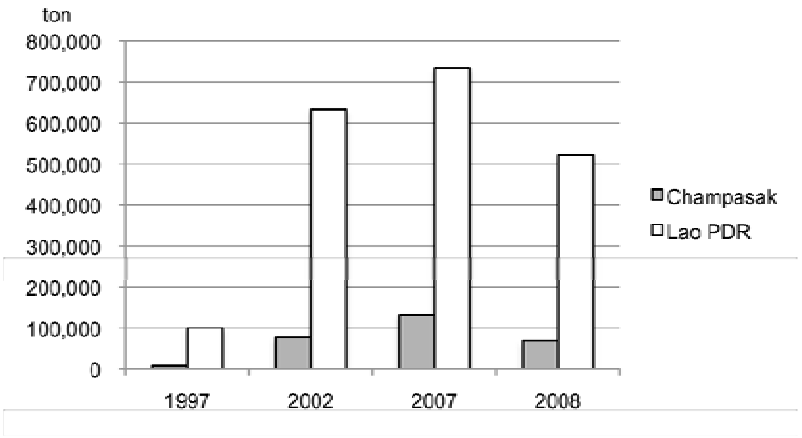


Source: Statistical Yearbook 1975-2005 and 2008

Figure 2.1.1 1997-2008 Rice Production in Champasack Province

Figure 2.1.2 indicates vegetable production in the Lao PDR and Champasack Province. Vegetable production in Champasack Province was recorded at 132,000 tons (13% of national production): in 2007 it was ranked in 1st position in terms of vegetable production. Its position dropped to 3rd behind Luangprabang and Vientiane Capital: its production share nevertheless remained at 13% in 2008. Vegetables produced in Champasack Province are transported to Vientiane Capital, and are also exported to Thailand under contract farming with Thai private companies.

Bolaven Plateau located in the east of Pakse, has bountiful soil and high potential for agricultural development. Private-based agricultural development projects are starting up, and Vietnamese farmers are colonizing the Pakson District, 40km from Pakse.



Source: Statistical Yearbook 1975-2005 and 2008

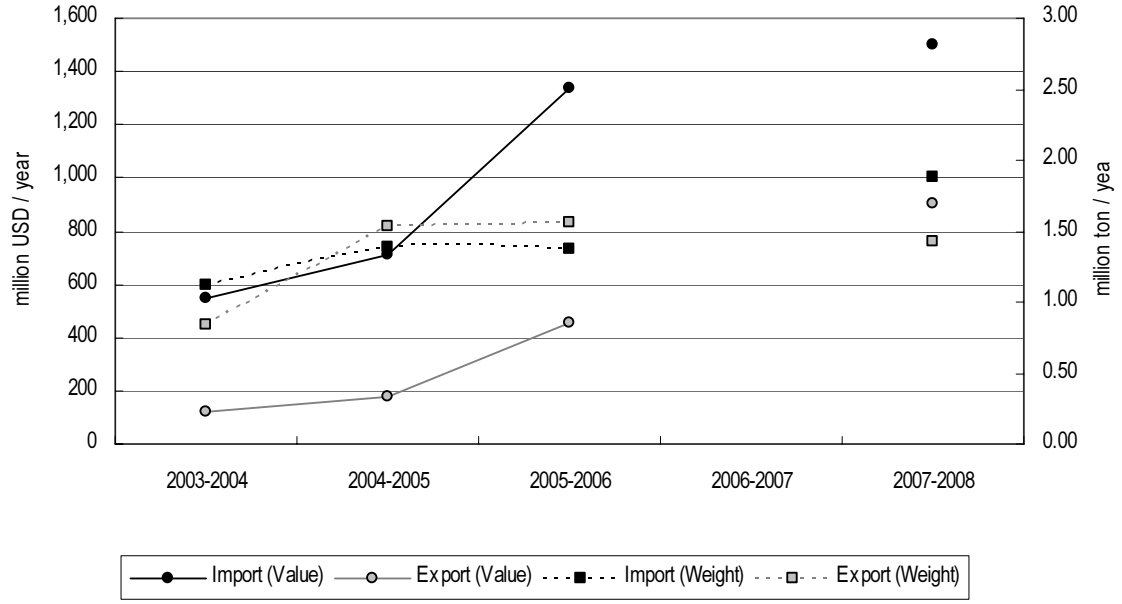
Figure 2.1.2 1997-2008 Vegetable Production in Lao PDR and Champasack Province

2.2 Current Logistics in Champasack

2.2.1 Volume and Movements

(1) Trade Volume and Movements in Lao PDR

Chapter 4 of the Lao National Logistics Strategy documented the current features of the trade in Lao PDR. Figure 2.2.1 shows the annual import and export volume in Lao PDR over the recent five years in terms of both weight and monetary value. The trade in Lao PDR has shown an increasing trend. Over the last few years, export and import volume have remained almost constant, with the import value observed as being 2-3 times larger than the export value.



Note: 2006/07 data is blank because data from Oct. 2006 to Sep. 2007 are missing.

Source: C2000 Database

Figure 2.2.1 2002-2008 Import/Export Volume

Table 2.2.1 shows trade volume by origin/destination country in 2007/08. The trade in Lao PDR is dominated by trade with surrounding GMS countries: about 90% of the trade in Lao PDR is to/from other GMS countries in terms of both volume and value.

Table 2.2.1 2007/08 Trade Volume to/from Lao PDR

Category		GMS Country	External of GMS	Total (All Country)	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%

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

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

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

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

Table 2.2.2 shows trade matrix within GMS countries in 2007/08. As seen in the table, import and export volumes in Lao PDR are dominated by Thailand. Major transit cargo through Lao PDR is from Thailand to Vietnam. However, the volume of the transit cargo is observed as being relatively smaller than that of export/import cargo to/from Lao PDR.

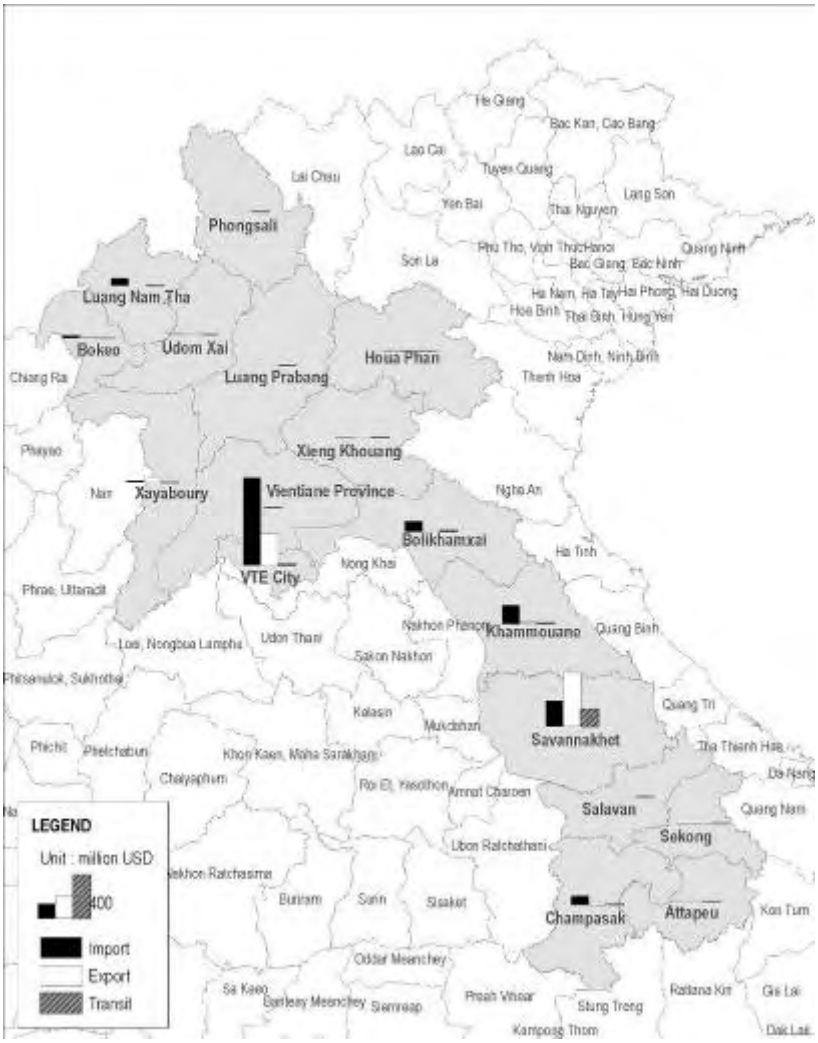
Table 2.2.2 2007/08 Trade in GMS to/from Lao PDR

Unit: USD million

	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)

Figure 2.1.1 shows monetary trade volume in 2007/08 by province. 53% of import volume in Lao PDR is concentrated at customs in Vientiane Capital and 53% of export volume is concentrated at customs in Savannakhet.



Source: Prepared by JICA Study Team based on C2000 Database (Oct. 2007 – Sep. 2008)

Figure 2.2.2 Trade Volume by Province in FY2007/08

(2) Trade Volume and Movements in Champasack

Table 2.2.3 shows import tonnage by custom in Champasack Province in 2007/08. There are two major cross border points in Champasack: these are located along the borders with Thailand and Cambodia. The trade between Lao PDR and these two countries differ significantly in prominence. The trade between Thailand and Lao PDR is very vigorous while the one between Cambodia and Lao PDR is minimal: in fact, there aren't any records of it in the customs department. The import volume from Thailand was recorded at 165,000 tons in 2007/08: with the import of construction materials contributing to a great portion of this quantity.

Table 2.2.4 shows that as regards export cargo from Champasack Province, the export volume to Thailand was recorded at 72,000 tons in 2007/08; with fruits and vegetables being the major contributors to this volume.

Table 2.2.3 Import Volume by Customs at Champasack Province in FY2007/08

Unit: 1,000 ton / Year

Commodity Type	Volume	
1) Rice & Cereals	6.4	3.9%
2) Animal Products	1.3	0.8%
3) Sugar & Sugar Confectionary	1.7	1.0%
4) Fruits & Vegetables	3.2	1.9%
5) Animal Feed & Fertilizers	11.0	6.7%
6) Mineral & Construction Material	67.4	41.0%
7) Chemical & Plastic & Industrial Material	17.1	10.4%
8) Manufactured Goods	8.3	5.1%
9) Petroleum	48.1	29.2%
10) Woods Products	0.1	0.0%
Total	164.7	100.0%

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

Table 2.2.4 Export Volume by Customs at Champasack Province in FY2007/08

Unit: 1,000 ton / Year

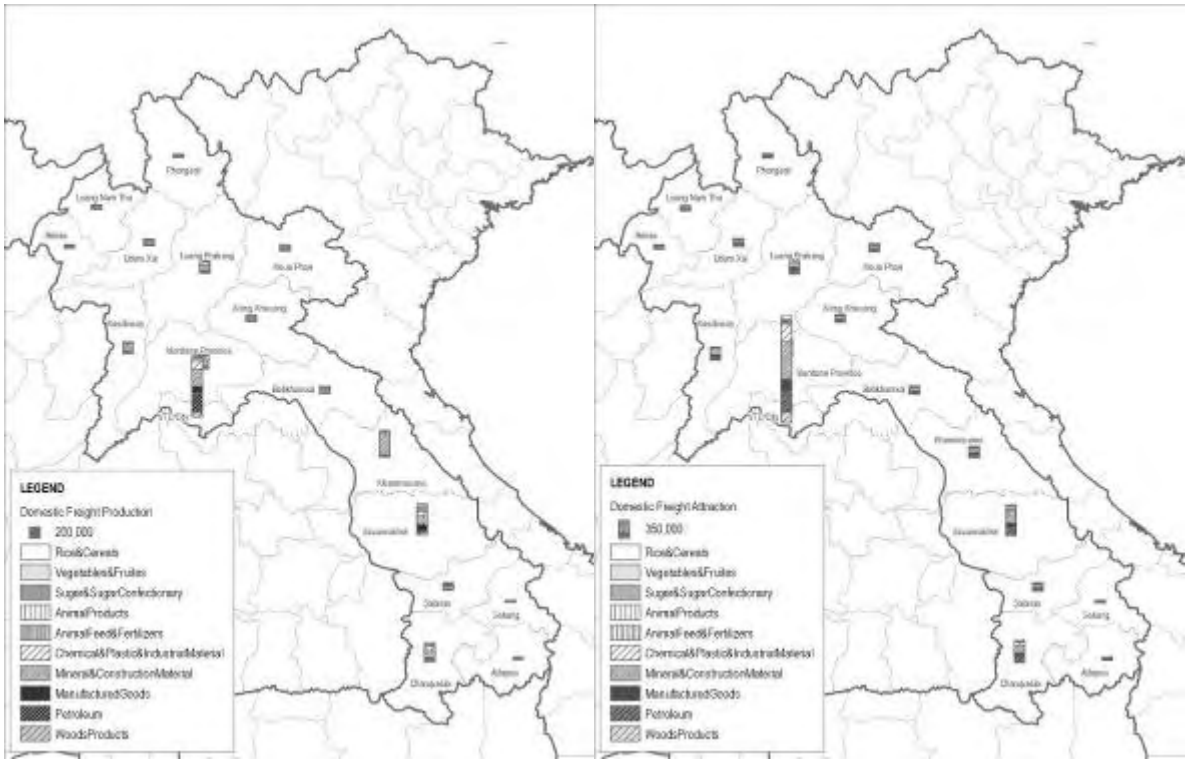
Commodity Type	Volume	
1) Rice & Cereals	2.2	3.1%
2) Animal Products	1.6	2.3%
3) Sugar & Sugar Confectionary	0.0	0.0%
4) Fruits & Vegetables	33.8	47.3%
5) Animal Feed & Fertilizers	0.1	0.1%
6) Mineral & Construction Material	0.0	0.0%
7) Chemical & Plastic & Industrial Material	0.8	1.1%
8) Manufactured Goods	1.6	2.2%
9) Petroleum	0.0	0.0%
10) Woods Products	31.4	43.9%
Total	71.5	100.0%

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

(3) Volume and Movements of Domestic Cargo in Champasack

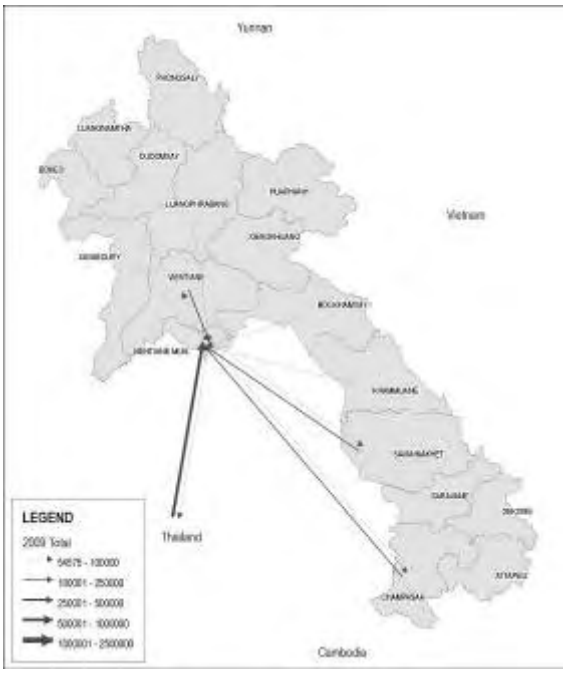
Before this study had conducted a specific analysis, there hadn't been any numerical evidence to appreciate the domestic cargo in/between region(s). The comprehensive freight demand forecast model for export and import cargo was developed in this Study, using the results of the roadside interview survey, traffic count survey and the secondary data and information such as transport statistics. Figures 2.2.3 and 2.2.4 show the freight generation/attraction and distribution of the domestic cargo.

Looking at the freight generation and attraction in Champasack, the volume of freight generation is dominated by minerals and is estimated to reach 161,000 tons per year in 2009. On the other hand, the freight attraction is dominated by minerals, construction materials and petroleum and is expected to reach 109,000 tons per year in 2009. As regards the freight distribution in Champasack, as seen in the following figure, most domestic cargo in Champasack is distributed to/from Vientiane Capital.



Source: JICA Study Team

Figure 2.2.3 Estimated Domestic Freight Production (left) and Attraction (right) in 2009



Source: JICA Study Team

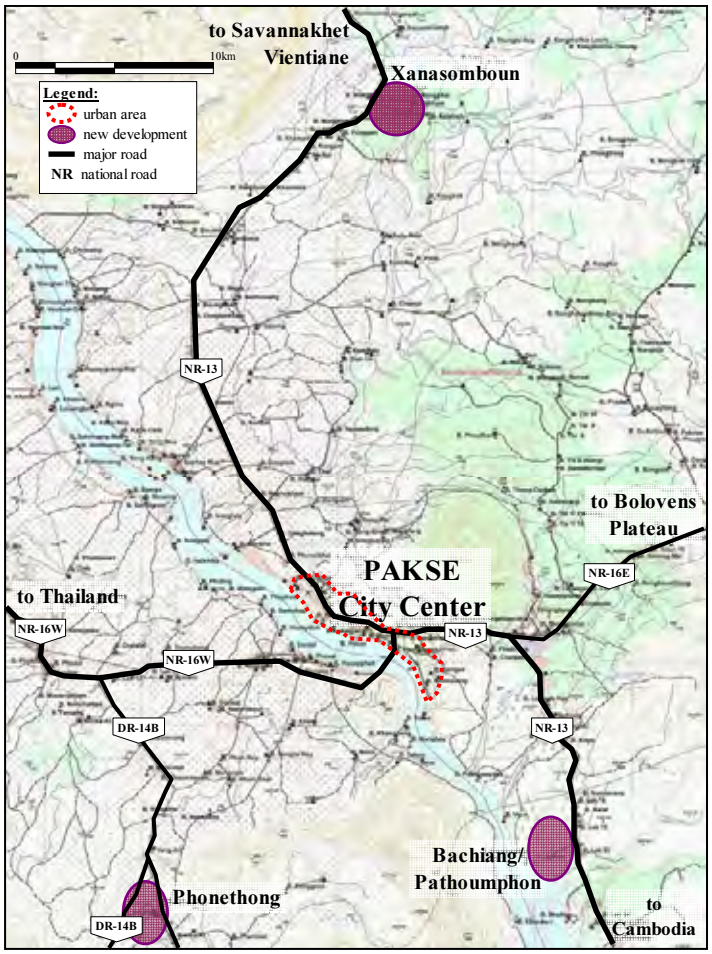
Figure 2.2.4 Estimated Freight Distribution in 2009

2.3 Spatial and Physical Conditions

2.3.1 Road Network

Vangtao Chongmek, the western side of the province shares a national border with Thailand, while Veun Kham, the southern side of the province shares a national border with Cambodia. A national border facility is currently being planned at the Thailand border, and the provincial government plans to improve the road connecting to Siem Reap. It also plans to develop Specific Economic Zone (SPEZ) at Si Phan Don – Four Thousand Island to attract Foreign Direct Investment.

The road transportation network consists of 2 major roads, namely: the NR-13 which passes through the entire country and connects Pakse to Vientiane Capital; and NR-16 which crosses the province and links the Thailand border to the Bolaven Plateau. NR-16W starts from the Thailand border to Pakse City and NR-16E continues from the City to the Bolaven Plateau.



Source: Prepared by JICA Study Team for Preparatory Survey on Industrial Zone Development in Lao PDR

Figure 2.3.1 Major Road Network in Pakse

The international transportation distance to Danang (Vietnam) is about 400km; to Siem Reap (Cambodia) about 200km; and to Bangkok (Thailand) about 780km. Total road length in the province was about 1,617,098km by the year 2008, which consists of road types as listed in Table 2.3.1.

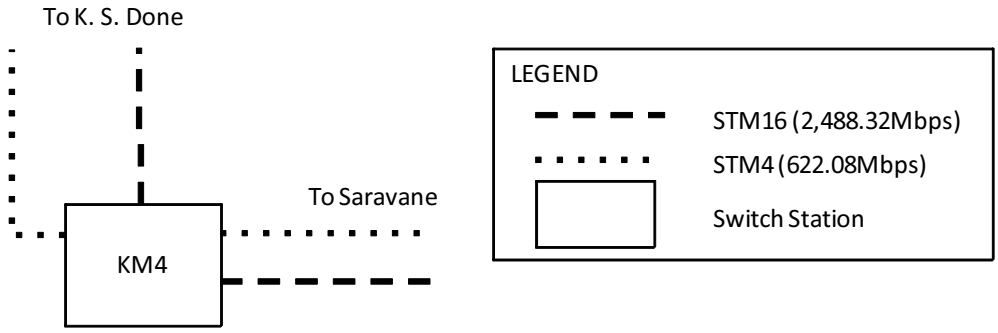
Table 2.3.1 Road Length by Pavement Type (2006)

Road Type		Length	Coverage Ratio
1.	Concrete Road	11,310 km	0.7 %
2.	Tar Road	517,750 km	32.0 %
3.	Gravel/Earth Road	1,088,038 km	67.3 %
4.	Asphalt Road	0 km	0.0 %
TOTAL		1,617,098 km	100.0 %

Source: Prepared by JICA Study Team for Preparatory Survey on Industrial Zone Development in Lao PDR

2.3.2 Telecommunication

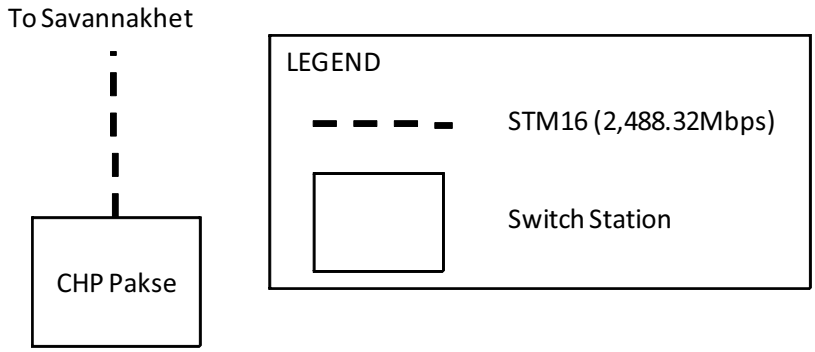
The Trunk line diagram of Enterprise of Telecommunications Lao (ETL) surrounding the Pakse district is as shown in Figure 2.3.2. The Km8 station is the main switch station located in the downtown of Pakse district. The main trunk line of Km4 station is connected with Synchronous Transport Module (STM) 16 (2,488.32Mbps) from Savannakhet and Saravan by means of optical fiber cable.



Source: Prepared by JICA Study Team for Preparatory Survey on Industrial Zone Development in Lao PDR

Figure 2.3.2 Trunk Line Diagram of ETL in and around Pakse District

The Trunk line diagram of Lao Telecom surrounding Pakse district is shown in Figure 2.3.3. Champasack Pakse station is the main switch station located in the downtown of Pakse district. The trunk line of Savannakhet Kaison station is connected with STM16 (2,488.32Mbps) from Savannakhet by means of optical fiber cable and microwave. The branch line is connected to CHP Pakse station in a connecting method known as star configuration.



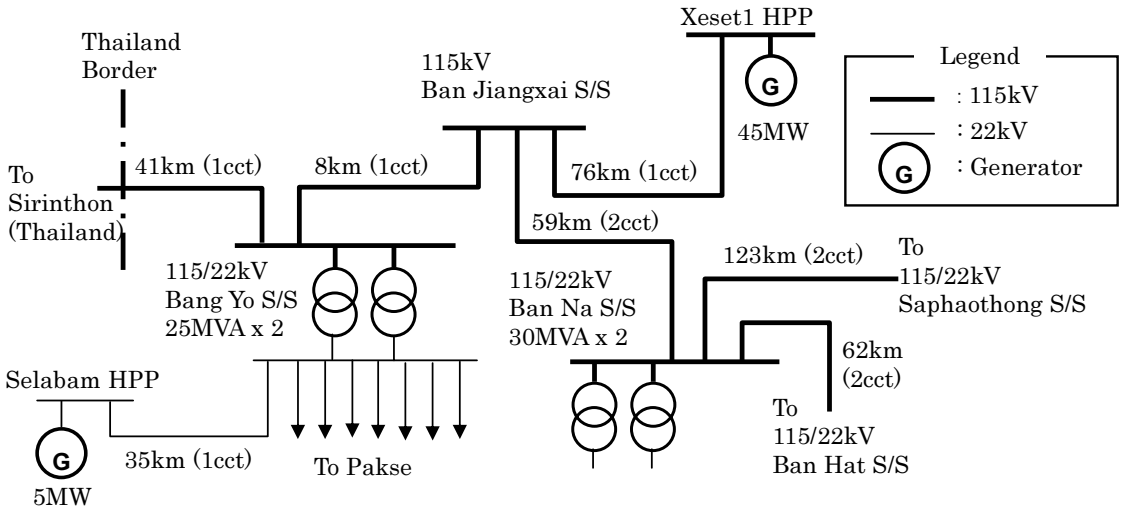
Source: Prepared by JICA Study Team for Preparatory Survey on Industrial Zone Development in Lao PDR

Figure 2.3.3 Trunk Diagram of Lao telecom in and around Pakse District

2.3.3 Power Supply

(1) Power Grid System

The power grid system in the Champasack province is shown in Figure 2.3.4. The southern region has Xeset 1 and Selabam hydroelectric power plants, and the power demands of Champasack province and the Southern region are covered by the above-mentioned power plants. The surplus electricity is generally exported to Thailand.



Source: Prepared by JICA Study Team for Preparatory Survey on Industrial Zone Development in Lao PDR

Figure 2.3.4 Power Grid System in Champasack Province

(2) Power Supply System

The existing 115/22kV substation in the vicinity of Pakse district is shown in Table 2.3.2. The power to the area surrounding the Pakse district is supplied by use of 22kV distribution lines from 115/22kV Pakbo substation and Selabam hydropower plant. As for the surrounding area to the industrial zone, the 22kV distribution lines were maintained.

Table 2.3.2 Existing 115/22kV Substation for the Surrounding of the Pakse District

Name of Substation	Description			Remarks
1. 115/22kV Bang Yo Substation	Transformer	:	25 MVA × 2	Power source of all industrial zone
	Peak Demand	:	24.0 MW	

Source: Prepared by JICA Study Team for Preparatory Survey on Industrial Zone Development in Lao PDR

2.3.4 Water Supply

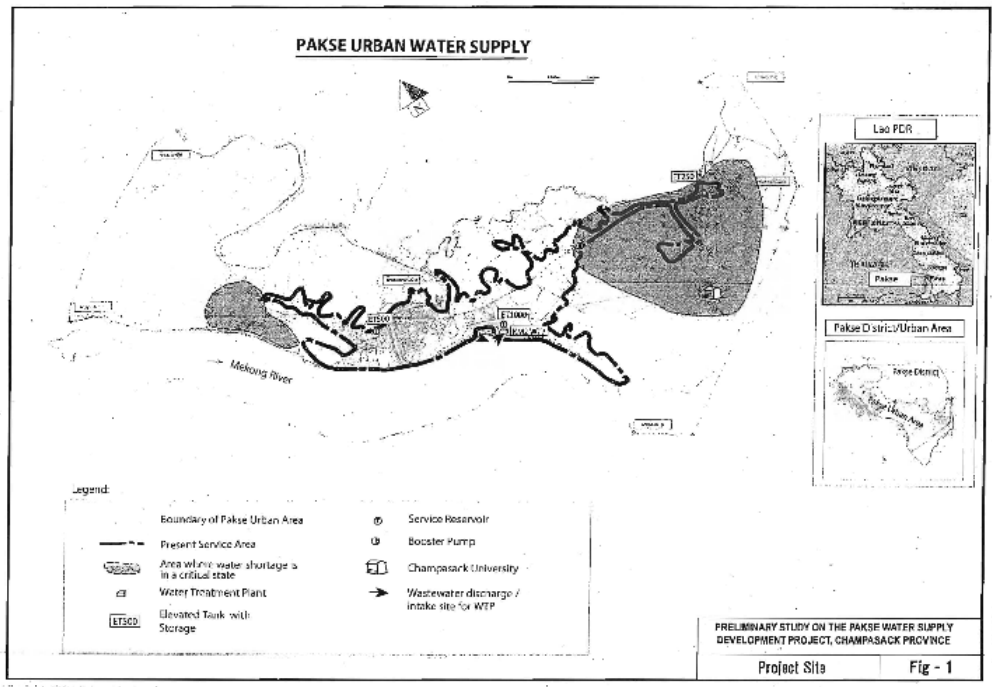
Piped water supply facilities are limited and installed only in urban areas. Water supply in Champasack Province is conducted by Nam Papa Champasack (NPC) under control of the Ministry of Public Works and Transport (MPWT). Main water sources for drinking water are surface water of the Mekong River system and underground water. The present conditions and water demand projection are summarized in Table 2.3.3.

Table 2.3.3 Present Conditions and Water Demand Projection in Pakse and Champasack Province

Item		Unit	2001	2003	2005	2007	2009
1	Population in Champasack Province	Persons	586,198	615,874	647,052	679,809	714,225
	Population in Pakse District	Persons	74,043	77,791	81,730	85,867	90,214
	Growth Rate	%	2.6	2.6	2.6	2.6	2.6
2	Population in Urban Pakse	Persons	48,394	50,944	53,627	56,452	59,426
3	Number of Connections	Households	7,126	7,705	8,305	8,905	10,105
4	Population Served	Persons	47,032	50,853	54,813	58,773	66,693
5	Service Ratio in District	%	63.5	65.4	67.1	68.4	73.9
6	Ave. Daily Demand	m^3/day	13,810	14,338	15,661	16,456	18,674
	Max. Daily Demand	m^3/day	15,000	22,383	19,576	20,570	23,343
	Unit Water Demand	lpcd	294	282	286	280	280
7	Ave. Daily Consumption	m^3/day	9,540	10,510	10,963	11,519	13,072
	Ave. Daily Consumption per Capita	lpcd	203	207	200	200	200
8	Ratio of Accounted Water	%	69	70	70	70	70
9	Production Capacity	m^3/day	15,000	15,000	15,000	15,000	15,000
10	Max. Ration of Operation	%	100	149	131	137	156

Source: Prepared by JICA Study Team for Preparatory Survey on Industrial Zone Development in Lao PDR

At present, Nam Papa Savannakhet (NPS) supplies water only to Urban Pakse in the district with service ratio of 65% due to a lack of water production capacity and shortage of distribution network as shown in Figure 2.3.5. The existing water facilities for Pakse are summarized in Table 2.3.4.



Source: NPC

Figure 2.3.5 Present Service Area of Water Supply in Pakse

Table 2.3.4 Existing Water Facilities in Pakse

Facilities	Description
KM2 Phonsavanh WTP	Design Capacity: 15,000 m^3/d
Transmission & Distribution Pipeline	98.6 km with diameters varying 500mm – 40mm (DIP, uPVC and PVC)
Reservoirs	2,550 m^3 (2 ground reservoirs & 3 elevated tanks)

Source: Prepared by JICA Study Team for Preparatory Survey on Industrial Zone Development in Lao PDR

CHAPTER 3 FREIGHT DEMAND FORECAST

3.1 Introduction

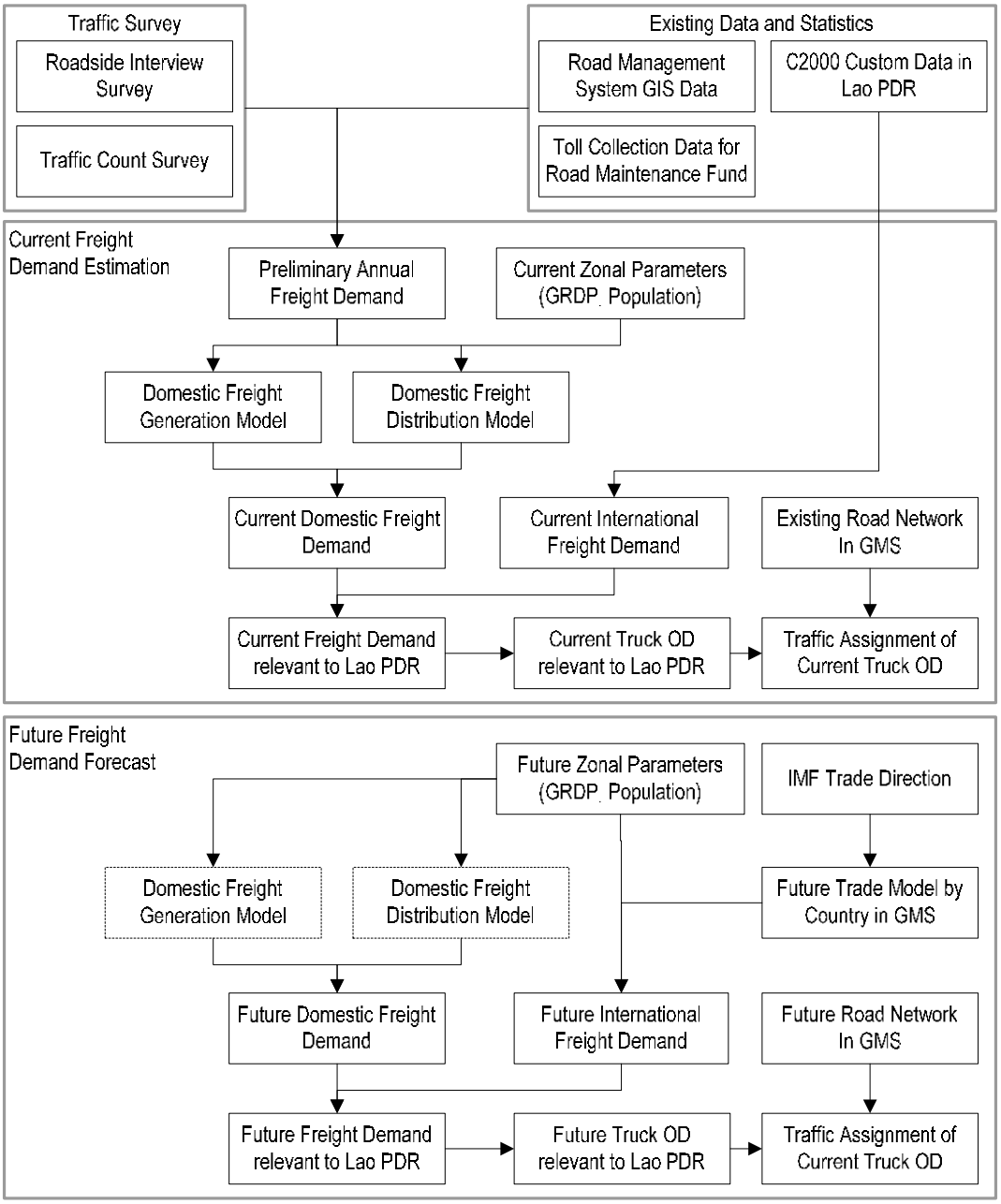
As explored in Chapter 4 of the Lao National Logistics Strategy (Volume2), a comprehensive freight demand forecast model was developed at the national/regional level to foresee domestic, export/import and transit cargo in/through Lao PDR. Based on this freight demand forecast model, this Chapter estimates the future freight demand in the Champasack Logistics Park (CLP), and provides numerical inputs for planning and designing the CLP and for testing its economical and financial validity, which will be discussed in the following chapters.

3.2 Methodology of Freight Demand Forecast for EXIM Cargo

The comprehensive freight demand forecast model for export and import cargo was developed, using the results of the roadside interview survey, traffic count survey and the secondary data and information such as transport statistics and customs data. The methodology for this freight demand forecast model is summarized below:

- A target year of the projection was set as Year 2025 and mid-term as Year 2015.
- Commodity-wise freight demand forecast model was developed, based on the conventional four-step model: Freight Generation Model, Freight Distribution Model, and Traffic Assignment, for domestic, export/import and transit cargo.
- Commodities analyzed by the demand forecast model included (1) Rice and Cereals, (2) Animal Products, (3) Sugar and Sugar Confectionary, (4) Fruits and Vegetables, (5) Animal Feed and Fertilizers and (6) Mineral and Construction Material, (7) Chemical, Plastic and Industrial Material, (8) Manufactured Goods, (9) Petroleum (10) Woods Products.

Figure 3.2.1shows a work flow of overall freight demand modeling and forecasting.



Source: JICA Study Team

Figure 3.2.1 Work Flow for Freight Demand Modeling and Forecast

3.3 Summary Result of Freight Demand Forecast for EXIM Cargo

3.3.1 Socio-economic Framework Applied

A planning framework, which was prepared in reference to the staff report of International Monetary Fund (IMF), is shown in Table 3.3.1. GDP in 2009, 2015 and 2025 were estimated based on forecasted annual growth rate.

Table 3.3.1 Estimated GDP in GMS Countries

GDP (USD billion)	2000	2001	2002	2003	2004	2005	2006	2007	2009	2015	2025
Cambodia	3.65	3.98	4.28	4.66	5.33	6.29	7.26	8.69	9.67	14.55	27.93
Yunnan (China)	22.73	25.13	26.94	29.84	35.76	42.34	50.17	62.13	73.07	119.21	269.52
Lao PDR	1.74	1.77	1.83	2.15	2.51	2.87	3.51	4.14	4.72	7.29	14.46
Myanmar	8.91	6.48	6.78	10.47	10.57	11.99	14.50	19.62	N/A	N/A	N/A
Thailand	122.73	115.54	126.88	142.64	161.34	176.35	206.99	246.05	265.88	363.09	592.84
Vietnam	31.20	32.50	35.15	39.63	45.55	53.05	61.00	69.23	80.73	123.55	246.18
GMS Total	190.95	185.40	201.86	229.38	261.06	292.89	343.43	409.86	434.06	627.7	1,144.9

Source: The World Economic Outlook (IMF), National Statistic Bureau of PRC.

Note: GDP in 2009, 2015 and 2025 are estimated by annual growth rate in IMF Staff Report.

3.3.2 Freight Generation

Future trade to/from Lao PDR, which provides the control total of import/export volume, was initially estimated by the regression model using the GDPs of the home country and other neighboring countries. Table 3.3.2 summarizes the result of the forecasted trade volume, indicating that both imports and exports were estimated to grow by 1.6 times by 2015 and over 3.0 times by 2025 and both would continue to rely heavily on Thailand till 2025.

Table 3.3.2 Existing and Forecasted Trade in Lao PDR

Country	Export (million USD)			Import (million USD)		
	2009	2015	2025	2009	2015	2025
Cambodia	1.3	2.5	5.7	0.4	0.7	1.4
Thailand	538.9	863.9	1,631.9	1,569.6	2,602.4	5,489.2
Vietnam	214.9	370.8	817.2	118.5	169.9	313.6
Yunnan (China)	38.9	69.5	169.3	51.5	85.0	178.5
Total	794.0	1,306.7	2,624.1	1,740.1	2,858.0	5,982.7

Source: JICA Study Team

Commodity-wise future trade volume was estimated by the regression model, explained by the GDPs of the home country and other neighboring countries. Table 3.3.3 and Table 3.3.4 show forecasted import and export values. With the exception of food products which rely heavily on the population growth, all the commodities were estimated to increase at the same pace as the overall import and export volumes.

Table 3.3.3 Existing and Forecasted Import Values and Expansion Factors

Commodity Type	Forecasted Import Value (million USD)			Expansion Factor	
	2009	2015	2025	2015/2009	2025/2009
1) Rice & Cereals	25	36	71	1.44	2.84
2) Animal Products	18	25	48	1.39	2.67
3) Sugar & Sugar Confectionary	8	7	10	0.88	1.25
4) Fruits & Vegetables	11	19	41	1.73	3.73
5) Animal Feed & Fertilizers	25	39	82	1.56	3.28
6) Mineral & Construction Material	54	85	174	1.57	3.22
7) Chemical & Plastic & Industrial Material	635	1,099	2,369	1.73	3.73
8) Manufactured Goods	521	822	1,671	1.58	3.21
9) Petroleum	425	697	1,457	1.64	3.43
10) Woods Products	18	29	59	1.61	3.28
Total	1,740	2,858	5,983	1.64	3.44

Source: JICA Study Team

Table 3.3.4 Existing and Forecasted Export Values and Expansion Factors

Commodity Type	Forecasted Export Value (million USD)			Expansion Factor	
	2009	2015	2025	2015/2009	2025/2009
1) Rice & Cereals	41	46	59	1.12	1.44
2) Animal Products	2	2	4	1.00	2.00
3) Sugar & Sugar Confectionary	0	0	1	1.00	1.00
4) Fruits & Vegetables	34	56	113	1.65	3.32
5) Animal Feed & Fertilizers	0	0	0	1.00	1.00
6) Mineral & Construction Material	108	178	377	1.65	3.49
7) Chemical & Plastic & Industrial Material	420	724	1,485	1.72	3.54
8) Manufactured Goods	141	234	473	1.66	3.35
9) Petroleum	5	6	9	1.20	1.80
10) Woods Products	43	58	103	1.35	2.40
Total	794	1,307	2,624	1.65	3.30

Source: JICA Study Team

3.3.3 Freight Distribution

Future trade volume was distributed to the provinces in Lao PDR by the gravity model. This gravity model was formulated by freight generation and attraction of the domestic freight demand and transport distance between traffic analysis zones as the explanatory factors. Using this gravity model, the future import and export volume to/from Champasack Province was estimated as tabulated in Table 3.3.5 and Table 3.3.6. The expansion factors, estimated by 2009, 2015 and 2025 trade volumes, will provide an input to estimate the future freight volume handled at the CLP. In order to convert freight value (in USD) into freight volume (in ton), the conversion factor was prepared by commodity type based on the customs data of Lao PDR in 2008/09.

Table 3.3.5 Forecasted Import Volumes and Expansion Factors (Champasack Province)

Commodity Type	Forecasted Import Volume (1000 ton)			Expansion Factor	
	2009	2015	2025	2015/2009	2025/2009
1) Rice & Cereals	7.8	11.3	22.9	1.45	2.92
2) Animal Products	1.8	2.5	4.8	1.36	2.63
3) Sugar & Sugar Confectionary	1.7	1.6	2.2	0.96	1.28
4) Fruits & Vegetables	2.4	4.3	9.4	1.79	3.87
5) Animal Feed & Fertilizers	13.1	20.8	44.0	1.59	3.36
6) Mineral & Construction Material	98.1	154.7	319.5	1.58	3.26
7) Chemical & Plastic & Industrial Material	21.3	37.2	80.7	1.75	3.79
8) Manufactured Goods	15.0	23.8	48.8	1.59	3.26
9) Petroleum	71.9	119.0	250.5	1.66	3.49
10) Woods Products	0.4	0.7	1.4	1.62	3.46
Total	233.5	376.0	784.3	1.61	3.34

Note: The figures show import volumes from Thailand.

Source: JICA Study Team

Table 3.3.6 Forecasted Export Volumes and Expansion Factors (Champasack Province)

Commodity Type	Forecasted Export Volume (1000 ton)			Expansion Factor	
	2009	2015	2025	2015/2009	2025/2009
1) Rice & Cereals	2.9	3.1	3.7	1.08	1.26
2) Animal Products	1.6	2.0	3.4	1.24	2.13
3) Sugar & Sugar Confectionary	0.0	0.0	0.0	1.00	1.00
4) Fruits & Vegetables	61.2	96.2	176.7	1.57	2.89
5) Animal Feed & Fertilizers	0.1	0.1	0.1	1.17	1.69
6) Mineral & Construction Material	0.0	0.0	0.0	1.00	1.00
7) Chemical & Plastic & Industrial Material	1.6	2.7	5.1	1.67	3.21
8) Manufactured Goods	1.3	2.0	3.8	1.60	2.97
9) Petroleum	0.0	0.0	0.0	1.00	1.00
10) Woods Products	46.0	56.6	86.6	1.23	1.88
Total	114.7	162.8	279.5	1.42	2.46

Note: The figures show export volumes to Thailand.

Source: JICA Study Team

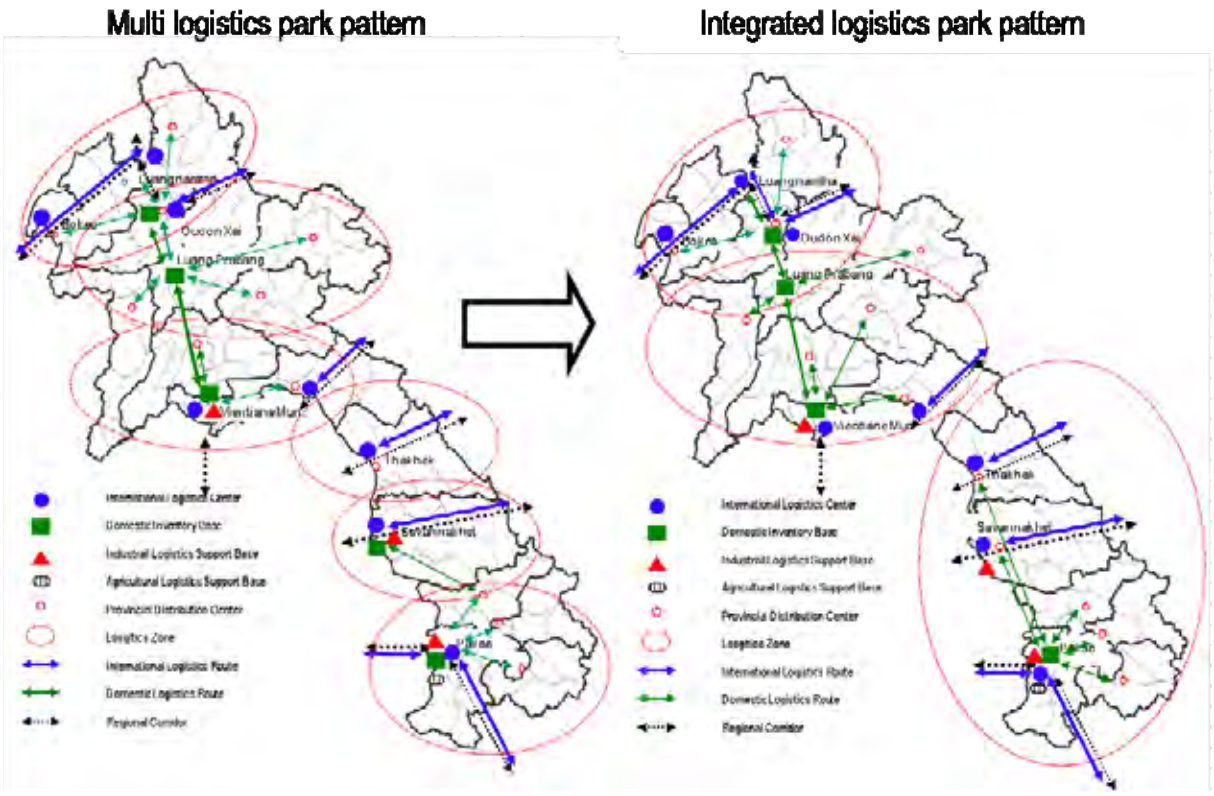
CHAPTER 4 CLP DEVELOPMENT POLICY

4.1 Project Rationale

(1) National Logistics Strategy and CLP

As discussed in a separate volume of this report (Volume 1), the National Logistics Strategy was drafted and proposed to demonstrate the policy direction of logistics development in Lao PDR, the modernization of logistics infrastructures and the promotion of logistics industries. The overall aim of the National Logistics Strategy is to realize Laos' potential for future development through exploitation of its strategic geographic location among the GMS countries as well as the advantages of cross border agreements with/among surrounding countries. This strategy was developed based on the concept that integration of logistics facilities and facilitation of trade are essential and it plays an important role in providing quality logistics service as a regional hub covering a wide area of Lao PDR and neighboring countries. Here, the key issue was how to locate integrated logistics parks strategically within Lao PDR.

Functions of Champasack Logistics Park (CLP) can be established from viewpoints of national, regional development as well as local demand. Having considered that Savannakhet has been deemed a regional logistics hub, Savannakhet Logistics Park (SLP) does not necessarily have fully equipped logistics facilities like the Vientiane Logistics Park (VLP) does. As such SLP should focus on the limited services: targeting transit and export and import cargo (EXIM cargo) handling, container depot and business incubation functions. Instead of Savannakhet, Champasack is expected to become a focal logistics point, delivering the EXIM cargo in the central and southern region of Lao PDR, as proposed in the National Logistics Strategy.



Source: JICA Study Team

Figure 4.1.1 Spatial Development Plan of National Logistics Strategy

(2) Regional Integration and CLP

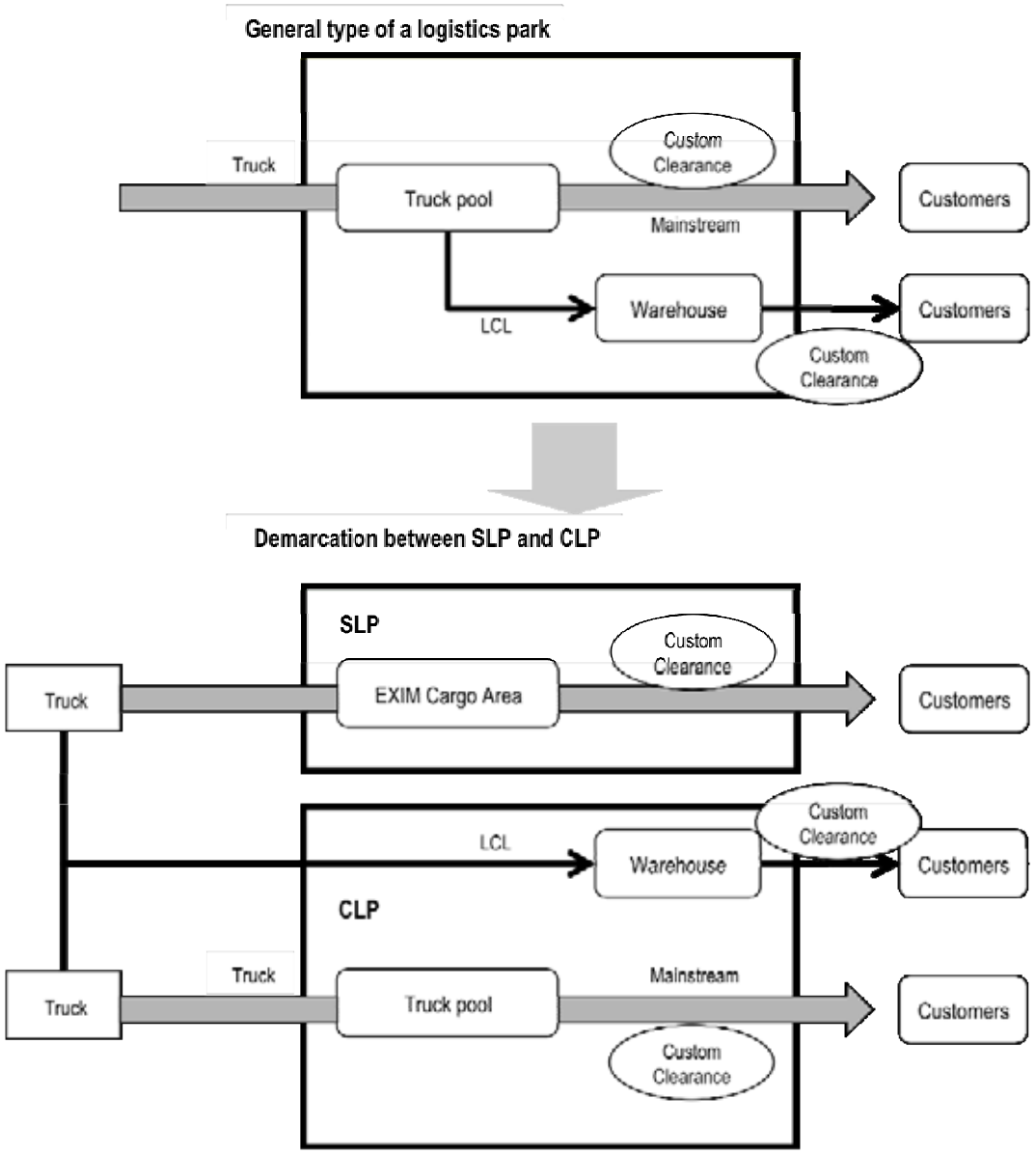
In consideration of the small amount of cargo volume handled at both the SLP and CLP, it is not practical to place two individual integrated logistics facilities in both cities. Table 4.1.1 shows commodity-wise cargo volume handled at the SLP and CLP: it indicates that the inbound cargo volumes of both SLP and CLP are observed as being almost equal. Taking a look at outbound cargo volumes, the inbound and outbound cargo volumes at the SLP are established as being very distorted; which might contribute to high transport costs. On the other hand, trade in the CLP exhibits well balanced inbound and outbound cargo volumes. In this regards, the CLP could function as an integrated logistics hub which mainly handles EXIM cargo to/from Thailand and render a logistics service that covers the central and southern region of Lao PDR. The regional logistics integration between SLP and CLP is illustrated in Figure 4.1.2.

Table 4.1.1 Present and Future Cargo Volume at SLP and CLP

Unit: 000 ton

Savannakhet Logistics Park	Inbound			Outbound		
	2,009	2,015	2,025	2,009	2,015	2,025
1) Rice & Cereals	1,281	1,852	3,745	211	227	266
2) Animal Products	2,650	3,616	6,968	0	0	0
3) Sugar & Sugar Confectionary	2,635	2,520	3,370	0	0	0
4) Fruits & Vegetables	104	185	402	17	28	50
5) Animal Feed & Fertilizers	0	0	0	0	0	0
6) Mineral & Construction Material	5,207	8,212	16,958	35	56	112
7) Chemical & Plastic & Industrial Material	6,861	11,976	25,984	0	0	0
8) Manufactured Goods	17,905	28,517	58,446	440	703	1,309
9) Petroleum	0	0	0	0	0	0
10) Woods Products	1,957	3,169	6,773	0	0	0
Total	38,600	60,048	122,646	703	1,014	1,738
Champasack Logistics Park	Inbound			Outbound		
	2,009	2,015	2,025	2,009	2,015	2,025
1) Rice & Cereals	3,912	5,656	11,442	1,445	1,560	1,827
2) Animal Products	1,284	1,752	3,375	0	0	0
3) Sugar & Sugar Confectionary	1,707	1,633	2,183	0	0	0
4) Fruits & Vegetables	76	136	295	16,560	26,033	149,761
5) Animal Feed & Fertilizers	13,087	20,826	43,981	0	0	0
6) Mineral & Construction Material	230	363	750	0	0	0
7) Chemical & Plastic & Industrial Material	9,396	16,401	35,583	0	0	4,866
8) Manufactured Goods	11,318	18,026	36,942	1,270	2,029	3,758
9) Petroleum	0	0	0	0	0	0
10) Woods Products	2	3	7	9,576	11,776	515
Total	41,012	64,796	134,558	28,851	41,399	160,726

Source: JICA Study Team



Source: JICA Study Team

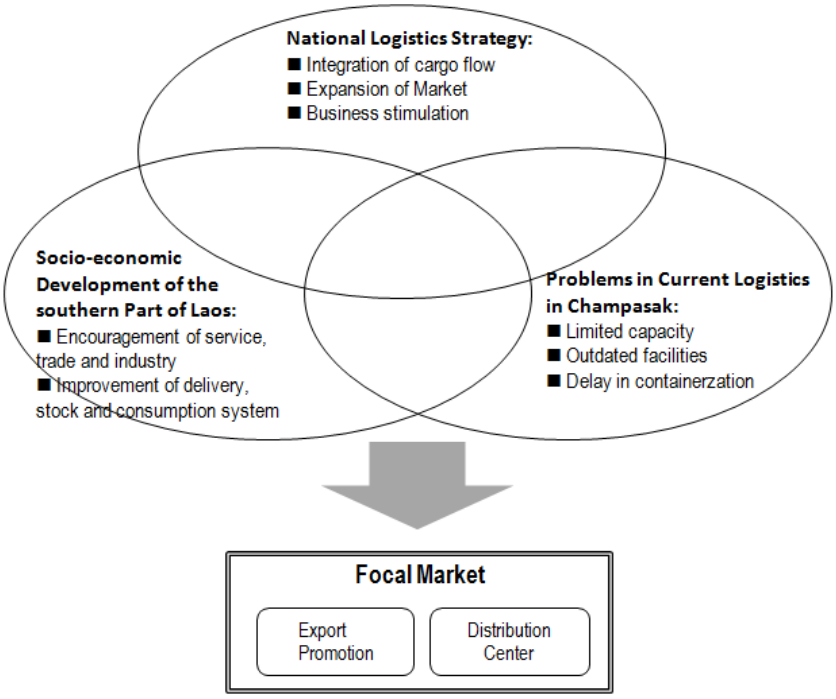
Figure 4.1.2 Illustration of Regional Logistics Integration

4.1.2 Roles of CLP

The CLP is expected to function as a core logistics facility as proposed in the National Logistics Strategy. The overall aim of the National Logistics Strategy is to materialize the policy of transformation from “land locked country” to “land linked country”: fully utilizing its geographical advantage among the GMS countries as well as the advantages accrued from cross border agreements with/among surrounding countries. However, the reality is that the small economy and the limited market size of Lao PDR only generate a small amount of cargo, which contributes to high logistics costs in Lao PDR.

Champasack Province has abundant agricultural products such as rice, vegetables and coffee beans. Production from the forest industry is also at a relatively high level in Lao PDR. Boloven

Plateau, located in the eastern side of Pakse, has bountiful soil and high potential for agricultural development. Furthermore, the major export cargo from Champasack is agricultural products and the volume of this export cargo from Champasack is observed as being almost equal in volume to the import cargo to Champasack. CLP is expected to play an important role in providing quality logistics service, in response to the cargo demand. Taking a look at the agricultural products, the logistics facility and services provided at the CLP should meet customers' needs, i.e. timely, speedy and quality delivery such as temperature controlled delivery.



Source: JICA Study Team

Figure 4.1.3 Role of CLP

Considering these circumstances, the CLP needs to play the following roles:

- Interface of international trade
- Export promotion
- Incubation of logistics business
- Efficient domestics logistics hub

1) Interface of international Trade

CLP is expected to provide efficient cross border procedural service, mainly for cargo to/from Thailand and partially for that to/from southern Vietnam and Cambodia. The facilitation of the CBTA and bilateral agreement are progressing to promote cross border trade in the southern region of Lao PDR. Both facility improvement and Custom, Immigration and Quarantine (CIQ) development are required for the CLP to function effectively in such a role.

2) Export Promotion

Champasack Province has abundant agricultural products and high potential for agricultural

development. Thus, the major export cargo from Champasack is and will be agricultural products. The CLP needs to provide quality and improved logistics service for exportation of these agricultural products to meet customers' demands towards freshness and safety. A major advantage of these agricultural products in Lao PDR is that they are organic products and the logistics service at the CLP should enhance this brand image and competitiveness. The facility development is top priority for development of the CLP.

3) Incubation of Logistics Business

CLP is a quite unique logistics park among those proposed in Lao PDR. Import and export cargo are and will be balanced in terms of volume. There is a high potential to accumulate the export and import cargo and to generate business opportunity at the CLP. For example, coordination between export and import vehicles can contribute to reduction in empty backhaul and transport cost.

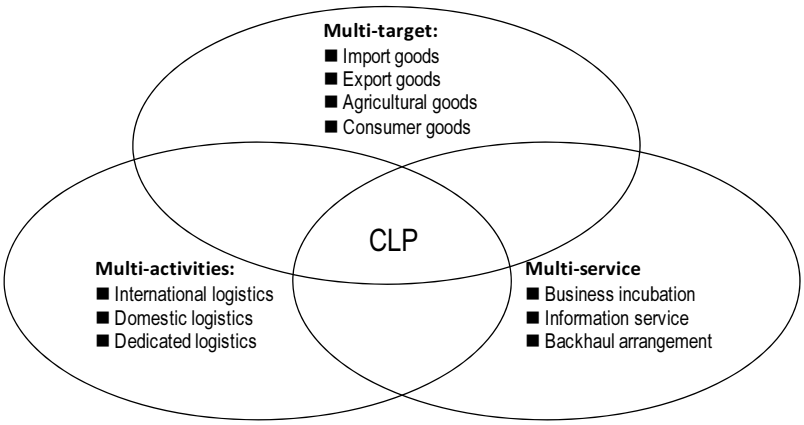
4) Efficient Domestic Hub

CLP is expected to function as a regional distribution centre in Lao PDR and to distribute goods to major cities in response to an increase in demand on consumption goods toward these cities. The CLP is expected to render its logistics service over a wider area covering the central and southern region of Lao PDR.

4.2 Development Concept

4.2.1 Overall Concept

As mentioned earlier, the SLP is expected to focus on the limited services: mainly targeting transit cargo while the CLP is expected to become a regional logistics hub, catering to the EXIM cargo in the central and southern region of Lao PDR, as proposed in the National Logistics Strategy. CLP would also function as a regional logistics facility which contributes to realizing local development in Pakse such as industrial development and urbanization, as well as addressing current logistics issues. CLP is expected to meet these requirements through providing quality and comprehensive logistics services. This is not only effective for customers' benefits, but also acts as an incentive for logistics providers since accumulated volume of cargo can be conducive for their business. In this regard, "Triple-Multi" is the key concept of CLP development as illustrated in the Figure 4.2.1.



Source: JICA Study Team

Figure 4.2.1 Overall Concept of CLP

(1) Multi-target

CLP is expected to handle EXIM cargo and the volumes of export and import cargo are estimated as being very balanced. The commodities handled at the CLP would be very diverse. Looking at the import cargo, commodities handled at the CLP are comprised of: animal feed and fertilizer (33% of the total import volume in 2025), chemical (26%), and industrial goods (27%) based on the result of demand forecast. As for the export cargo, CLP handles mainly fruits and vegetables (93% of the total export volume in 2025). The operators at the CLP could minimise the business risks due to these diverse commodities, which are less affected by seasonal fluctuation. CLP, accordingly, is expected to expand its logistics services to handle wide range of commodities.

(2) Multi-activity

1) International Logistics Service

One of fundamental roles of the CPL would be to provide international logistics services. CLP should provide more quality and customer-friendly services: less costly and punctual services. Costs can be reduced, using scale merits, by increasing cargo handling volume as well as the business competition among logistics providers in CLP. As the main business target at the CLP is EXIM cargo, container and truck pool functions should also be availed at the CLP. The container pool needs to be serviceable both for loaded and empty containers. Since inbound and outbound cargo volume at the CLP is estimated as being well balanced, the empty container pool would be effective in reducing empty backhaul and therefore reducing transport costs.

2) Domestic Service

Besides the international services, the CLP is expected to provide domestic logistics services delivering the cargo in the central and southern region of Lao PDR. In order to do so, warehouse services will be a key facility placed in the CLP. Warehouse operation needs to be upgraded from storage function to quality inventory control in order to provide sophisticated delivery services, such a Just-In-Time (JIT) delivery.

3) Dedicated Service

Lao PDR has been making considerable effort to strengthen industrial competitiveness, especially for export-oriented industry. Considering various potential industrial projects, logistics services at the CLP need to be facilitated and improved especially for agricultural products: fast, punctual, safe.

(3) Multi-service

One of important objectives of development of the CLP is to provide favourable business environment to stimulate logistics business in Lao PDR. CLP is the designated area for provision of incentives to promote the following logistics businesses in Lao PDR:

- Business incubation such as advice for administration improvement and intermediary intervention between customers and local forwarders
- Information services
- Support and related business provisions

Since the CLP is expected to handle well balanced EXIM cargo in terms of volume and diversity of commodities, there is a potential need for information services in the CLP, to help consolidation and accumulation of EXIM cargo.

4.2.2 Functions under Multi-activity

(1) International Logistics

1) Import

Import cargo tends to be handled by fully-loaded truck or containers. Though the current regulations restrict import cargo to be unloaded at designated terminals, Lao Government enacted a deregulation law to allow direct delivery of import cargo. The CLP will follow this trend, allowing customs procedure without unloading it. Accordingly, the CLP needs to be equipped with truck parking and/or open space waiting for customs clearance. In order to facilitate customs procedures, the CLP also needs to be equipped with switching tractor or trailer.

In the CLP, most of the import cargo could be delivered directly to the co-signees: hence a diminished need for the warehouse function. However, CLP could absorb advanced warehouse facility and function to provide value add service, quality inventory and warehouse management service.

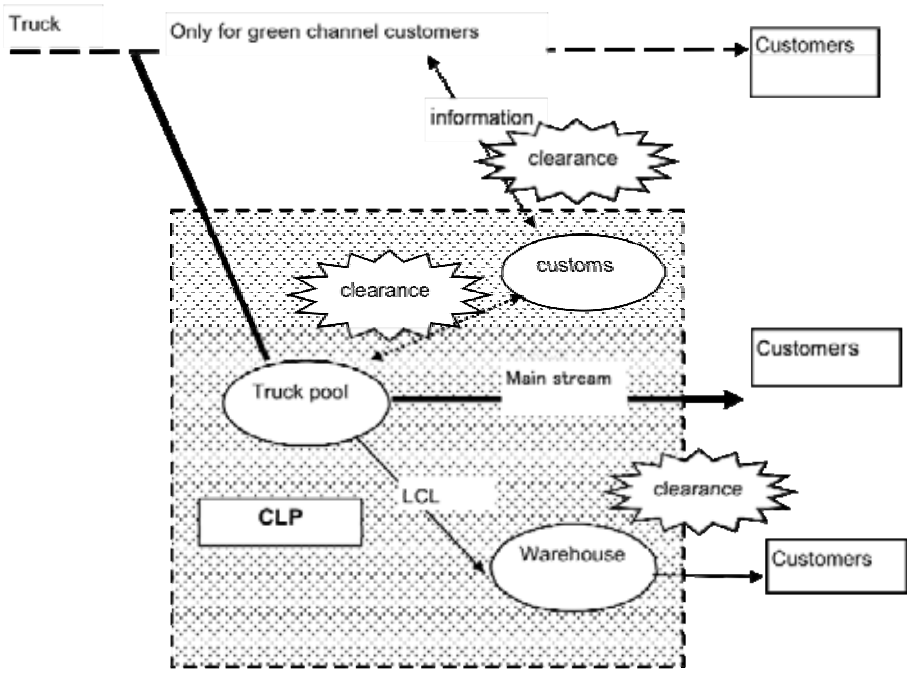
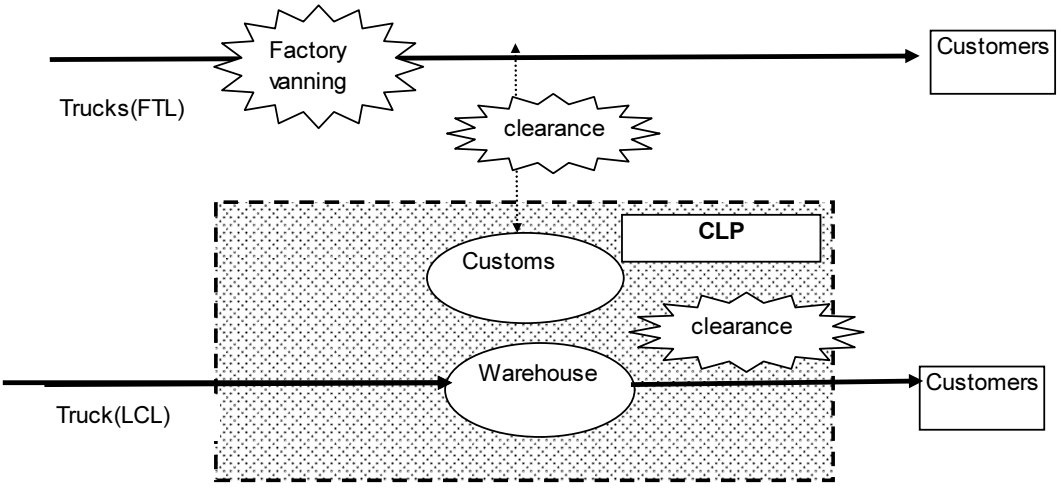


Figure 4.2.2 Import Function

2) Export

Customs procedures for export cargo were facilitated to a great extent and the factory vanning system has become common practice in Lao PDR. Having said that, the customs operation should be provided at the CLP. The CLP is expected to be equipped with warehouse facilities and therefore the CLP could provide LCL service and value added service, both required for customs operations.



Source: JICA Study Team

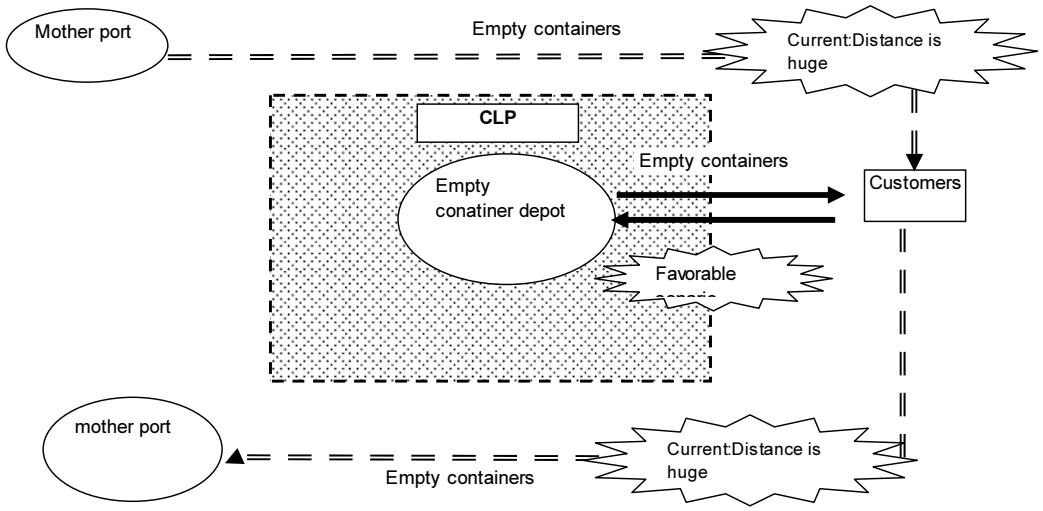
Figure 4.2.3 Export Function

3) Container Depot

Container yard (CY) is a place to dispatch and receive bonded or non-bonded containers. Lao PDR has been in the process of establishing CY; however, the container owners, such as shipping lines, have not been active in Lao PDR mainly because of low cargo volume and low quality inventory control available in Lao PDR (no-returning containers, uncertainty of identifying container location and unreliable return schedule). Accordingly, container turnaround in Lao PDR becomes quite low and container owners lose business profits.

To address this, empty container depot should be available at the CLP to reduce transport costs associated with containers. This can contribute to cheaper delivery of empty containers. Considering the current situation in which empty containers are delivered to/from Thailand, the logistics costs can be reduced by development of empty container depot.

It should be noted that use of container for land transport has become popular in Thailand and Malaysia and is partly observed even in Lao PDR. These containers are owned by the transport operators and/or shippers. Accordingly, unlike shipping companies (tend to control use of their containers), these transport operators and shippers tend to use empty container depots to reduce transport costs.



Source: JICA Study Team

Figure 4.2.4 Empty Container Depot Function

Figure 4.2.5 Snapshot of Containers observed at Thailand/Malaysia Border

(2) Dedicated Service

The major commodities handled at the CLP would be export agricultural products. The CLP is thus expected to provide dedicated service to export them. The following discussion expounds on the details of this dedicated service for agricultural products.

1) Improvement of Inbound Operation

Currently, local farmers tend to directly deliver their products to the export warehouse located near the cross border point with Thailand. Therefore, the inbound operation should be facilitated and improved. This would benefit both farmers and customers by providing advanced technology such as consolidation, milk-run method and scheduled pick-up operation.

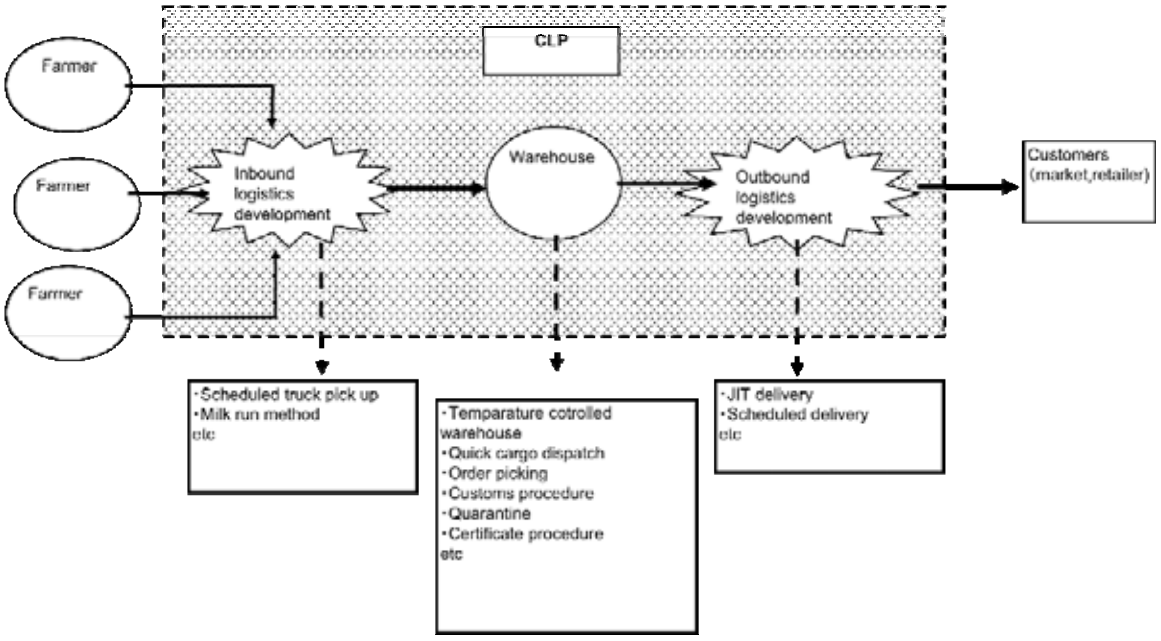
2) Improvement of Warehouse Management

An existing export warehouse is an open yard facility without any equipment available. Agricultural products need to be stored in a certain condition. Some agricultural products need to be kept in a temperature controlled facility. A temperature control warehouse is effective in maintaining quality

of the products and all-year-round delivery to sell the products at a higher price. Besides facility development, quality warehouse management also needs to be provided at the CLP to smoothen distribution of the products.

3) Improvement of Delivery

A delivery service provided at the CLP also needs to be improved. A vehicle used for this delivery needs to be temperature controlled. Customs procedure needs to be facilitated to smoothen the delivery service since agricultural products comply with quarantine and food safety regulations. Development of the Common Control Area (CCA) could significantly contribute to this delivery improvement of the agricultural products.



Source: JICA Study Team

Figure 4.2.6 Dedicated Service Function

4.2.3 Services of CLP

The detailed service available at the CLP is summarized in the discussion below.

(1) Full-loaded EXIM Cargo

Since full loaded EXIM cargo tends to be delivered directly between shippers and co-signees and this cargo is transported by fully-loaded trucks, the following services should be available at the CLP.

Table 4.2.1 Services under general import/export cargo

Functions	Detailed service
Truck export and import	**Customs (CIQ)**
	Truck arrival and dispatch
	Temporary cargo storage (Stop-over)
	Warehouse (Storage, bonded)
	LCL service
	Consolidation
	Empty van depot
CY	Stuffed container yard (depot)
	Container arrival/dispatch
	Empty container pool
	Returning empty container to origin port

Note: Detailed services in gothic letters represent key services.
Source: JICA Study Team

(2) Warehouse Oriented Cargo

Since this cargo tends to require warehouse and inventory function at the CLP, the following services should be available at the CLP.

Table 4.2.2 Services under general goods requiring warehouse operation

Functions	Detailed service
Inbound	**Scheduled pick-up planning and implementation**
	Milk run cargo pick up
Warehouse	**Inventory control and management**
	Speedy picking and packing
	Sorting
	Accurate and quick picking
	Order picking
	Re-packing
	Quick dispatch
	Schedule controlling
	Processing
	VMI (Vendor Management Inventory)
	Bonded cargo inventory (for import/domestic)
	Customs procedure (for import/domestic)
	Duty payment and cash control (for import/domestic)
	Keep recording foreign/domestic inventory
Outbound	**JIT delivery**
	Backhaul arrangement

Note: Detailed services in gothic letters represent key services.
Source: JICA Study Team

(3) Agricultural Products

Since agricultural products, the major export cargo to be handled at the CLP, require specific services, as discussed above, the following services should be availed at the CLP.

Table 4.2.4 Services under agricultural goods for export

Functions	Detailed service
Inbound	**Scheduled pick-up planning and implementation**
	Milk run cargo pick up
Warehouse	**Inventory control and management**
	Speedy picking and packing
	Sorting
	Accurate and quick picking
	Order picking
	Re-packing
	Quick dispatch
	Processing
	Temperature control stock
	Customs procedure
	Quarantine
	Export/import permit and certificate issue
Outbound	**JIT delivery**
	Backhaul arrangement
	Tracing

Note: Detailed services in gothic letters represent key services.

Source: JICA Study Team

4.2.4 Necessary Facilities at CLP

CLP needs various facilities to offer the services mentioned above. The needs for logistics facilities depend on type of goods handled and type of service provided. CLP also needs some common facilities and management facility to work CLP as one designated area/facility.

Table 4.2.3 Necessary Facilities in CLP

Function	Service	Facilities
Import	Customs Clearance on Chassis	CIQ office, Customs office Open space for customs clearance (Warehouse for inventory-oriented cargo)
Export	Customs Clearance	CIQ office Customs office (Warehouse for LCL)
Container deport	Stuffed container pool（CY） Empty container pool	Open space for container storage Chassis pool Truck pool
Domestic	Inbound transport service Warehouse management Outbound	General warehouse
Dedicated service (Agricultural export)	Inbound transport service Warehouse management Outbound	Temperature controlled warehouse
Business Incubation		Administration office
Information Service		
Support & related business		Maintenance shop, Office Container Washing
		Administration office Temporary parking lots Gate, Buffer, Road (in CLP)

Source: JICA Study Team

4.3 Handling Cargo Volume

4.3.1 Methodology of Freight Demand Forecast at CLP

The freight demand forecast model, built for the export and import cargo, was originally developed for the national analysis to determine the national logistics strategy. It also provided essential guidance in foreseeing the freight demand at the micro level, such as the cargo handled in the CLP. Adopting the comprehensive demand forecast model, the methodology of the freight demand forecast for the CLP is summarized below.

- CLP will handle import and export cargo from/to Thailand and transit cargo through Lao PDR from Thailand to Vietnam or Cambodia.
- Containerization is a worldwide trend. Thus, the commodity-wise future freight demand will be categorized by packing type; container, general cargo, heavy bulk and petroleum, and the volume of the container cargo will be separately estimated.

4.3.2 Pre-conditions of Freight Demand Forecast

Using the comprehensive freight demand forecast model, built for the national analysis, the freight demand in the CLP was forecasted based on the following pre-conditions.

- A target year was set as Year 2025 with the intermediate year set as Year 2015.
- Adopting the same socio-economic framework, annual GDP growth of 7.5% (from 2011 to 2020) and 7.0% p.a. (from 2021 to 2025) and population growth of 1.7% p.a. (from 2008 to 2025) were applied to the demand forecast model.
- The current volume of the EXIM cargo was divided into 99 commodities (following HS 2 digits code) and share of cargo at CLP against the total EXIM cargo was estimated by collecting commodities of the EXIM cargo to be handled at CLP (see Table 4.3.1).

Table 4.3.1 Handling Cargo Ratio by Type of Commodity at CLP

Commodity Type	Share of CLP	
	Import	Export
1) Rice & Cereals	50%	50%
2) Animal Products	70%	0%
3) Sugar & Sugar Confectionary	100%	0%
4) Fruits & Vegetables	3%	85%
5) Animal Feed & Fertilizers	100%	0%
6) Mineral & Construction Material	0%	0%
7) Chemical & Plastic & Industrial Material	44%	95%
8) Manufactured Goods	76%	99%
9) Petroleum	0%	0%
10) Woods Products	0%	1%
Total	14%	40%

Note: Calculated from C2000 Custom Data.
Source: JICA Study Team

4.3.3 Freight Generation/Distribution

As discussed above, the expansion factor was estimated by import/export/transit and commodity. Using the same expansion factor, the import and export volume to/from Thailand was estimated,

which provided the control total for estimation of the cargo handled in CLP. CLP was assumed to partly operate by 2015 and to be fully operational by 2025. Accordingly, the handling volume of the CLP in 2015 was under-estimated using the current share of cargos handled at the existing warehouse against total volume of the cargo through the Champasack border. Tables 4.3.2 and 4.3.3 show the future import and export volumes in Year 2015 and 2025.

Table 4.3.2 Forecasted Annual Import Volume

Commodity Type	Forecasted Import Volume (1000 ton)			Expansion Factor	
	2009	2015	2025	2015/2009	2025/2009
1) Rice & Cereals	7.8	11.3	22.9	1.45	2.92
2) Animal Products	1.8	2.5	4.8	1.36	2.63
3) Sugar & Sugar Confectionary	1.7	1.6	2.2	0.96	1.28
4) Fruits & Vegetables	2.4	4.3	9.4	1.79	3.87
5) Animal Feed & Fertilizers	13.1	20.8	44.0	1.59	3.36
6) Mineral & Construction Material	98.1	154.7	319.5	1.58	3.26
7) Chemical & Plastic & Industrial Material	21.3	37.2	80.7	1.75	3.79
8) Manufactured Goods	15.0	23.8	48.8	1.59	3.26
9) Petroleum	71.9	119.0	250.5	1.66	3.49
10) Woods Products	0.4	0.7	1.4	1.62	3.46
Total	233.5	376.0	784.3	1.61	3.34

Note: The figures show import volume from Thailand.
Source: JICA Study Team

Table 4.3.3 Forecasted Annual Export Volume

Commodity Type	Forecasted Export Volume (1000 ton)			Expansion Factor	
	2009	2015	2025	2015/2009	2025/2009
1) Rice & Cereals	2.9	3.1	3.7	1.08	1.26
2) Animal Products	1.6	2.0	3.4	1.24	2.13
3) Sugar & Sugar Confectionary	0.0	0.0	0.0	1.00	1.00
4) Fruits & Vegetables	61.2	96.2	176.7	1.57	2.89
5) Animal Feed & Fertilizers	0.1	0.1	0.1	1.17	1.69
6) Mineral & Construction Material	0.0	0.0	0.0	1.00	1.00
7) Chemical & Plastic & Industrial Material	1.6	2.7	5.1	1.67	3.21
8) Manufactured Goods	1.3	2.0	3.8	1.60	2.97
9) Petroleum	0.0	0.0	0.0	1.00	1.00
10) Woods Products	46.0	56.6	86.6	1.23	1.88
Total	114.7	162.8	279.5	1.42	2.46

Note: The figures show export volume to Thailand.
Source: JICA Study Team

Table 4.3.4 Forecasted Annual Transit Volume (from Thailand to Vietnam, Cambodia)

Commodity Type	Forecasted Transit Volume (1000 ton)			Expansion Factor	
	2009	2015	2025	2015/2009	2025/2009
1) Rice & Cereals	0.0	0.0	0.0	1.70	3.69
2) Animal Products	0.0	0.0	0.0	1.70	3.69
3) Sugar & Sugar Confectionary	0.0	0.0	0.0	1.70	3.69
4) Fruits & Vegetables	0.0	0.0	0.0	1.70	3.69
5) Animal Feed & Fertilizers	0.0	0.0	0.0	1.71	3.71
6) Mineral & Construction Material	0.1	0.2	0.4	1.70	3.69
7) Chemical & Plastic & Industrial Material	0.0	0.0	0.0	1.70	3.69
8) Manufactured Goods	0.0	0.0	0.0	1.70	3.69
9) Petroleum	6.3	10.7	23.2	1.70	3.69
10) Woods Products	0.0	0.0	0.0	1.71	3.71
Total	6.4	10.9	23.7	1.70	3.69

Note: The figures show transit volume from Thailand.
Source: JICA Study Team

Table 4.3.5 Forecasted Annual handling Volume at CLP in 2015

	Import	Export	Transit	Total (1000 ton)
1) Rice & Cereals	5.7	1.6	0.0	7.2
2) Animal Products	1.8	0.0	0.0	1.8
3) Sugar & Sugar Confectionary	1.6	0.0	0.0	1.6
4) Fruits & Vegetables	0.1	26.0	0.0	26.2
5) Animal Feed & Fertilizers	20.8	0.0	0.0	20.8
6) Mineral & Construction Material	0.4	0.0	0.2	0.6
7) Chemical & Plastic & Industrial Material	16.4	0.0	0.0	16.4
8) Manufactured Goods	18.0	2.0	0.0	20.1
9) Petroleum	0.0	0.0	0.0	0.0
10) Woods Products	0.0	11.8	0.0	11.8
Total	64.8	41.4	0.2	106.4

Source: JICA Study Team

Table 4.3.6 Forecasted Annual handling Volume at CLP in 2025

	Import	Export	Transit	Total (1000 ton)
1) Rice & Cereals	11.4	1.8	0.0	13.3
2) Animal Products	3.4	0.0	0.0	3.4
3) Sugar & Sugar Confectionary	2.2	0.0	0.0	2.2
4) Fruits & Vegetables	0.3	149.8	0.0	150.1
5) Animal Feed & Fertilizers	44.0	0.0	0.0	44.0
6) Mineral & Construction Material	0.8	0.0	0.4	1.2
7) Chemical & Plastic & Industrial Material	35.6	4.9	0.0	40.4
8) Manufactured Goods	36.9	3.8	0.0	40.7
9) Petroleum	0.0	0.0	0.0	0.0
10) Woods Products	0.0	0.5	0.0	0.5
Total	134.6	160.7	0.5	295.8

Source: JICA Study Team

4.3.4 Containerization Ratio

Containerized cargo ratio throughput in Lao PDR was estimated by cross country analysis, which incorporates GDP and population as was the case with estimation of containerized ratio at

Vientiane Logistics Park.

$$CONT = 3.07^{-6} \times GDP + 0.0343 \times Pop \ (\mathrm{r2} = 0.93)$$

where, CONT: Annual container throughputs (million TEU), GDP: Nominal Gross Domestic Product (million USD), Pop: Population (million)

Applying the annual GDP growth of 7.5% (from 2011 to 2020) and 7.0% p.a. (from 2021 to 2025) and population growth of 1.7% p.a. (from 2008 to 2025), the container traffic in Lao PDR was estimated to reach 0.08 million TEUs, equivalent to 953,000 tons, by 2025. Excluding minerals and petroleum, the trade volume will reach 2,968,000 tons by 2025, implying that 32% of the general cargo will be transported by containers. Table 4.3.7 shows containerization ratio up to 2025.

Table 4.3.7 Containerization Ratio

Year	2009	2015	2025
Import	9.9%	18.3%	32.1%
Export	5.9%	15.8%	32.1%

Note: Containerization ratio in 2009 is estimated based on the trip generation survey at Thanaleng Warehouse conducted by the Study Team.

Source: JICA Study Team

4.3.5 Packing Type

Commodities to be handled in the CLP can be categorized into the four packing types: container, general cargo, heavy bulk and petroleum. The containerized ratio by type of commodity is, as shown in following tables, defined based on the existing Thanaleng Warehouse in Vientiane Capital.

Table 4.3.8 Commodity and Packing Type in 2015

Commodity Type	Packing Type	Containerized Ratio		
		Transit	Import	Export
1) Rice & Cereals	Container, General Cargo	100%	18.3%	15.8%
2) Animal Products	Container, General Cargo	100%	18.3%	15.8%
3) Sugar & Sugar Confectionary	Container, General Cargo	100%	18.3%	15.8%
4) Fruits & Vegetables	Container, General Cargo	100%	18.3%	15.8%
5) Animal Feed & Fertilizers	Container, General Cargo	100%	18.3%	15.8%
6) Mineral & Construction Material	Heavy Bulk	0.0%	0.0%	0.0%
7) Chemical & Plastic & Industrial Material	Container, General Cargo	100%	18.3%	15.8%
8) Manufactured Goods	Container, General Cargo	100%	18.3%	15.8%
9) Petroleum	Liquid Cargo	0.0%	0.0%	0.0%
10) Woods Products	Heavy Bulk	0.0%	0.0%	0.0%

Source: JICA Study Team

Table 4.3.9 Commodity and Packing Type in 2025

Commodity Type	Packing Type	Containerized Ratio		
		Transit	Import	Export
1) Rice & Cereals	Container, General Cargo	100%	32.1%	32.1%
2) Animal Products	Container, General Cargo	100%	32.1%	32.1%
3) Sugar & Sugar Confectionary	Container, General Cargo	100%	32.1%	32.1%
4) Fruits & Vegetables	Container, General Cargo	100%	32.1%	32.1%
5) Animal Feed & Fertilizers	Container, General Cargo	100%	32.1%	32.1%
6) Mineral & Construction Material	Heavy Bulk	0.0%	0.0%	0.0%
7) Chemical & Plastic & Industrial Material	Container, General Cargo	100%	32.1%	32.1%
8) Manufactured Goods	Container, General Cargo	100%	32.1%	32.1%
9) Petroleum	Liquid Cargo	0.0%	0.0%	0.0%
10) Woods Products	Heavy Bulk	0.0%	0.0%	0.0%

Source: JICA Study Team

4.3.6 Summary of Results of Future Freight Demand at CLP

Table 4.3.10 shows the future freight demand at the CLP and the results of the future demand forecast for the CLP cargo are summarized as follows.

- Forecasted annual handling cargo volume at CLP will be about 106,000 tons in 2015 and 296,000 tons in 2025.
- The share of heavy bulk and general cargo will decrease from 12% and 73% in 2015 to 1% and 67% in 2025 respectively.
- Container cargo will increase from 15% in 2015 to 32% in 2025.

Table 4.3.10 Annual Handling Volume by Packing Type in 2015

Unit: 000 ton

Commodity Type	Petroleum Freight	Heavy Bulk	General Cargo	Container	Total
1) Rice & Cereals	0.0	0.0	5.9	1.3	7.2
2) Animal Products	0.0	0.0	1.4	0.3	1.8
3) Sugar & Sugar Confectionary	0.0	0.0	1.3	0.3	1.6
4) Fruits & Vegetables	0.0	0.0	22.0	4.1	26.2
5) Animal Feed & Fertilizers	0.0	0.0	17.0	3.8	20.8
6) Mineral & Construction Material	0.0	0.6	0.0	0.0	0.6
7) Chemical & Plastic & Industrial Material	0.0	0.0	13.4	3.0	16.4
8) Manufactured Goods	0.0	0.0	16.4	3.6	20.1
9) Petroleum	0.0	0.0	0.0	0.0	0.0
10) Woods Products	0.0	11.8	0.0	0.0	11.8
Total	0.0	12.3	77.6	16.5	106.4

Source: JICA Study Team

Table 4.3.11 Annual Handling Volume by Packing Type (Unit: 1,000 ton) in 2025

Commodity Type	Petroleum Freight	Heavy Bulk	General Cargo	Container	Total
1) Rice & Cereals	0.0	0.0	9.0	4.3	13.3
2) Animal Products	0.0	0.0	2.3	1.1	3.4
3) Sugar & Sugar Confectionary	0.0	0.0	1.5	0.7	2.2
4) Fruits & Vegetables	0.0	0.0	101.9	48.2	150.1
5) Animal Feed & Fertilizers	0.0	0.0	29.9	14.1	44.0
6) Mineral & Construction Material	0.0	1.2	0.0	0.0	1.2
7) Chemical & Plastic & Industrial Material	0.0	0.0	27.5	13.0	40.4
8) Manufactured Goods	0.0	0.0	27.6	13.1	40.7
9) Petroleum	0.0	0.0	0.0	0.0	0.0
10) Woods Products	0.0	0.5	0.0	0.0	0.5
Total	0.0	1.7	199.6	94.4	295.8

Source: JICA Study Team

4.3.7 Traffic Volume at CLP

The previous discussion reveals how to estimate tonnage of the future cargo handled at the CLP. Next topic discussed in this section is how to estimate the traffic demand to transport the estimated cargo demand at the CLP. First of all, the following analysis enabled estimation of the number of trucks necessary to transport the cargo to/from the CLP.

(1) Number of Trucks for CLP Cargo

1) Average Loading Weight by Truck

Table 4.3.12 summarizes the average loading weight by truck type, prepared by the trip generation survey at the Thanaleng Warehouse. Considering tonnage of the future freight demand at the CLP, the truck-wise average loading weight was estimated as shown in the table. It should be noted that average loading weight of the container truck was separately estimated to be 24 tons per 40 feet equivalent unit (FEU) from the trip generation survey conducted at the Thanaleng Warehouse.

Table 4.3.12 Average Loading Weight by Truck Type

Unit: ton/truck

Type of Package	2 Axles Bed / Roof Truck	3 Axles Bed / Roof Truck	4 Axles Bed / Roof Truck	Articulated Truck	Tanker	Trailer	Total
(1) Empty							0
(2) Less than 1/4 (25%)							0
(3) 1/4 (25%)		8.0					8.0
(4) 1/2 (50%)	7.2	0.7		15.0			6.6
(5) 3/4 (75%)	10.0	3.3				25.0	18.5
(6) Full (100%)	7.0	8.9	16.2	23.0	23.3	23.4	17.1
Average	7.2	8.5	16.2	22.9	23.3	23.6	16.8

Source: JICA Study Team

Table 4.3.13 Average Loading Weight by Truck Type

Unit: ton

Packing Type	3 and more axles	Trailer
Petroleum Freight	12.0	12.0
Heavy Bulk	12.0	24.0
General Cargo	12.0	24.0
Container (40 FEU)		24.0

Source: JICA Study Team

2) Number of International Trucks at SLP

There are two types of transport generated from the CLP: domestic and international transport. The following analysis reveals the volume of the international transport (trucks), mainly to/from Thailand, at the CLP.

The number of international trucks at the CLP was estimated, dividing the daily future freight demand by the average loading weight. For export and import cargo, average loading weight of the trailer was adopted for estimation of international trucks delivering to/from the CLP. Table 4.3.14 summarizes the estimated number of international trucks and indicates that 35 and 65 international trucks will use the CLP to transport export and import cargo in 2015 and 2025, respectively.

Table 4.3.14 Number of International Trucks at CLP

Unit: truck/day

Year	2015			2025		
Packing Type	Import	Export	Transit	Import	Export	Transit
Heavy Bulk	2	2	1	2	1	1
General Cargo	13	6	0	19	20	0
Container	7	3	1	11	11	0
Sub-total	22	11	2	32	32	1
Grand Total	35			65		

Source: JICA Study Team

3) Number of Domestic Trucks at CLP

For estimation of the trucks delivering export and imported cargo to the domestic market in Lao PDR, average loading weights of both truck (for mixed loading cargo) and trailer (for full loading cargo and cargo by railway) were adopted for estimation of the number of domestic trucks at the CLP. Table 4.3.1 provides a summary of the estimated number of domestic trucks and shows that 39 and 77 domestic trucks will use the CLP to transport export and import cargo to the local market in 2015 and 2025, respectively.

Table 4.3.1 Number of Domestic Trucks at CLP

Unit: truck/day

Year	2015			2025		
Packing Type	Import	Export	Transit	Import	Export	Transit
Full Loading						
Heavy Bulk	2	2	1	2	1	1
General Cargo	13	6	0	16	17	0
Container	7	3	1	10	9	1
Sub-total	22	11	2	28	27	2
Mixed Loading						
Heavy Bulk	0	0	0	0	0	0
General Cargo	3	1	0	7	7	0
Container	0	0	0	3	3	0
Sub-total	3	1	0	10	10	0
Grand Total	39			77		

Note: Mixed loading cargo is assumed to reach at 10% of all the cargos handled at the CLP by 2015 and 20% by 2025.

Source: JICA Study Team

4.4 Layout Concept

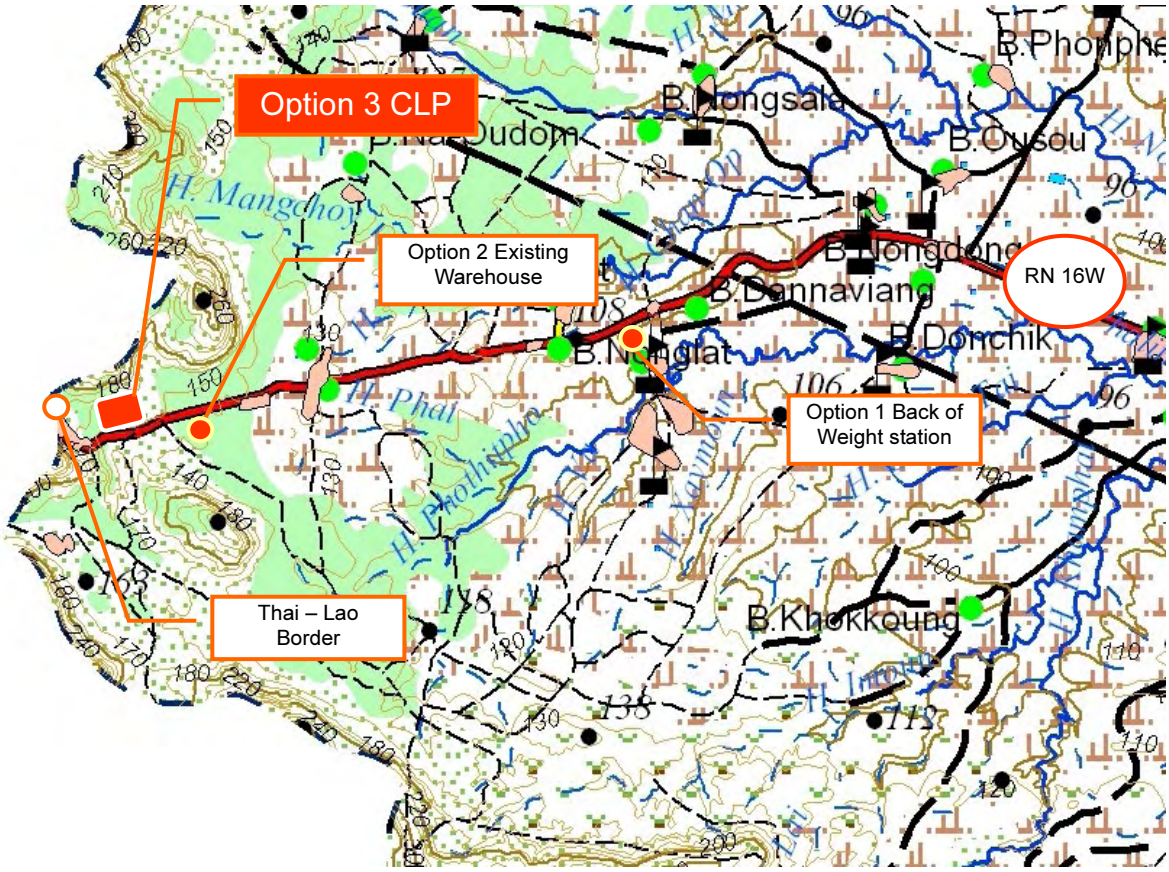
4.4.1 Preconditions

(1) Selection of Optimum Location of the CLP

As discussed in Section 4.2, the CLP is expected to handle EXIM cargo, mainly agricultural products for export and manufactured goods for import, to/from Thailand. Considering the volume and flow of the EXIM cargo at the CLP, there are two options for the location of CLP: (i) near the cross border point with Thailand and (ii) in/around the centre of Pakse. Mainly because appropriate size of the public land for development of the CLP is no longer available in/around the centre of Pakse, it is suggested that the CLP be located near the cross border point along NR 16.

Considering availability of the public land, the following three candidate locations of the CLP were short-listed and preliminarily studied: the backyard of the existing weight station (Option 1); the existing warehouse (Option 2); and the open space adjacent to the new customs department. Following the preliminary site survey and interviews with the relevant local officials, the optimum location of the CLP was finally determined as Option 3. It is located near the cross border point with Thailand where the new customs department is to be developed.

Figure 4.4.1 shows the 3 candidate sites for the CLP located in the vicinity of Thai-Lao cross border point in Champasack. These candidate locations are, in general, public land, currently utilized as paddy fields and/or open spaces surrounded by the forest. Option 3 of the candidate locations is located east of the cross border point along NR-16. Border facilities and CIQ office are located west of Option 3. Location of CLP was decided after a discussion with MPWT, DPWT, custom and Champasack Provincial Office. Issues discussed included land ownership, suitability of related development plans and available area, etc.



Source: JICA Study Team

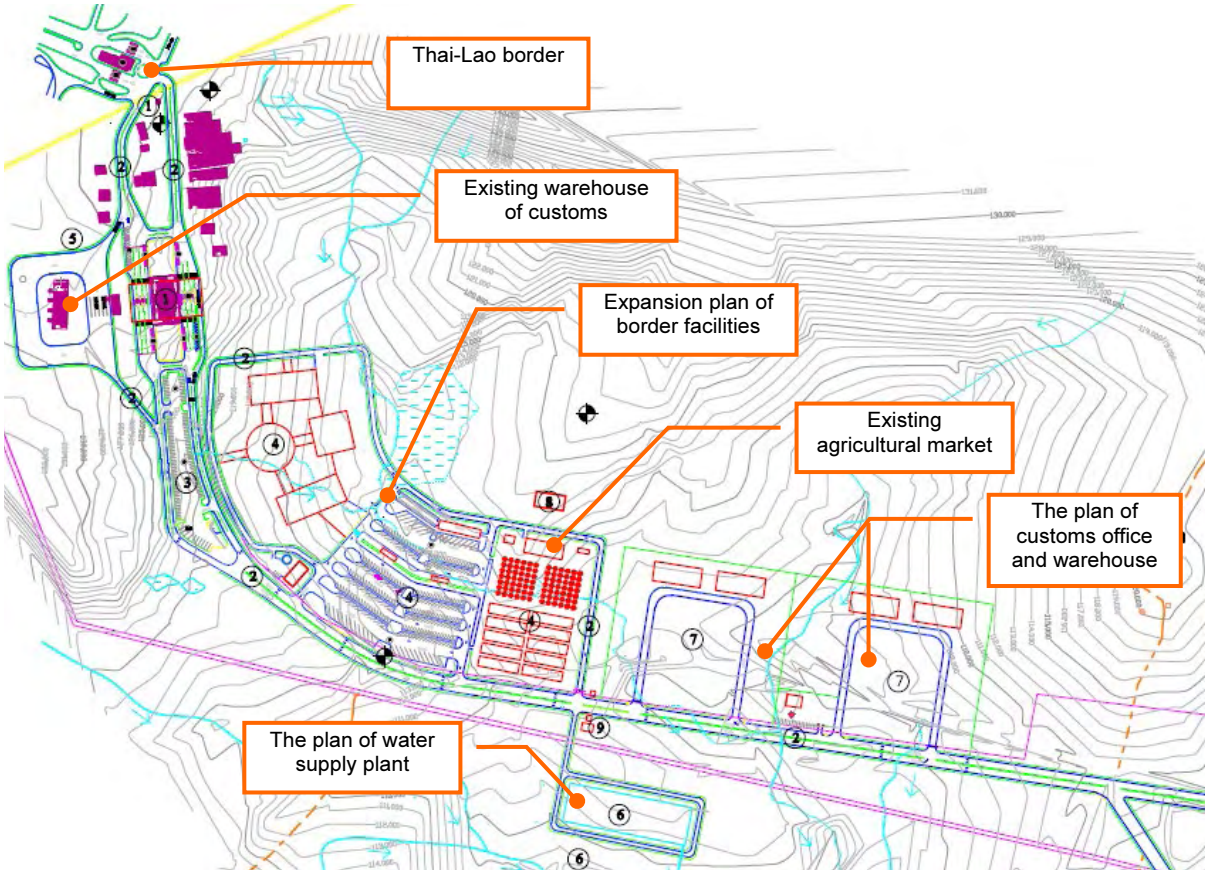
Figure 4.4.1 Alternative Locations of the CLP

(2) Physical Conditions of Optimum Location of the CLP

The existing land use and future development plan around Option 3 is illustrated in Figure 4.4.2. The following control points of physical planning were identified during the preliminary site survey by the Study Team. Considering these control points, the CLP is proposed to be developed on the eastern side of development area of border facilities, adjacent to the new customs office and warehouse.

- Development and expansion of border facilities at Champasack is planned and new customs office and new customs warehouse are to be placed in the eastern area of this development area.
- The agricultural market and power plant are to be newly installed on the western side adjacent to development area of border facilities.
- The water supply plant is newly planned and to be located on the opposite end of development area of border facilities.
- A military base exists in the north-eastern side adjacent to development area of border facilities. Based on the interviews with the local officials, this military base can be relocated for development of the CLP, if necessary.
- There aren't any existing facilities and development projects on the eastern side of development area of border facilities. There aren't any squatters in this area. Land preparation works for development of the customs office and warehouse are ongoing.

- There is a protected forest area 2 km north of NR-16, and development of the CLP does not adversely affect this protected forest area.
- The power line is installed along NR-16.
- The existing warehouse is planned to be relocated at development area of border facilities.



Source: JICA Study Team

Figure 4.4.2 Physical Conditions of the CLP

4.4.2 Layout Plan

(1) Preconditions of Layout Planning

As discussed in the previous section, the CLP is expected to provide functional and smooth operation for customers. In this regard, the following considerations were taken into account in planning the layout of the CLP:

- The distance in both traffic/freight flow and flow of the customs procedure should be minimal.
- CY and warehouse should be located in such a manner so as to maintain good connectivity by trailer and truck.
- Customs office and customs clearance area should also be located in such a manner so as to maintain good connectivity.
- Different commodities and packing types are separately handled.
- Bonded warehouses for supplying stocks should be located in a functional manner.

- Fixed temperature warehouses for agricultural products should also be set up.
- Traffic collision and congestion in/around the CLP should be minimal and appropriate parking lots, in terms of size and location, should be made available.
- There should be room for expansion of the CLP.

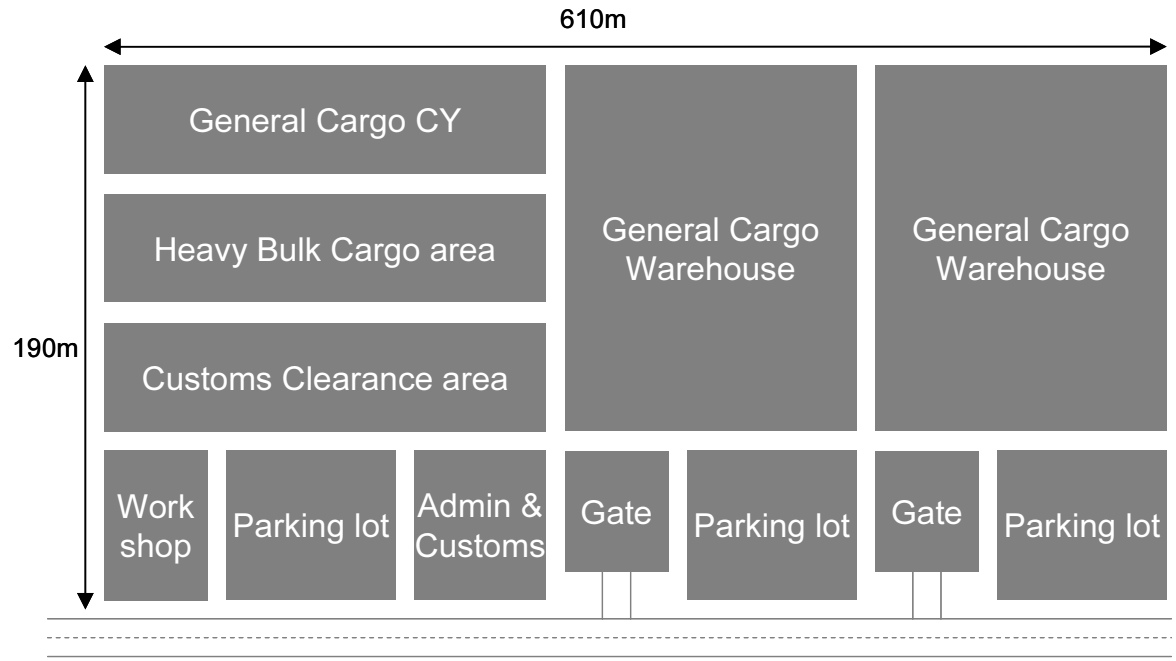
As the first step of layout planning, location of CY and warehouse should be designated. Then, heavy bulk and general cargo area should be designated to avoid collision with the cargo handled at CY and warehouse. Location of parking lots should be designated putting into consideration the location of CY and warehouse. Location of administration, customs office and customs clearance area is selected to ensure good accessibility to the customers of heavy bulk cargo area, CY and warehouse. Finally, the maintenance workshop and employees' parking lot are then set up in the remaining space.

Considering the volume of the cargo and types of the commodities handled at the CLP, the area required for development of the CLP is estimated at 11.6 ha in total (190m * 610m) and the details of this estimation of each facility are explained in Chapter 5.

(2) Layout Plan

1) Alternative A

Based on preconditions of layout planning, a layout plan of the CLP, Alternative A, was prepared as shown in Figure 4.4.3. CY, heavy bulk cargo area and customs clearance area would be located at the west-end of the project site. A general cargo warehouse would be located at the central to east-end of the project site to maintain good accessibility to both warehouses of general cargo. The administration and customs office would be located in central-west area, considering operation of customers/operators.



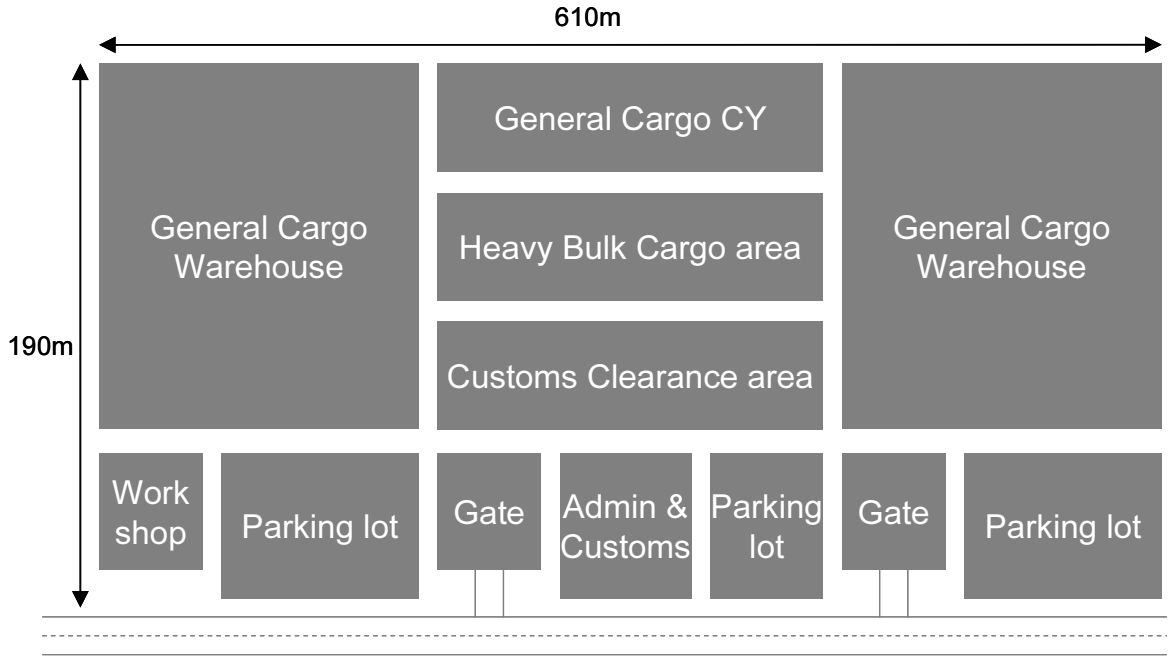
Source: JICA Study Team

Figure 4.4.3 Layout Plan of CLP (Alternative A)

2) Alternative B

A layout plan of the CLP, Alternative B, was also prepared to compare and examine efficiency of the layout of the CLP. Alternative B is a plan to emphasize workability of general cargo warehouse. CY, heavy bulk cargo area and customs clearance area would be placed in the centre of the project site as shown in Figure 4.4.4.

Comparing the layout plans of Alternative A and B, both layout plans do not significantly differ and both have pros and cons. Alternative B could minimize the flow of the customs procedures, reducing the distance between the warehouse operators, who handle a dominant amount of cargo at the CLP, and administration and customs office. On the other hand, Alternative A could allow future expansion of the CLP toward the east side of the project site. Putting future expansion of the CLP as higher priority, Alternative A was selected as an optimum layout plan of the CLP.

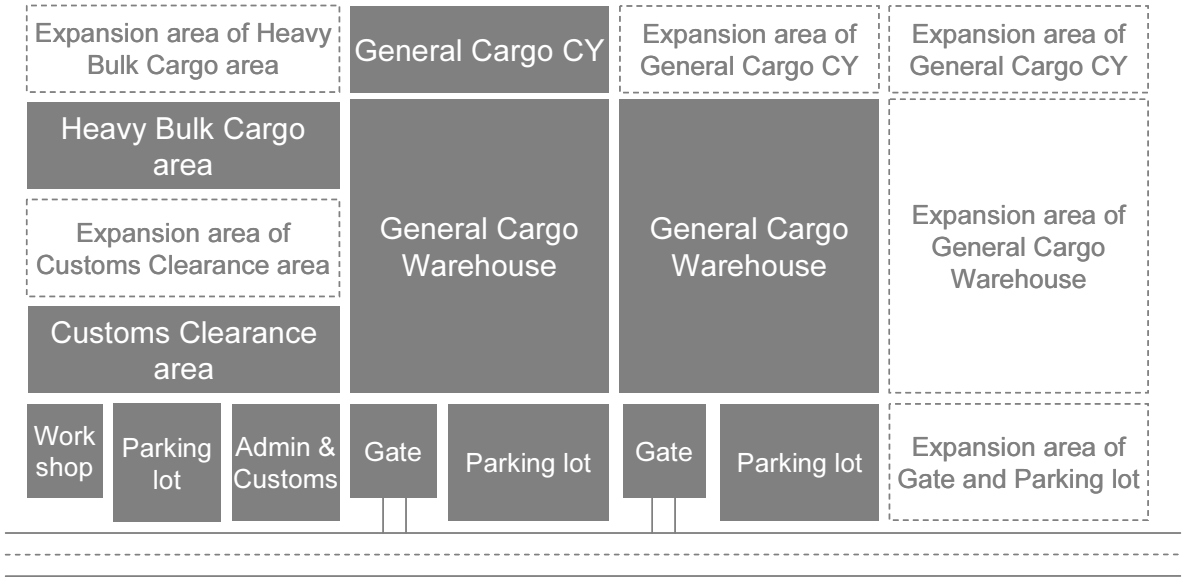


Source: JICA Study Team

Figure 4.4.4 Layout Plan of CLP (Alternative B)

4.4.3 Consideration of Further Expansion

The layout plan of the CLP, as discussed above, is prepared based on the volume of the cargo and types of the commodities handled at the CLP, with the target year of 2025. Considering availability of the land, geological features of the project site and workability of operation at the CLP, future expansion of the CLP is proposed as illustrated in figure 4.4.5.



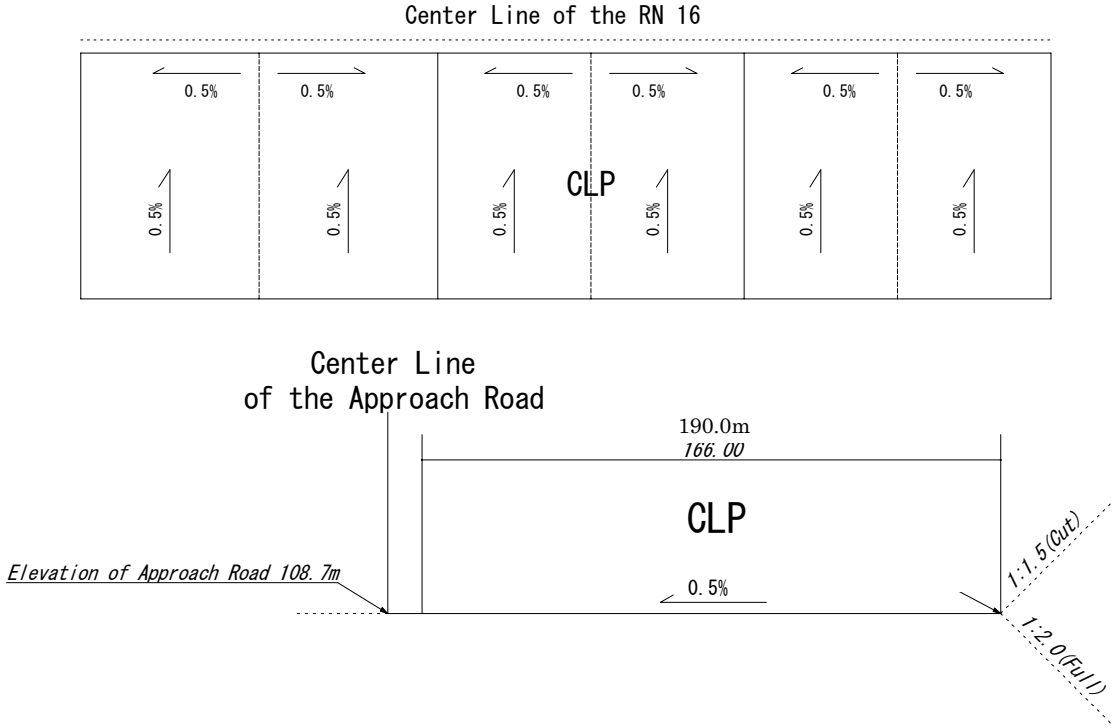
Source: JICA Study Team

Figure 4.4.5 Illustration of Future Expansion of CLP

CHAPTER 5 PHYSICAL DEVELOPMENT PLAN

5.1 Land Preparation Plan

The project site of Champasack Logistics Park (CLP) was designed to be located along the NR-16. Length and width of the CLP are 610m parallel to the NR-16 and 190m respectively. The elevation of the CLP is 108.7m on average: about the same level as the NR-16. Heavy loaded vehicles will be used for loading/unloading such that pavement thickness of 30cm (25cm of concrete and 5cm of sand) is required for development of the CLP, with additional 40 cm required for concrete pavement and installation of the lifeline. The CLP is designed with a slope of 0.5% down towards the NR-16 to discharge rainfall in CLP. Based on the interviews with the local officials, there isn't any record of flooding in/around the project site of the CLP. Figure 5.1.1 shows plan and section of land preparation for development of the CLP.



Source: JICA Study Team

Figure 5.1.1 Plan and Section of Land Preparation

Table 5.1.1 shows volume of the earthworks (both cut and fill). Volume of earthworks (cut and fill) is about 334,000 m^3 (cut) and 77,000 m^3 (fill). Nearly 0.3 million m^3 of soil excavation is necessary for development of the CLP. The soil excavated for the CLP can be utilized as construction material for development of the cross border facility and/or development of agricultural market planned near the CLP. This will be further discussed and confirmed with the

relevant authorities. Also, it should be noted that the project cost, discussed in the latter section, includes the transport cost (assuming 5 km from the project site) of the excavated soil.

Table 5.1.1 Volume of Earthworks

Earth Work	Unit	Volume
Cut	m^3	334,219
Fill	m^3	76,956

Source: JICA Study Team

5.2 Facility Plan

As discussed in Chapter 4 of this report, alternative layout concepts were tested and the project site of the CLP was proposed to be located on the eastern side of the development area of border facilities, adjacent to the new customs office and warehouse.

This section will study the facility plan of the CLP, estimating the area required for the facilities installed. These facility include custom clearance area, heavy bulk cargo area, general cargo CY area, general cargo warehouse area, container pool area, chassis pool area, parking lot, container washing area, administration and customs, operator's office and maintenance workshop. The major determinant of these facilities is the future cargo volume to be handled in the CLP. It should be noted that the annual average daily cargo volume, estimated in Chapter 4, was converted to the monthly average daily cargo volume in the peak month, by adding 50% to the annual average daily cargo volume. This average daily cargo volume in the peak month was utilized to estimate the size and design of the facility of the CLP.

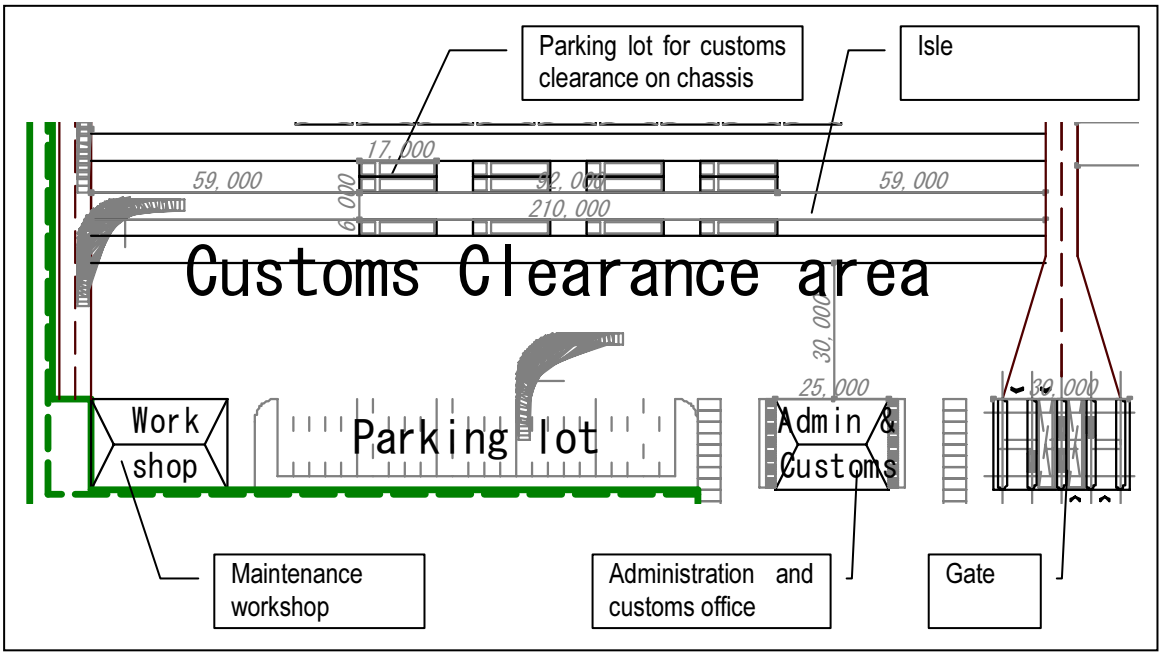
5.2.1 Custom Clearance Area

The floor area for the customs clearance area can be estimated based on the number of full loaded import and transit containers. The precondition for estimation of customs clearance area is 2 times per day as the turnover ratio. As a result, the floor area for customs clearance area was estimated as 800 m^2 in 2025. A layout of customs clearance area is illustrated in Figure 5.2.1.

Table 5.2.1 Floor Area required for Customs Clearance

		Unit	Figures in 2025	Note
Container	Import	No	11.0	A
	Transit	No	2.0	B
Fluctuation		-	1.5	C
Turnover ratio		-	2.0	D
Safe factor		-	1.2	E
Subtotal		No	12.0	F: (A+B)*C/D*E
Trailer parking lot /m^2		m^2	59.5	G
Customs Clearance area		m^2	800.0	H: F*G

Source: JICA Study Team



Source: JICA Study Team

Figure 5.2.1 Layout of Customs Clearance area

5.2.2 Heavy Bulk Cargo Area

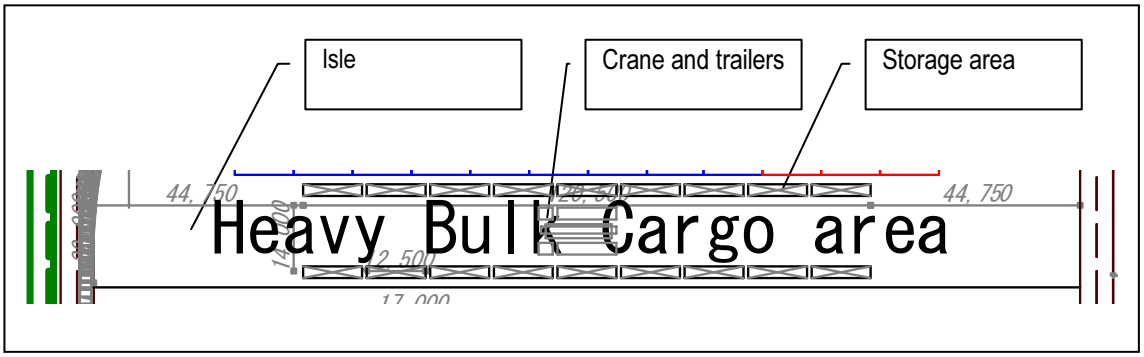
The floor area required for the heavy bulk cargo area can be estimated based on the volume of fully-loaded cargo by trailer. The precondition for estimation of heavy bulk cargo area is 3 days of temporary stock.

As a consequence, the floor area for heavy bulk cargo was estimated as 900 m^2 in 2025. A layout of heavy bulk cargo is illustrated in Figure 5.2.2.

Table 5.2.2 Floor Area required for Heavy Bulk Cargo area

		Unit	Figures in 2025	Note
Trailer	Import	No	2.0	A
	Export	No	1.0	B
Fluctuation		-	1.5	C
Temporary stock days		Day	3.0	D
Safe factor		-	1.2	E
Subtotal		No	17.0	F: (A+B)*C*D*E
Container position		m^2/No	47.3	G
Heavy Bulk Cargo area		m^2	900.0	H: F*G

Source: JICA Study Team



Source: JICA Study Team

Figure 5.2.2 Layout of Heavy Bulk cargo area

5.2.3 General Cargo CY Area

The area for general cargo CY area consists of the general cargo CY, container pool and chassis pool area.

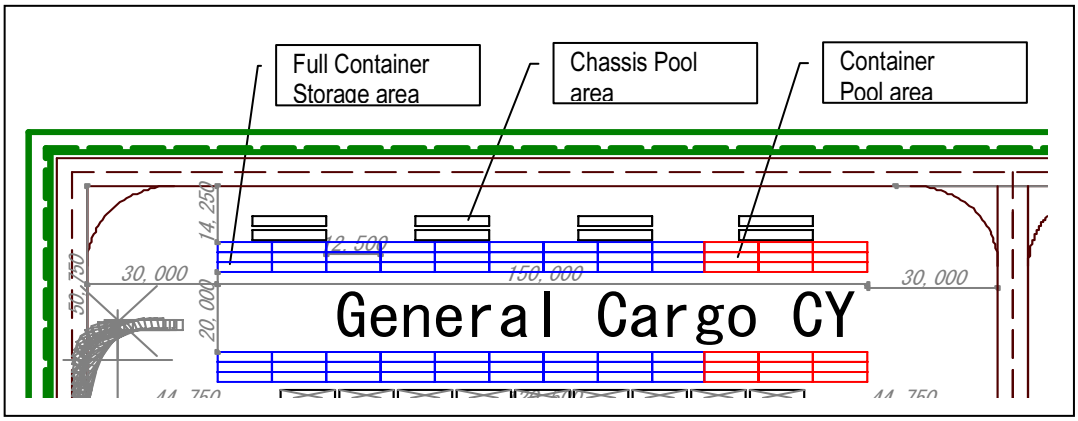
(1) General Cargo CY (Full Container)

The floor area for the general cargo CY (full container) can be estimated based on the volume of trailer cargo (import/export of general cargo and container cargo). As is the case with other types of cargo, the precondition for estimation of general cargo CY (full container) area is 3 days of temporary stock. As a result, the floor area for general cargo CY (full container) was estimated as 1,800 m^2 in 2025. A layout of general cargo CY (full container) is illustrated in Figure 5.2.3.

Table 5.2.3 Floor Area required for General Cargo CY (Full Container)

		Unit	Figures in 2025	Note
Trailer	Import	No	30.0	A
	Export	No	-	B
Fluctuation		-	1.5	C
Temporary stock days		Day	3.0	D
Safe factor		-	1.2	E
Subtotal		No	162.0	F: (A+B)*C*D*E
Container position		m^2	11.0	G, 3 stacks (13m(L)*2.5m(W)/3)
General Cargo CY area		m^2	1,800.0	H: F*G

Source: JICA Study Team



Source: JICA Study Team

Figure 5.2.3 Layout of General Cargo CY

(2) Container Pool Area

The floor area for the container pool can be estimated based on the volume of export containers. As is the case with general cargo warehouse, the precondition for estimation of container pool area is 5 days of temporary stock with 5-stack containers. As a result, the floor area for general cargo CY was estimated at 700 m^2 in 2025.

Table 5.2.4 Floor Area required for Container Pool

		Unit	Figures in 2025	Note
Trailer	Import	No	-	A
	Export	No	11.0	B
Fluctuation		-	1.5	C
Temporary stock days		Day	5.0	D
Safe factor		-	1.2	E
Subtotal		No	99.0	F: (A+B)*C*D*E
Container position		㎡	7.0	G, 5 stacks (13m(L)*2.5m(W)/5)
Container Pool area		㎡	700.0	H: F*G

Source: JICA Study Team

(3) Chassis Pool Area

The floor area for the chassis pool can be estimated based on the turnover ratio of the containers. The precondition for estimation of chassis pool area is 3 times per day as turnover ratio. As a result, the floor area for chassis pool area was estimated at 400 m^2 in 2025.

Table 5.2.5 Floor Area required for Chassis Pool

		Unit	Figures in 2025	Note
Trailer	Import	No	-	A
	Export	No	11.0	B
Fluctuation		-	1.5	C
Turnover ratio		-	3.0	D
Safe factor		-	1.2	E
Subtotal		No	7.0	F: (A+B)*C/D*E
Chassis position		㎡	51.0	G
Chassis Pool area		㎡	400.0	H: F*G

Source: JICA Study Team

5.2.4 General Cargo Warehouse Area

The floor area for the general cargo warehouse can be estimated based on the volume of trailer cargo (import/export and mix-loading). In addition, the floor area for fixed temperature storage of warehouse can be based on the volume of agricultural products (import/export and mix-loading). This fixed temperature storage is part of the warehouse facilities. Unlike other types of cargo, the precondition for estimation of general cargo warehouse area is 5 days of temporary stock. As a result, the floor area for general cargo warehouse was estimated at 12,000 m^2 in 2025. The fixed temperature storage was estimated at 6,400 m^2 in 2025. A layout of general cargo warehouse is illustrated in Figure 5.2.4.

Table 5.2.6 Floor Area required for General Cargo Warehouse

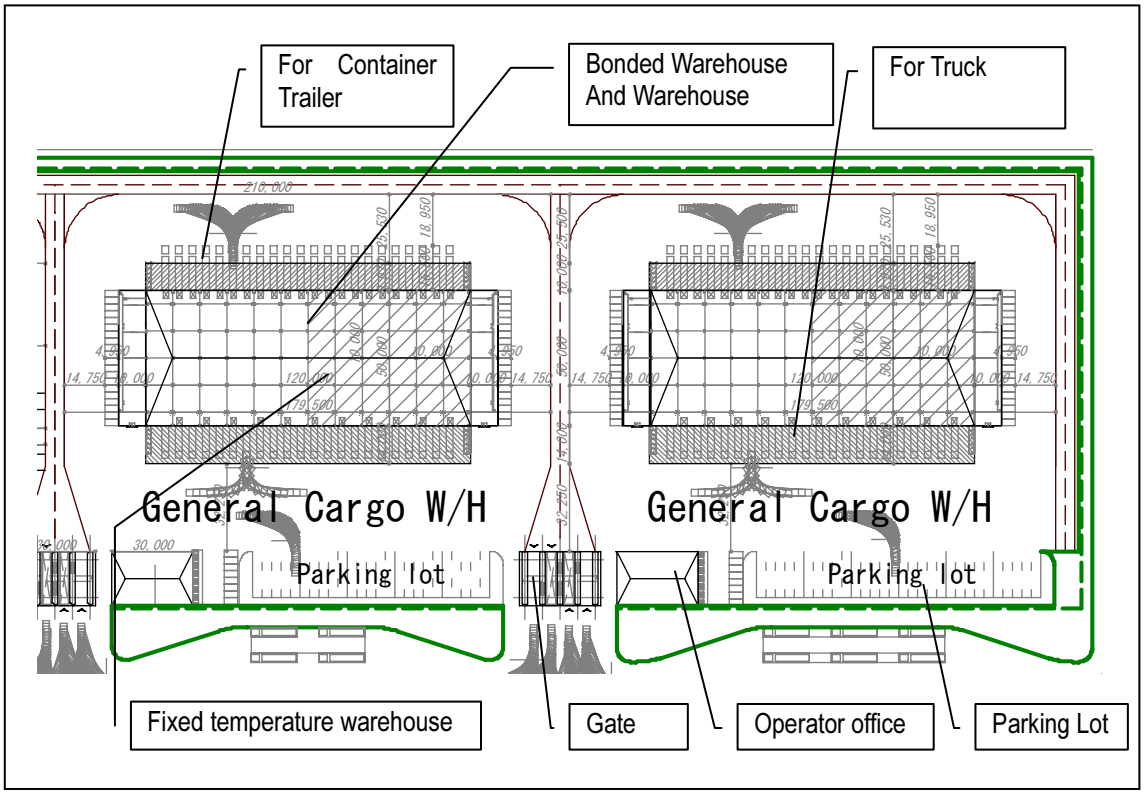
		Unit	Figures in 2025	Note
Track & container of mix loading	Import	t	102.9	A
	Export	t	123.2	B
Container of full loading	Import	t	132.2	C
	Export	t	158.2	D
	LCL	t	58.1	E:(C+D)*20%
Fluctuation		-	1.5	F
Subtotal		t	426.4	G:(A+B+C)*F
Temporary stock days		Day	5.0	H
Storage unit		㎡/t	2.6	I
Sorting unit		㎡/t	2.6	J
Safe factor		-	1.8	K
Warehouse area		㎡	12,000.0	L:(G*H*I+G*J)*K

Source: JICA Study Team

Table 5.2.7 Floor Area required for Fixed Temperature Storage in Warehouse

		Unit	Figures in 2025	Remarks
Track & container of mix loading	Import	t	9.4	A
	Export	t	109.9	B
Container of full loading	Import	t	12.0	C
	Export	t	141.1	D
	LCL	t	30.6	E:(C+D)*20%
Fluctuation		-	1.5	F
Subtotal		t	224.7	G:(A+B+C)*F
Temporary stock days		Day	5.0	H
Storage unit		㎡/t	2.6	I
Sorting unit		㎡/t	2.6	J
Safe factor		-	1.8	K
Warehouse area		㎡	6,400.0	L:(G*H*I+G*J)*K

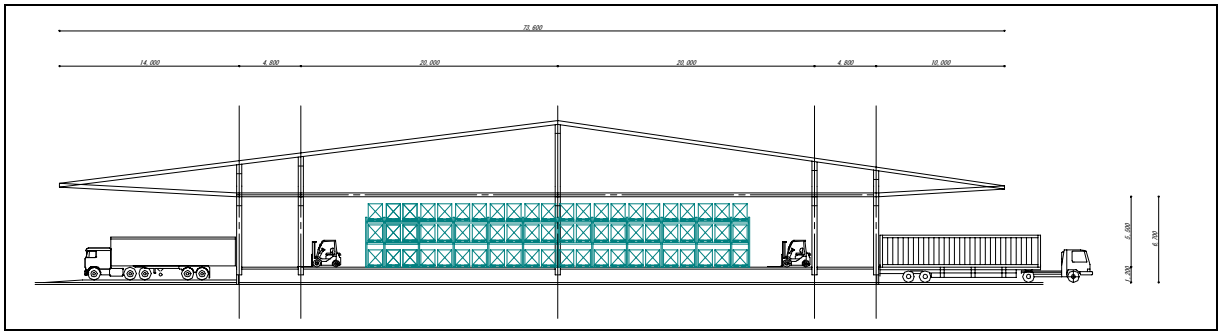
Source: JICA Study Team



Source: JICA Study Team

Figure 5.2.4 Layout of General Cargo Warehouse

The cross section of the freight station is illustrated in Figure 5.2.5 and image of the wing type truck, commonly observed in Lao PDR, is illustrated in Figure 5.2.6. In consideration of the rainy season, the length of warehouse roof should at least be 14 meters.

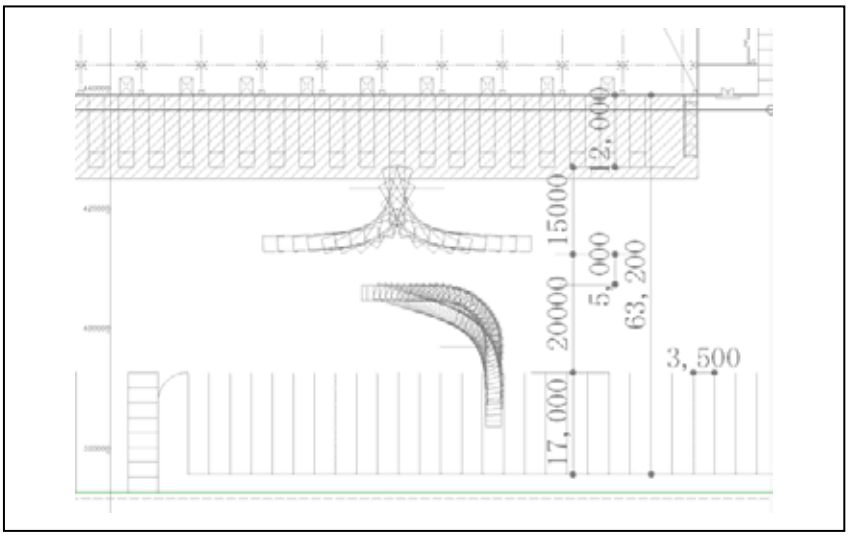


Source: JICA Study Team

Figure 5.2.5 Cross Section of Warehouse

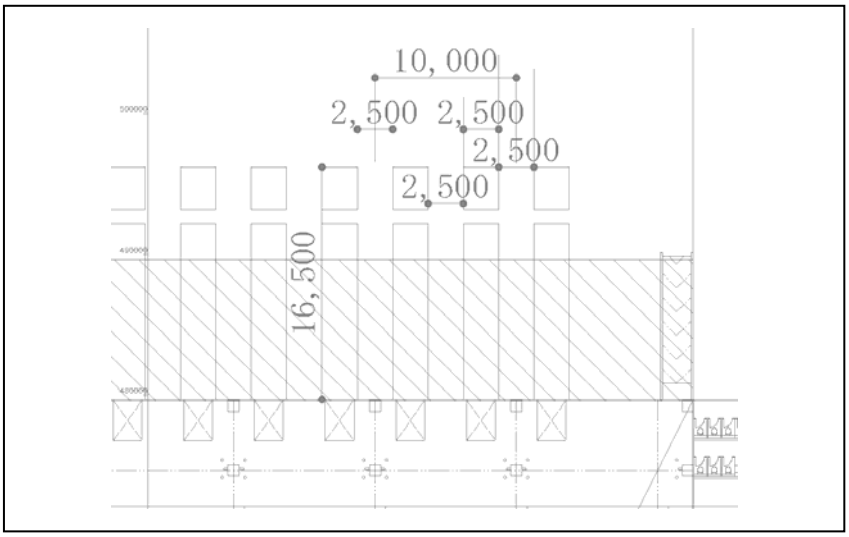
Figure 5.2.6 Image of Wing Type Truck

The turning radius of the container trailer and pickup/delivery truck and the berth size of the container trailer are illustrated in the Figures 5.2.7 and 5.2.8.



Source: JICA Study Team

Figure 5.2.7 Turning Radius of Line-haul Truck



Source: JICA Study Team

Figure 5.2.8 Berth Size of Container Trailer

5.2.5 Parking Lot Area

The floor area for the parking lots can be estimated based on the number of import/export, transit and domestic vehicles. The precondition for estimation of parking lots is 3 times per day as turnover ratio. As a result, the floor area for the parking lots was estimated at 4,800 m^2 in 2025.

Table 5.2.8 Floor Area required for Parking Lot

	Unit	Figures in 2025	Note
International=24ton/veh	No	66.0	A
Domestic=24ton/veh	No	58.0	B
Domestic=12ton/veh	No	9.0	C
Fluctuation	-	1.5	D
Turnover rate	-	3.0	E
Safe factor	-	1.2	F
Subtotal	No	80.0	G: (A+B+C)*D/E*F
Trailer parking lot /m^2	㎡	59.5	H
Parking area	㎡	4,800.0	I: G*H

Source: JICA Study Team

5.2.6 Container Washing Area

The floor area for the container washing area can be estimated based on the number of containers. The precondition for estimation of container washing area is that 10% of containers require washing and cleaning. Accordingly, the number of washing containers will be 1 FEU per day in 2015 and 6 FEU per day in 2025. Assuming 9 times a day as turnover ratio, the floor area for container washing area was estimated at 120 m^2 in 2025.

0.96h＝{0.6km × 2(round trip) ÷ 20km/h ＋ 3minite/container × 2(O/D) ÷ 60minite/h} × 6container

9ratio =8h/day ÷ 0.96h

40m^2＝6conteainer ÷ 9 ratio × 31.25m^2/container × safety factor 1.2

5.2.7 Administration and Customs

The floor area for the administration and customs office can be estimated based on the number of the workers at these offices. The precondition for estimation of these offices is that the office space per person is set at 4.5 m^2 for office use, 7.0 m^2 for conference use and an additional 40% for open spaces. The number of the workers at the administration and customs office was estimated as 59 people in 2025, considering the future cargo volume handled at the CLP. Accordingly, the floor area for administration and customs office was estimated to be 1,000 m^2 in 2025.

1,000 m^2 = (4.5 m^2/person + 7.0 m^2/person) × 59 person × 140 %

5.2.8 Operator Offices

The area for operator offices of CLP was calculated to be about 600 m^2 per operator. Two operators are expected to provide this service. The necessary area for new operator offices is about 1,200 m^2 in 2025, considering an increase in cargo.

5.2.9 Maintenance Workshop

The floor area for the maintenance workshop can be estimated based on the number of trucks. The precondition for estimation of maintenance workshop is that 10% of trucks would require maintenance. Accordingly, the number of trucks in the maintenance workshop will be 11 trucks per day in 2015 and 20 trucks per day in 2025. Assuming 2 times a day as turnover ratio, the floor area for maintenance workshop was estimated as 600 m^2 in 2025, considering an increase in cargo.

600m^2 =20 trucks ÷2 ratio × 37.5m^2/trucks × safety factor 1.5

5.2.10 Gate and Weight Station

3 gates would be installed in the CLP. A weight station would also be installed at the gate to measure cargo weight.

5.2.11 Overall Layout of CLP

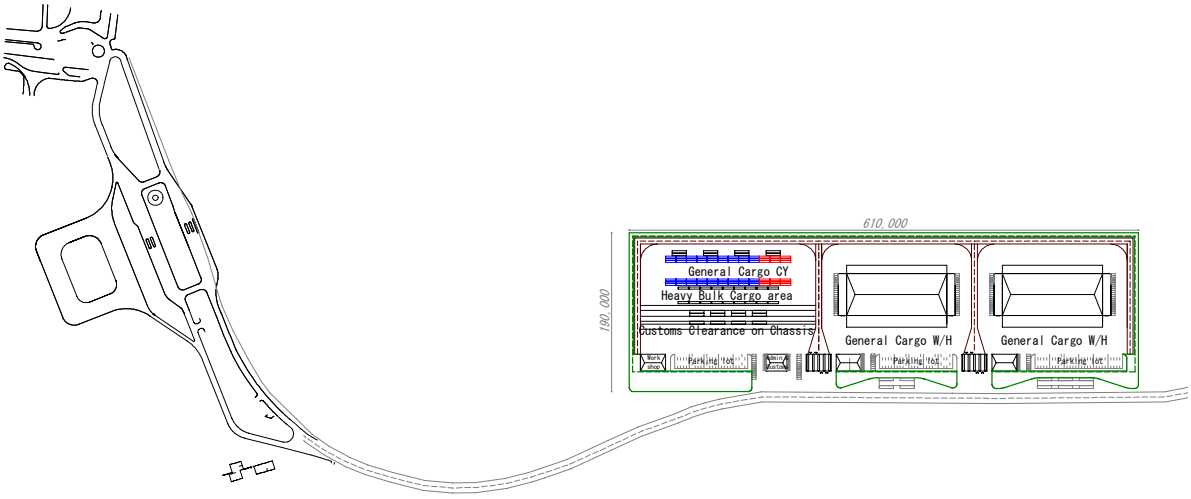
Based on the above discussion, the total area required for development of the CLP is summarized in Table 5.2.9. An overall layout of the CLP is also illustrated in Figure 5.2.9.

Table 5.2.9 Summary of Total Area required for CLP

	Floor area (m^2)	Area (m^2)	Occupancy rate at CLP	Remarks
Customs Clearance area	800	8,600		
Heavy bulk Cargo area	900	5,500		
General Cargo CY area	2,900	10,600		CY area includes CY, container pool, chassis pool and container washing area.
General Cargo Warehouse area	12,000	42,000		
Administration and Customs offices	500	3,800		2 stories: 1,000m^2.
Operator Offices	3,200	5,500		By 2 operators. Operator offices are situated near the gate and neighbor warehouse.
Maintenance shop	600	1,200		
Gate and Weight Station	600	4,400		2 operators.
Parking Lots	-	13,800		Aisle is shared under customs clearance and warehouse area. Occupancy area of parking lot is 4800 m^2.
Buffer area	-	12,700		
Load in CLP	-	7,700		
Others	-	100		
Total	21,500	115,900		
Total area, excluding parking lot	21,500	102,100	23%	

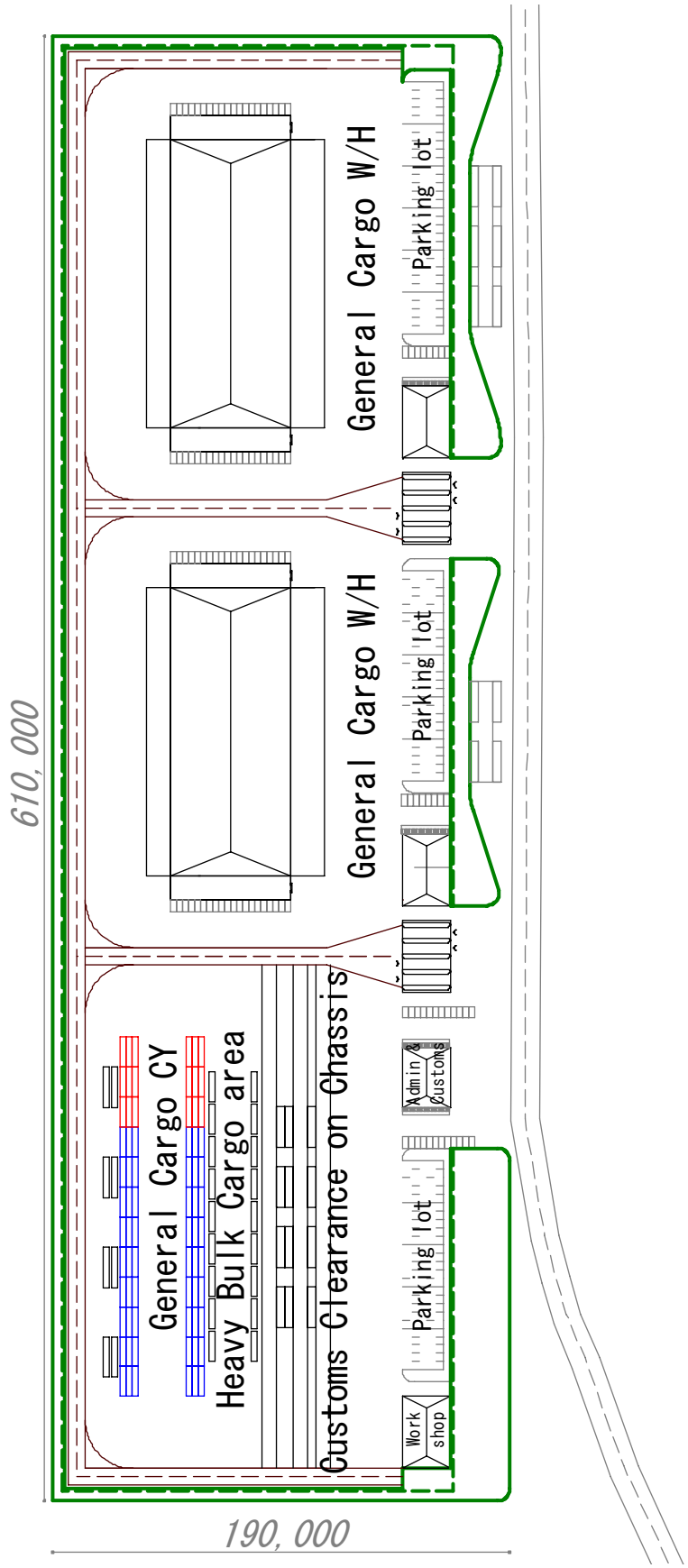
Note Referring to Hironao Takahashi, "Kontena yusou to kontena kouwan",2004, as occupancy rates of about 20% to 25% are common. The occupancy rate at Lat krabang ICD is about 26% and about 24% at the VLP Logistics Park.

Source: JICA Study Team



Source: JICA Study Team

Figure 5.2.9 Layout of CLP (1/2)



Source: JICA Study Team

Figure 5.2.10 Layout of CLP (2/2)

5.3 Machine and Equipment

5.3.1 Freight Handling Equipment

(1) Forklift

Forklifts are used for loading and unloading the cargo, mainly inside the containers. No forklifts are currently in operation at Champasack CCA. It may be necessary to provide 2 forklifts at the new CLP given that the total cargo will increase by two times by 2025. The CLP will have 2 warehouses and therefore one forklift could be used at each warehouse.

Source: JICA Study Team

Figure 5.3.1 Snapshot of Forklift

(2) Reach Stacker

Reach stacker is a heavy-duty vehicle used for loading and unloading by carrying the container itself to the CY. At present, there isn't any container crane observed at Champasack CCA. The estimated number of container reaches 40 FEU per day by 2025. Accordingly, it would be necessary to provide 1 reach stacker at the new CLP as shown below.

1 vehicle = 40 container × {(3minute /loading +3minute/unloading)÷60minute/h +75.0m/CY×2 round trip÷15,000m/h}×safe factor 1.2 ÷10h/day

Source: JICA Study Team

Figure 5.3.2 Snapshot of Reach Stacker

(3) Crane

A crane is also a heavy-duty vehicle used to carry heavy bulk cargo from one vehicle to another. Currently, Champasack CCA has no cranes. Although the handling volume of heavy bulk cargo at the CLP is forecasted to increase by 4 times by 2025, one crane is proposed to be provided at the CLP.

Source: JICA Study Team

Figure 5.3.3 Snapshot of Crane

(4) X-ray Inspection Apparatus

A few types of imported containers need to be X-rayed for inspection of the cargo. The X-ray will be placed near the customs office at CLP.

Source: JICA Study Team

Figure 5.3.4 Snapshot of the Car for X-ray Inspection (mobile X-ray)

(5) Weight Station

One weight station will be placed near the gate to check both outgoing and incoming trucks.

Source: JICA Study Team

Figure 5.3.5 Snapshot of Weight Station at Thanaleng ICD

5.4 Infrastructure and Utility Plan

5.4.1 Water Supply

The average consumptions of water for domestic use and container washing are estimated at 100 liter/person/day for CLP staffs and 150 liter/container for container washing. The number of staff and containers was estimated as tabulated below based on the future cargo volume in 2025. The consumption volume of water in CLP is, accordingly, estimated at 16.6m^3 per day. Considering water leakage (20%) and peak factor (1.2), 24.9m^3/day of water is needed in the CLP.

Table 5.4.1 Number of Staff, Truck and Container

Items		Number	Remarks
Staff	Custom	59	
	Operator	98	2 operation companies
	Total	157	
Container		6	

Source: JICA Study Team

Table 5.4.2 Volume of Daily Water Consumption

Items	Unit Volume	Number	Volume (m^3/day)
Staff	100lt/staff/day	157	15.7
Container	150lt/container/day	6	0.9
Total			16.6

Source: JICA Study Team

Table 5.4.3 Daily Water Demand

No.	Item	Volume (m^3/day)
1	Water Demand	16.6
2	Water leakage (20 %) = 1/(1-0.2)	20.75
3	Peak Factor (1.2) = 2x 1.2	24.9
4	Water Demand Forecast	24.9

Source: JICA Study Team

A water reservoir with a pump would have to be installed under the ground of the CLP. The recommended volume of a reservoir is above 9m^3 (8hour operation per day: 24.9/3=8.3m3≒9m^3).

No water supply pipe exists in the area surrounding the CLP. People living near the CLP use ground water as drinking water. A future plan for water supply to the CLP does not exist at present. Therefore, the CLP would have to contain a water supply facility at the site. A well of 20m depth having a pump and a water purification facility would be installed in the CLP.

Hydrants are provided within 50 meters around the building.

Table 5.4.4 Water Supply Facility

Item		Quantity	Remarks
Well	20m depth	1	With a pump and a purification plant
Water Pipe	Φ15	800m	Within CLP
Water Reservoir	9m^3	1	Within CLP

Source: JICA Study Team

5.4.2 Electricity

An existing high voltage 22kV line is located about 300m west of the CLP. Electricity to the CLP would be supplied from this 22kV line. A new 300m long 22kV line connecting the existing 22kV line and the CLP would be installed 5 to 6m above the ground and new 400m long 22kV line would be installed under the ground in the CLP. A transformer would have to be installed at three administration and operation buildings to drop the voltage from 22kV to 400/200V. A total length of about 2km long 400/200V line would be installed under the ground.

Table 5.4.5 Electricity Facility

Item		Quantity	Remarks
22kV line	Above the ground	300m	Between existing line and CLP
	Under the ground	400m	Within CLP
400/200V line	Under the ground	2,000m	Within CLP
Transformer	22kV to 400/200V	3	Within CLP

Source: JICA Study Team

5.4.3 Telecommunications

One administration office and two for operators will be installed at the CLP. Each office would have 2 fixed telephone lines and an Internet connection. The telephone lines would be extended to connect to the existing line installed near the station. The length of the new telephone lines will reach about 500m.

5.4.4 Drainage

The drainage system is designed to discharge into the existing waterway for agriculture located near the CLP. U-shaped concrete ditches with concrete covers would be installed along roads to collect rainwater within the CLP. A reinforced concrete ditch is preferred since the axle loads of the trailers and trucks with the cargo tends to be large.

Volume of flood discharge estimates and capacity of drainage were calculated based on the Road Design Manual (Provisional Use) issued by the former Ministry of Communication Transport Post and Construction, 1996. The flood discharge was estimated using the following equation:

$Q = 1/360 \times C \times I \times A$ (Rational Formula)

Where:

Q: Expected flow (m^3/sec)

C: Run-off coefficient

I: Intensity of Rainfall (mm/hr)

A: Area for drainage (ha)

C: Concrete 0.9 (0.80-0.95), Forest 0.45 (0.4-0.5)

I: 75mm/h (5 or 10 minute storm with a return period of 2 years)

Capacity of drainage was estimated using the Manning Striker formula.

$Q = K \times A \times R^{2/3} \times S^{1/2} = A \times V$

Where:

Q: Discharge (m^3/sec)

A: Cross section of flow area (m^3/sec)

R: Hydraulic radius = A/WP where WP is the wetted perimeter of flow area (m)

V: Water velocity (m/sec)

S: Longitudinal slope of flow

K: Roughness factor (1/n)

n: Roughness coefficient (concrete: 0.015)

The total length of drainage by size is shown in Table 5.4.6.

Table 5.4.6 Length of Drainage by Size

Drainage Size	Length (m)	Remarks
500 x 500	1,080	U-shaped reinforced concrete with cover
700 x 700	120	U-shaped reinforced concrete with cover
900 x 900	940	Includes discharge drainage to existing facility

Source: JICA Study Team

5.4.5 Sewage Treatment

A centralized sewer treatment system was adopted considering environment for not only the CLP but also its surrounding area. This sewage collection system was designed to collect only wastewater from domestic sewage (24.9m^3/day of wastewater from staff in the CLP). Wastewater generated from each building would gravitate towards the treatment plant installed in the CLP.

The sewage treatment volume was estimated at 90% of the water supply volume. Seepage/ encroachment of ground water into sewage pipe was also considered.

Q = Q1 x 90% x 1.1

Where:

Q: Sewage Volume (m^3/day)

Q1: Water volume (=24.9m^3/day)

1.1: Encroaching ration

Q : 24.9 x 0.9 x 1.1 = 24.651 ≒25m^3/day

The treated wastewater would be discharged into the existing waterway for agriculture. The water quality required is as follows:

Table 5.4.7 Water Quality

Parameter	Wastewater (mg/l)	Treated Water (mg/l)
BOD	200	20
SS	250	50

Source: JICA Study Team

Figure 5.4.1 Sewerage Treatment Facility

The facilities and quantity of this centralized sewerage treatment system are summarized below.

Table 5.4.8 Facilities of a Centralized Sewerage Treatment System

Item		Quantity
Drain Pipe	ϕ150	800m
Sewerage Treatment Tank	25m^3/day	1 piece

Source: JICA Study Team

5.5 Project Cost

Project cost consists of construction cost, administration cost, consultant cost and contingency. These costs were estimated as of November 2009, and the following exchange rate was applied.

USD1.00=JPY93.57=LAK8506.61 =THB33.84

Construction of CLP consists of land preparation works, building works, railway works and access road works. Table 5.6.1 shows individual and total construction costs. Construction costs of land preparation works and building works were estimated to be around USD5.2 million and USD7.0 million, respectively. Total construction cost is thus around US$12.2 millions.

Taxes such as import tax and value added tax were not included in the Project Cost. The Article 52 of Law on Investment Law (2010) sets incentives of import tax and other tax. Materials and equipment for Logistics Parks are included in the incentives. The Article 10 of Law on Value Added Tax sets incentives regarding materials and equipment for aid projects. This process is not tax refund but tax exemption.

Administration cost and consultant cost were estimated as 3% and 7% of total construction cost. And contingency was estimated as 10% of the sum of the construction cost and the consultant cost. As a result, administration cost is USD 367,000, consultant cost is USD 857,000, and contingency is USD1.3 million. Total project cost is thus USD 14.8 million.

Table 5.5.1 CLP Project Cost

Items		Total Cost	Foreign Portion and Local Portion			Remarks
			Foreign	Local	Local	
		(USD)	(USD)	(USD)	(LAK1000)	
1	Land Preparation Works	5,223,975	3,046,799	2,117,176	18,520,387	
2	Building Works	7,017,760	5,321,820	1,695,940	14,426,700	
3	Total Construction Cost	12,241,735	8,368,619	3,873,116	32,947,087	1+2
4	Administration Cost	367,252				3% of 3

Items		Total Cost	Foreign Portion and Local Portion			Remarks
			Foreign	Local	Local	
		(USD)	(USD)	(USD)	(LAK1000)	
5	Consultant Cost	856,921				7% of 3
6	Contingency	1,309,866				10% of 3+5
7	Total Project Cost	14,775,774				3+4+5+6

Source: JICA Study Team

Table 5.5.2 CLP Project Cost (Civil Works)

Item		Unit Cost (US$)		Quantity	Amount (US$)	Remarks
Preparatory Works		0.26	/m2	115,900	30,134	Site cleaning and grubbing
Earthworks	Excavation	1.50	/m3	334,219	501,329	Sand with Soil
	Filling	4.50	/m3	76,956	346,302	Sand with Soil
	Slope Protection	2.50	/m2	6,230	15,575	Grass
Pavement	within LP （t=25cm）	50.00	/m2			Reinforced Concrete Pavement (thickness=25cm)
	within LP （t=15cm）	35.00	/m2	78,717	2,755,095	Reinforced Concrete Pavement (thickness=15cm)
	Road within LP	30.00	/m2	7,658	229,740	Asphalt Concrete Pavement (thickness=10mm+30mm+30mm)
Utilities	Drainage I	300.00	/m	940	282,000	U-shaped Reinforced Concrete Ditch with Cover (900x900)
	Drainage II	250.00	/m	120	30,000	U-shaped Reinforced Concrete Ditch with Cover (700x700)
	Drainage III	200.00	/m	1,080	216,000	U-shaped Reinforced Concrete Ditch with Cover (500x500)
	Drain Pipe	30.00	/m	800	24,000	VP ϕ＝150mm
	Centralized Treatment	30,000.00	/piece	1	30,000	Treatment Volume:25m^3
	Well	30,000.00	/m	1	30,000	20m deep with a pump and a purification plant
	Water Tank	50,000.00	/piece	1	50,000	Underground, Volume:9m^3
	Water Pipe	15.00	/m	800	12,000	VP ϕ＝15mm
	Electricity (Line I)	100.00	/m	300	30,000	22kv line (underground within CLP)
	Electricity (Line II)	20.00	/m	400	8,000	22kv line (overhead outside CLP)
	Electricity (Transformer)	28,000.00	/piece	3	84,000	Transformer （22kv to 400 v /220v） , 1000KVA
	Electricity (Line III)	80.00	/m	2,000	160,000	400v/220v line （underground within CLP）
	Electricity	950.00	/piece	95	90,250	Streetlight
	Telecommunication	120.00	/m	500	60,000	Fiber Optic Cable
Green	Grass	3.00	/m2	12,625	37,875	
	Tree	5.00	/m2	12,625	63,125	
Others	Fencing	100.00	/m	1,386	138,550	H＝1.7m～2.0m
Total of Civil Works					5,223,975	

Source: JICA Study Team

Table 5.5.3 CLP Project Cost (Building Works)

Item	Description	Unit Cost (US$/m2)	Quantity (m2)	Amount (US$)
Warehouse (FS)	Slate Structure High-rise Floor Load=3t/m2 H=5.5m from Floor Shutter Slope for a fork lift	220.0	6,000.0	1,320,000.0
Warehouse (FS)-fixed temperature	Slate Structure High-rise Floor Load=3t/m^2 H=5.5m from Floor Shutter Slope for a fork lift	660.0	6,000.0	3,960,000.0
Operator office	Slate Structure	250.0	3,200.0	800,000.0
Administration	Reinforced Concrete	250.0	1,000.0	250,000.0
Gate	Reinforced Concrete	200.0	600.0	120,000.0
Maintenance Workshop	Slate Structure	110.0	600.0	66,000.0
Parking	with Roof	80.0	272.0	21,760.0
Weighbridge		120,000.0	4.0	480,000.0
Total of Building Works			17,400.0	7,017,760.0

Note: The figures shown above is not identically same to those summarized in Table 5.2.9 because the first figures show is estimated based on the actual layout plan and the latter shows the minimum area required for each facility.

Source: JICA Study Team

CHAPTER 6 MANAGEMENT AND OPERATION PLAN

This chapter aims at delineating the overall management and operation scheme of Champasack Logistics Park (CLP) through ascertaining various tasks required for management and operation of CLP.

6.1 Action-plan for success of CLP

The proposed CLP will be a public inter-modal facility to cater for both road and rail transport. It will also serve as a cross border facility to provide CIQ service. CLP will also be a key facility in supporting the manufacturing sector in Champasack Province by providing transport, warehousing, trans-loading and inventory management services. CLP will, in addition, serve as a unique facility in stimulating logistics business in Champasack through provision of certain privileges. In this regard, CLP should be recognized not only as a business-oriented facility but also as a strategic facility in the national logistics development in Lao PDR. The success of CLP is crucial in realizing logistics policies such as reduction of transport costs, smooth and stable crossing of borders as well as maintenance of self-reliance. The following 3 words will be crucial in achieving success:

- Collaboration
- Efficiency
- Stimulation

CLP will serve multi-functions such as CIQ, truck transport and private logistics businesses, such that it is vital for CLP development to involve several governmental agencies and private companies. In this regard, "**Collaboration**" among the stakeholders will be an indispensable aspect in the establishment, management and operation of CLP.

On the other hand, "**Efficiency**" indicates several efficiencies to be realized in CLP. CLP firstly should be the facility to offer efficient logistics services in terms of speed, safety and security, reliability and cost. For this purpose, CLP must be a financially efficient business to provide for the private sector. It is of great importance for CLP to ensure private involvement in order to realize efficient services in CLP.

Private involvement, in particular involvement of foreign logistics company/investor is indispensable in realising high quality logistics services in CLP. "**Stimulation**" measurements for foreign investment should be taken into account. There are two incentives for CLP. The first is to apply the SPEZ system, which is drafted in "Law of Investment Promotion". Investment in designated areas such as the SPEZ would benefit from several tax privileges. The second incentive would be to designate CLP as Common Control Area (CCA). The Single Stop- Single Window service would be provided at CLP.

6.2 Project Formulation

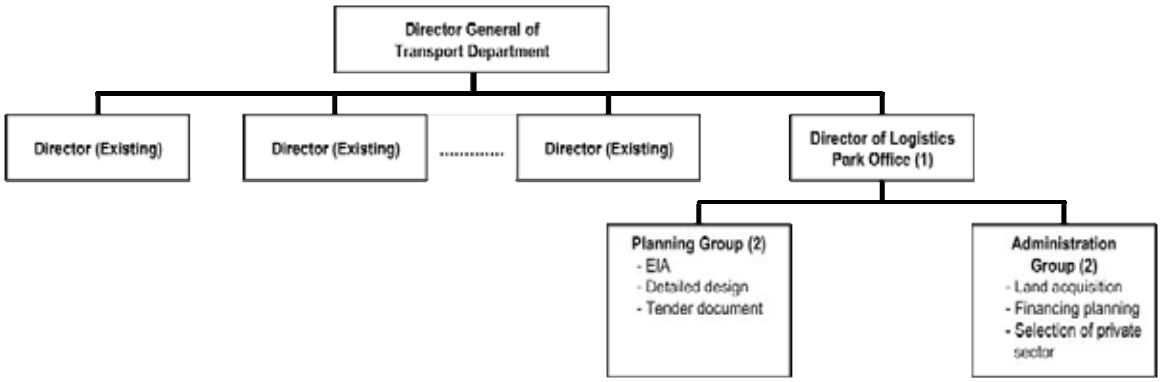
Prior to the establishment of CLP, there are several important activities that should be undertaken to ensure realization of CLP. Below, they are expounded upon:

6.2.1 Establishment of CLP Office in MPWT

There are many actions required to be undertaken to aid the formulation of the CLP as a project. The Department of Transport under MPWT has been responsible for taking care of the CLP project thus far. However, there isn't any permanent office such as a secretariat office to take care of the CLP. It is of great necessity to set up a CLP office or CLP unit that is entirely dedicated to project formation activities for the CLP. The tasks that would be handled by the specialist office include:

- EIA
- Detailed design and tender documentation
- Financing planning
- Tender management
- Development of CLP management plan in details
- Selection of private investors

The CLP office would be a new section in the MPWT dedicated to the CLP project for limited time basis until the completion of construction of the CLP. The office would have 1 director who would be at the same level as the existing directors under the Director General of Transport Department. Underneath this director in the organization chart would be 2 work groups, namely: the administration group; and the technical planning group as shown in Figure 6.2.1. The total number of personnel in the CLP office would be 5 persons.



Source: JICA Study Team

Figure 6.2.1 CLP Office in MPWT

6.2.2 Designation of CLP as Specific Economic Zone (SPEZ)

The Lao government consolidated foreign investment law and domestic investment law, and

issued "Law on Investment" in July 2009. The law aims at providing several incentives for the investment into designated areas such as Specific Economic Zone (SPEZ) and Special Economic Zones[1] (SEZs) as well as setting general procedures for concession and project investment. Both the SEZ and SPEZ are approved and managed by the national steering committee which consists of the Deputy Prime Minister, Minister of Planning and Investment, Minister of Industry and Commerce, Minister of Public Works and Transport, Minister of Finance, Minister of Justice and Vice Minister of National Land and Management Authority. The Secretariat for the committee is established at the Ministry of Planning and Investment.

CLP Office in MPWT should make all necessary endeavours to designate CLP as SPEZ to improve its attractiveness to private investors. Since the new investment law stipulates that SPEZ will include logistics parks as well as industrial estates and tourism complexes, it is quite likely that the CLP will be designated as a SPEZ. However, the Decree on Special Economic Zones is still under preparation: therefore the kinds of conditions under which the designation of SPEZ are assigned are not yet defined.

In case the CLP is not designated as a SPEZ, it might not have bonded function. This would also complicate the investment procedures for tenants entering the CLP.

6.2.3 Designation of CLP as a Common Control Area (CCA)

CCA is a fundamental scheme which provides the Single Stop-Single Window service at the designated Indochina corridors. The function of cross border procedure at CLP will be a fundamental service of the CLP and is a potential aspect that will add more value to CLP. The CLP could be designated as a CCA so as to offer Single Stop-Single Window service in future, under the existing bilateral agreement on cross border transport with Thailand. However, this may necessitate long discussions with Thailand as well as managing the complicated coordination between concerned government agencies in Lao PDR. Having considered those aspects, the designation of CLP as a CCA would be valuable in securing volume of handling goods and foreign investment until free trade is realized within ASEAN.

6.3 Organization Plan

6.3.1 Participants

CLP is multi-modal facility with multi-service capacity including CIQ, warehousing and trans-loading, inventory management, etc. CLP accordingly needs several participants to smoothly provide such services. In this regard, the involvement of the following organizations would be required in the CLP:

Project Owner:	Owner of Champasack Logistics Park who will develop or give concession to private entity to develop CLP, and take initiative to coordinate with relevant government agencies

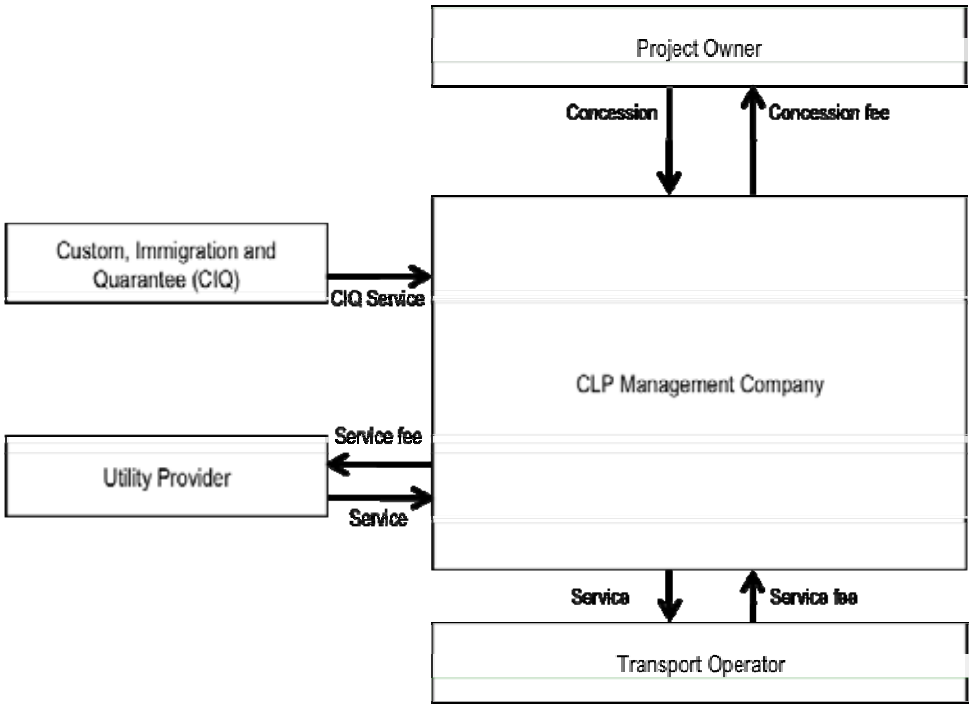
[1] In the new law, SEZ is defined as an area which is more than 1000 ha, and independent economic and financial system with special incentive(s), and SPEZ is defined as areas such as industrial zone, export promotion zone, tourism zone, ICT development zones and national border zones. Both SEZ and Specific Economic Zones are designated by the Government of Lao PDR.

CLP SPEZ Management Committee:	A committee consisting of CLP-MC, project owner, Champasack Province, MPWT to supervise CLP as SPEZ.
Champasack Logistics Park Management Company (CLP-MC):	A third party to be responsible for total operation and maintenance services for CLP, contracted by project owner under the laws of Lao PDR
Transport Operator	A company to utilize CLP to handle their goods at the module of a tenant
CIQ provider:	Custom, Immigration and Quarantine office
Utility Provider:	An authority to provide utility services such as electricity supply, water supply and telecommunications
Ministry of Planning and Investment (MPI):	Major role in designating CLP as SPEZ

6.3.2 Overall Organizational Structure

CLP-MC will be contracted by the project owner and will operate and maintain CLP as the representative of the project owner following the direction of the project owner. Management of CLP contains various tasks. Some of them will be performed by CLP-MC, while the other will be contracted out by CLP-MC to appropriate service providers. Actual logistics business will be carried out by tenants of CLP, who will be selected by the CLP-MC.

The overall organization of the CLP management is illustrated in Figure 6.3.1.



Source: JICA Study Team

Figure 6.3.1 Overall Management Structure of CLP

6.3.3 Project Owner

(1) Function of Project Owner

The project owner is an authority to plan, develop and manage CLP in planning, construction and management and operation periods. The project owner should maintain authority as follows:

- Own land and facilities in CLP
- Give CLP policy
- Select and supervise CLP-MC
- Give concurrence on selection of tenants to CLP-MC.

(2) Potential Candidate of Project Owner

The proposed CLP will be a public inter-modal facility to cater for both road and rail transport. It will also serve as a cross border facility to provide CIQ service. CLP will also be a key facility in encouraging logistics-oriented business in GMS through facilitation of international logistics. Furthermore, CLP will act as a key facility in supporting the industrial sector in Champasack through provision of transport, warehousing, trans-loading and inventory management services. In this regard, CLP should be recognized as not only a business-oriented facility but also as a strategic facility in national logistics development in Lao PDR. It is thus only natural and fitting that the project owner of VIP be a governmental agency. As potential project owner, first refusal should be given to the **Ministry of Public Works and Transport (MPWT)**, which is responsible for administration of cross border facilitation as well as transport and logistics. MPWT should directly manage the CLP so as to sustain its own development strategy.

On the other hand, there are some considerable potential candidates for the role of project owner such as Ministry of Planning and Investment (MPI), Ministry of Industry and Commerce (MOIC), Ministry of Finance (MOF) and Champasack Province. According to the new “Law on Investment Promotion”, the Ministry of Planning and Investment (MPI) plays a major role in the approval and management of SEZ and SPEZ. MPI has a relationship with CLP which is designated as a SPEZ at this point. Besides, the Ministry of Industry and Commerce (MOIC) has previous experience in managing the ICD at Thanaleang as project owner. MOIC may have acquired certain know-how in the supervision of concession scheme of the ICD business. The Ministry of Finance (MOF) is the current project owner of Thanaleang ICD, namely “Thanaleang Warehouse State Enterprise”. MOF may also have acquired certain know-how in the supervision of the ICD business from this experience. Having MOF as the project owner would carry the extra advantage of being able to manipulate custom procedures at the CLP to allow for flexibility since the CLP would fall directly under its responsibility. Lastly, the Champasack Province is a candidate for the role of project owner of CLP.

Among these organizations, MPWT, Ministry of Finance and Ministry of Industry and Commerce have the potential to develop and operate CLP as shown by the analysis of rationale of each potential project owner in Table 6.3.1. Although the project owner would be determined by evaluation of these ministries, the JICA Study Team proposes the MPWT as being the most appropriate organization for the role of project owner given its recent activities such as playing a leading role in the formulation of logistics policy among the ministries and in the CBTA meetings.

Table 6.3.1 Rationale of Potential Project Owner

Potential Project Owner	Rationale	Advantage	Disadvantage
Ministry of Public Works and Transport (MPWT)	• Public agency • Responsible for transport, logistics and cross border transport	• Will reflect national logistics policy/strategy to CLP management • Know-how to manage project implementation	-
Ministry of Planning and Investment	• Public agency • Major role in approving and managing SEZ and SPEZs	• Approve and manage SPEZ • Harmonization with policies on SEZ and SPEZ	• No experience in similar project • No responsibility for road transport and facility management
Ministry of Industry and Commerce	• Public agency • Experience in managing Thanaleang ICD with Concession scheme	• Project experience • Harmonization with industrial development	• Limited knowledge/ involvement in CLP project • Limited influence in transport and logistics business society
Ministry of Finance	• Public agency • Experience in managing Thanaleang ICD with Concession scheme	• Authority to manage customs • Project experience • Harmonization with improvement of Customs	• Limited knowledge/ involvement in CLP project • Limited influence in transport and logistics business society
Champasack Province	• Public agency • Near project site	• Easy legal process as regards project land • Experience in infrastructure and utility development, and land development project with concession	• Limited knowledge/ involvement in CLP project • Limited experience in similar project • Limited influence in transport and logistics business society

Source: JICA Study Team

6.3.4 CLP Management Company (CLP-MC)

(1) Functions of CLP-MC

The CLP-MC is a single management and operation body of CLP. CLP-MC will carry out actual logistics works in CLP as well as being responsible for maintenance of utility and infrastructure and safety as well as security and environment of CLP. Below are the fundamental functions of CLP-MC.

1) General Affairs

As a single organization of CLP, the CLP-MC would have to serve a function as administrator and secretariat of business entity by performing the following major tasks:

- Billing and Accounting
- Procurement and contract management
- Personnel affairs; and
- Legal matters and public relations.

2) Asset Management

CLP-MC would be responsible for maintenance and operation of infrastructure, utility and buildings in CLP such as:

- Maintenance of infrastructure, utility and buildings in CLP

- Implementation of drainage, sewerage treatment and solid waste disposal service.

3) Environment Monitoring

CLP-MC would also be responsible for environmental monitoring and protection of CLP by performing the following major tasks:

- Development of environmental monitoring plan
- Periodical environmental monitoring
- Issue of cautions, recommendations and orders to improve environment.
- Report of results of environmental monitoring to WREA.

4) Safety and Security

CLPMB would be responsible for safety and security in CLP. The CLP-MC will provide:

- Security service at CLP
- Coordination with all tenants, the concerned government agencies and local authorities to cope with any natural disaster and emergency.

(2) Potential Candidates of CLP-MC

CLP requires high quality logistics service to support the industrial sector in Champasack Province. The CLP-MC would not be the actual logistics service provider for the transport operators but would be required to generate good business environment for tenants and transport operators and avert any clear trouble in CLP quickly and reasonably. High skill of business management and operation are accordingly required of the CLP-MC, such that private sector involvement is requisite for the role of CLP-MC. For the private involvement, there are several options such as:

- Concession to private sector
- Joint venture between project owner and private sector
- State enterprise
- Project owner

The method of concession to private sector has the most potential and is the most reliable in selecting the most capable entity to undertake the management business of CLP. This method may also be the most reliable in realising high quality logistics services with high level of flexibility to accommodate changes in demand of service. The private concessionaire of CLP-MC will enjoy flexibility in the implementation of duties by either sub-contracting logistics business to tenants or by directly undertaking the logistics business, depending on the business model. The concession fee to be paid to the project owner is one of the important criteria in the evaluation of tenders of the potential concessionaires. The concessionaire will maintain flexibility in the choice of nature of implementing entity such as single foreign company (ies), joint-venture between foreign company (ies) and domestic company (ies), consortium of domestic companies etc. A scheme to preserve the right of intervention to uphold the public nature of CLP may be required.

In Lao PDR, the institutional framework to engage in Public Private Partnerships such as outsourcing of operation of public facilities to private sector has not been set up yet. However, such a scheme would be introduced on an ad hoc basis. For example, operation of the existing

Tanaleen ICD was outsourced to a private company from 1998 to 2008, and operation of the Wattay International Airport is operated by a joint venture between Lao PDR and Japan. The biddng process for an operator of Michi-no-eki (road side station) which is being constructed by ASEAN Integration Fund is on-going. Therefore, CLV-MC could be selected from the private sector following the same procedure.

On the other hand, there are other substantial potential methods such as joint-venture between Lao government/ state enterprise and foreign investor; state enterprise and project owner. The joint-venture method would establish a new entity for CLP-MC by conglomeration of the Lao public sector with a private company who satisfy qualification criteria. This has an advantage of maintaining the good aspects of private management and the goods aspects of public involvement. Of course, the public involvement should be minimized; however, it would be advantageous to make interventions in the CLP management so as to pursue public needs in emergency and particular cases. The state enterprise is an ordinal method that was applied in Lao when the Lao government carried out particular projects. The project owner would have to organise a new state enterprise or assign the existing state enterprise to act as CLP-MC. Thanaleang warehouse is currently managed by the state enterprise method. This method has the advantage of soundness of project implementation based on the plenty of experience in Lao PDR. However, it is doubtful whether international standards of logistics service would be realised in CLP.

The last option is the method in which the project owner will act as CLP-MC. The project owner would organize a responsible section/department from within its organization to carry out management by itself. The comparison of advantages and disadvantages among the potential methods is shown in Table 6.3.2.

As a consequence, the best possible methods seem to be that the Project owner shall assign a private concessionaire or establish a joint-venture with private sector, preferably foreign investor to act as CLP-MC.

Table 6.3.2 Comparison of Potential Types of CLP-MC Entity

	Concession	Joint Venture	State Enterprise	Project Owner
Characteristics	• Give concession to private company • Private company is flexible to formulate entity	• Joint-venture between Lao government/state enterprise and private company	• The project owner establishes new state enterprise or assigns existing state enterprise.	• Project owner establishes new section in own organization.
Public Involvement	• Lower public involvement • Need certain scheme to keep a right of intervention of management	• Medium public involvement	• Full public involvement	• Full public involvement
Business Efficiency	• Higher efficiency in performance is expected.	• Higher efficiency in performance is expected.	• Doubtful with limited experience • Management committee may be needed to offset private sense of business.	• Doubtful with limited experience • Management committee may be needed to offset private sense of business.

Source: JICA Study Team

6.4 CIQ Services

CIQ service will be done by several responsible agencies such as Custom Department,

Immigration Department and Quarantine Office at CLP. The CLP-MC will provide CIQ office at own expense to operate CIQ branch office in CLP. CIQ officers will be seconded from the responsible agencies to CLP.

6.5 Responsibility of Construction and Maintenance of Infrastructure, Utilities and Buildings

6.5.1 General

Infrastructure, utilities and buildings in CLP are basically developed by the project owner and are made available to the CLP-MC. The responsibility over necessary infrastructure and utilities outside the CLP which connect to existing main lines will be transferred to the concerned agencies. CLP-MC is responsible for maintenance works of infrastructure, utilities and buildings in CLP, while the infrastructure and utilities transferred to the concerned agencies will be maintained by those agencies.

6.5.2 Utility

(1) Water Supply

Water supply is solely done by Champasack Water Supply Enterprise (normally refereed to as “Nam Papa Champasack (NPC)”). NPC is responsible for supplying water to the area; however, a developer is expected to connect water supply pipeline to the NPC main line at his own expense. Accordingly the project owner of CLP will be responsible for construction of entire water supply system including water supply system in CLP and connections to main line outside CLP area. After completion of installation, the water supply system outside the CLP area will be transferred to and maintained by NPC. The water supply system in CLP will be owned by the project owner and maintained by CLP-MC.

Water used in the buildings will be charged depending on the amount used. However, water used in the common area should be borne as a cost item under the administration costs of CLP-MC, which may then be collected as part of the concession fee. For water used in the buildings, NPC will collect water charge directly from tenants.

(2) Electricity Supply

Electricity supply is solely done by Entreprise D’electricite du Lao (EDL) in Champasack. EDL is responsible for supplying electricity to the area. However, a developer is expected to connect main electricity line to main line of EDL at his own expense, in what is a similar scenario to the water supply arrangement. Accordingly the project owner of CLP will be responsible for installation of the entire electric supply system including electricity supply system in CLP and connection to main line outside CLP. After completion, the electricity supply system outside CLP will be transferred to and maintained by EDL. The electricity supply system in CLP will be owned by the project owner and maintained by CLP-MC.

Electricity used in the buildings is charged depending on the amount used. However, electricity used in common area should be borne as a cost item under administration costs of CLP-MC, which may then be recouped as part of the concession fee. For electricity used in the buildings,

EDL will collect electricity charge directly from tenants.

(3) Telecommunications

Telecommunications is solely done by Enterprise of Telecommunications Lao (ETL) in Champasack. ETL is responsible for supplying telecommunications and IT services to the area. However, a developer is expected to connect main telecommunications line to the main line of ETL at his own expense, which is a similar arrangement to the water and electricity supply. Accordingly, the project owner of CLP will be responsible for constructing all telecommunications systems including telecommunications system in CLP and the connection to main line outside CLP. After completion of installation, the telecommunications system outside CLP will be transferred to and maintained by ETL. The telecommunications system in CLP will be owned by the project owner and maintained by CLP-MC.

ETL will collect payments by itself directly from tenants. Fees to be paid by each tenant will be dependent on the extent of use of telecommunications.

(4) Drainage

Drainage will be provided by the project owner in CLP and will be maintained by the CLP-MC. The cost of maintenance will be shared amongst the tenants and will be included in the concession fee paid to CLP-MC.

(5) Waste Water Treatment

The waste water treatment system will be independently provided in CLP. The project owner will provide the system while its operation and maintenance will be undertaken by CLP-MC. The cost of maintenance will be shared amongst tenants. Discharge from the buildings is charged dependent on the amount discharged only. CLP-MC will collect payments directly from tenants.

(6) Solid Waste Disposal Service

Tenants should be directly responsible for solid waste management. CLP-MC will introduce private solid waste management company to the tenants, and the tenants will directly enter into contract with the private solid waste management company.

6.5.3 Building and Facility

(1) Facilities in Common Area in CLP

The project owner of CLP will be responsible for constructing all buildings and facilities in CLP. After completion, CLP-MC will be responsible for maintenance of buildings and facilities at his own expense.

(2) Buildings in Modules

The project owner of CLP will be responsible for constructing all buildings and facilities in module as well. After completion, CLP-MC will be responsible for maintenance of those buildings and facilities in the modules at his own expense. Table 6.5.1 provides a summary of allocation of

responsibility in development and maintenance of infrastructure, utilities and buildings.

Table 6.5.1 Responsibility of Construction and Maintenance of Infrastructure, Utilities and Buildings in CLP

Facility in CLP	Outside CLP (connection with main line)	Common Area in CLP	Inside Module
Water Supply	Construction • CLP Project Owner Maintenance • Champasack Water Supply Enterprise (Nam Papa)	Construction • CLP Project Owner Maintenance • CLP-MC	Construction • CLP Project Owner Maintenance • CLP-MC
Electricity Supply	Construction • CLP Project Owner Maintenance • EDL	Construction • CLP Project Owner Maintenance • CLP-MC	Construction • CLP Project Owner Maintenance • CLP-MC
Telecommunications	Construction • CLP Maintenance • ETL	Construction • CLP Project Owner Maintenance • CLP-MC	Construction • CLP Project Owner Maintenance • CLP-MC
Drainage		Construction • CLP Project Owner Maintenance • CLP-MC	Construction • CLP Project Owner Maintenance • CLP-MC
Waste Water Treatment		Construction • CLP Project Owner Maintenance • CLP-MC	Construction • CLP Project Owner Maintenance • CLP-MC
Solid Waste Disposal		Responsibility • CLP-MC	Responsibility • CLP-MC
Buildings (facilities) in CLP		Construction • CLP Project Owner Maintenance • CLP-MC	Construction • CLP Project Owner Maintenance • CLP-MC
Equipment in CLP		Procurement • CLP Project Owner Maintenance • CLP-MC	Procurement • CLP-MC Maintenance • CLP-MC

Source: JICA Study Team

6.6 Operation of CLP

6.6.1 Operation Time

(1) CLP Operation Hour

CLP will provide 24 hours service with no holidays.

(2) CIQ Operation Hour

Working hours of CIQ office at CLP will run from 8 am to 8 pm during week days, while it will remain closed during weekends (Saturday and Sunday).

6.6.2 Security Control

Security and safety control shall be implemented strictly by CLP-MC. The important points of security are gate control, property security and traffic safety.

(1) Gate Control

At the gate, security shall be maintained. The security personnel at the gate shall check people and vehicles.

(2) Property Security Management

CLP-MC has the general obligation of safeguarding and making appropriate use of the CLP 's property and equipment in CLP. The area will be enclosed by a fence. CLP-MC must ensure that reasonable security measures are implemented to prevent theft, damage or misuse of property and equipment.

(3) Traffic Safety

CLP-MC shall establish traffic control rules and carry out the measures for traffic safety within CLP.

6.6.3 Fire Fighting

CLP-MC will take the necessary measures for the safety of CLP, and follow the laws and regulations pertaining to fire fighting and emergency in Lao PDR.

(1) Government Coordination

CLP-MC will establish a proper fire fighting and emergency system for CLP in close cooperation with the responsible agencies.

(2) Rules and Regulations for Emergency

CLP-MC will formulate the regulations to be adhered to in times of emergency in the CLP and will manage, supervise and guide the fire prevention and fighting activities. CLP-MC should propose the rules and regulations for emergency to the Project Owner for approval.

(3) Organization and Network in Emergency

CLP-MC should establish protocol i.e. information network and allocation of responsibility to be applied in times of emergency.

6.6.4 Environmental Management

CLP-MC should have the overall responsibility of maintaining proper environment of the CLP and preventing pollution and damage to neighboring communities from activities of CLP. In this regard, the CLP-MC must assist, consult and monitor tenants to meet the environmental standards through the following actions:

- Providing updated information on environmental regulations and related analyses and interpretations that guide the tenants to acquire better understanding.
- Periodical monitoring of water discharged from CLP as well as air and noise.

- Liaising with concerned parties as regards complaints from neighboring communities pertaining to environmental matters
- Preparing necessary reports to present to WREA.

CHAPTER 7 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

7.1 Current Conditions of Champasack Province

7.1.1 Natural Environment

Champasack Province is located in the south-western part of Lao PDR and is one of the highly populated provinces in the country. It shares borders with Thailand and Cambodia and trade with those two countries has been very active. In addition, it enjoys warmer climate than the other areas in the country and has various geological and topographical characteristics which contribute to high agricultural productivity in the Bolaven Plateau.

Popular products in the Bolaven Plateau are coffee, banana and cardamom. The areas in/around Champasack Province account for a large share of the national coffee production. Coffee produced in the Bolaven Plateau is consumed domestically and internationally.

(1) Climate

The Project Area enjoys a tropical climate with two seasons: the rainy season from May to October and the dry season from November to April. Average annual rainfall in Champasack Province is 2081.1 mm for the period between 1951 and 2008. In 2008, temperature in Champasack ranged from 12.1^0 to 37.1^0 Celsius while average humidity was recorded between 59 and 83%.

Table 7.1.1 Meteorological Characteristics of Champasack Province (2009)

Station: Pakse (Attitude: 101.5m)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum temperature (C)	33.2	37.1	36.6	38.2	35.5	34.0	33.6	33.5	34.2	30.3	34.2	35.0
Minimum temperature (C)	12.7	17.1	17.0	22.7	21.7	22.6	22.0	23.3	22.0	23.4	16.0	17.3
Average temperature (C)	23.1	28.0	29.0	27.9	28.4	27.7	27.1	27.6	27.4	26.9	26.1	27.2
Evaporation (mm)	159.7	155.8	158.6	137.7	111.9	81.9	70.9	59.7	54.6	79.4	144.3	147.1
Humidity (%)	59	59	69	69	74	81	83	82	83	78	66	63
Rainfall (mm)	0	12.7	52.7	123.4	287.8	314.5	611.6	260.4	458.4	73.5	2.0	22.5

Source: Water Resource and Environment Office, Champasack, 2010

Table 7.1.2 Mean Annual Rainfall in Champasack Province (1951 – 2008)

	Rainfall (mm)	Note
Annual	2081.1	
Rainy Season	1981.7	May- October
Dry Season	140.6	Nov – April

Source: Disaster Management System in Lao PDR, prepared by Department of Meteorology and Hydrology, Water Resource and Environment Authority, 2009

(2) Topography

Topography in Champasack Province is mainly divided into six geological categories; Mz1, Mz2, N2-Q, vPz3,gPz3 and vPg. Major topographic characteristics and their locations are summarized in Table 7.1.3.

Table 7.1.3 List of Topographic Characteristics in Champasack Province

Category	Area	Major characteristic
Mz1	Central Southwest	Mostly continental sequence with local shallows – water marine faces persisting from Upper Paleozoic. Continental red clayey arenities with occasional thin coal seams and conglomerates in paralic intercalations. Middle Triassic marine limestone units which occur at the base of this interval interbedded with clays.
Mz2	North	Mostly red continental sandstones and clays, with lagoon mud rocks in the upper levels bearing evaporate units of halite and gypsum.
N2-Q	East	Unconsolidated gravels, sands, silts and clays mostly of fluvial origin, with some basaltic lava flows (v), ash and loess. Lateralized intra-sequence erosion surfaces are present. Intermountain basin sequence of fresh-water sandstones, shale and marls with rare limestone and lignite beds and some basaltic lava flow (v).
vPz3	Southwest	Shallow shelf sea sequence interdigitrated with a volcano sedimentary sequence, mostly sandstone, siltstone and shale.
gPz3	Central	Granitoid plutons (g); mostly granodiorite and monzogranite, with less abundant gabbro (m) and silicic subvolcanic intrusive rocks.
vPg	North	Alkali basalt lava flows (v) (basanitoid types) with associated eruptive vents.

Source: Data from Geology Department, Ministry of Energy and Mine

(3) Hydrology

Table 7.1.4 shows a record of the annual water level of the Mekong River in 2008 at the Pakse Station. It indicates that the highest water level was recorded in August and the lowest in March and April. According to the records of Mekong River Committee (MRC), the flood alarm water level at the Station along the Mekong River is 11.00 m and the flood water level there is 12.00 m. While water levels were above the alarm level during the rainy season of 2000, water levels have not risen above the alarm level since then.

Table 7.1.4 Annual Water Level of the Mekong River in Pakse (2008)

Altitude of the Station: 86.49 m

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum water level (m)	1.43	1.16	0.8	1.11	2.91	8.31	9.27	11.26	10.23	8.18	5.87	3.48
Minimum water level (m)	0.87	0.78	0.68	0.68	0.89	3.00	5.35	8.94	7.60	4.74	3.60	1.69
Mean water level (m)	1.09	0.97	0.74	0.90	2.07	5.72	7.78	10.34	8.83	6.47	4.92	2.63

Source: Department of Meteorology and Hydrology, Water Resource and Environment Authority, 2009

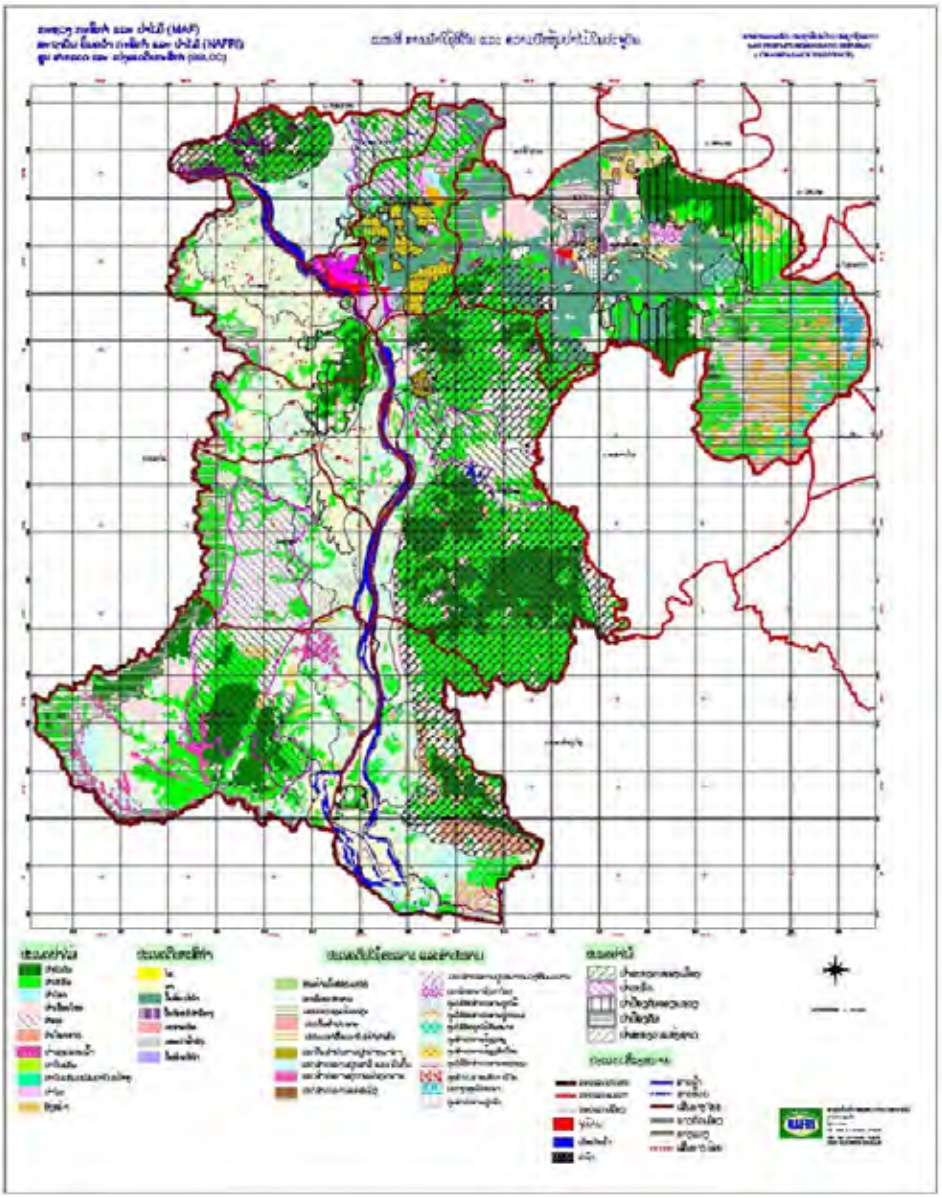
(4) Land Use

Table 7.1.5 shows the composition of forest area in Champasack Province in 2002. The land use in 2007 is shown in Figure 7.1.1.

Table 7.1.5 Land Use of the Champasack Province (2002)

Land Use	Percent (%)
Current Forest	54.0
Potential Forest Area	18.1
Other Wooded Area	1.0
Agriculture Land	20.6
Other Non-forest Area	6.3
Total	100.0

Source: Assessment of Forest Cover and Land Use, Ministry of Agriculture and Forest, 2005



Source: National Agriculture and Forestry Research Institute, 2007

Figure 7.1.1 Land Use of Champasack Province (2007)

(5) Nature and Biodiversity

There are three National Protected Areas (NPAs) in Champasack Province as shown in Table 7.1.6. According to the interview with the Department of Agriculture and Forest, Champasack Province has not conducted any biological studies to establish the conditions and status of the forest areas. And according to the interview with district office, there aren't any province or district protected areas in or near the Project Area. However, no official surveys related to biodiversity such as fauna and flora have been conducted thus far.

Table 7.1.6 List of National Protected Areas in Champasack Province

Items	Total Area (ha)	Village/District Location	Function
Phou Xiang Thong	120,000	N/A	National Protected Area
Dong Hua Sao	110,000	N/A	National Protected Area
Xe Pian	240,000	N/A	National Protected Area

Source: Data of the Department of Agriculture and Forest

(6) Air Quality

In Champasack Province, no official survey of air quality has been conducted. Here, the air quality of the Province was examined by comparing the traffic volume of Vientiane Capital to that of Champasack Province. Traffic volume is one of the factors determining the air quality, particularly SOx and NOx. Table 7.1.7 compares traffic volumes, recorded in Vientiane Capital and Champasack Province.

According to this table, the volumes in Vientiane Capital and Champasack Province are more or less similar at the surveyed locations. That may be translated to mean that the air quality in Champasack Province is the same as that in Vientiane Capital at most or could be less harmful due to the lower population density in Champasack Province compared to Vientiane Capital.

Air quality shown in Table 7.1.8 is the record of noise in Vientiane Capital in 2002 which was used as a reference. It can be discerned that each parameter of the air quality in Vientiane Capital is below the international standards.

Table 7.1.7 Annual Traffic Volume
(Vientiane Capital: Jan. – Dec.2008 / Champasack Province: Jan. – Dec.2008)

Target	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Total
Vientiane Capital (No. 18 64 km Sythong Bridge, Rd. 13S)	1,279	305,857	35,240	22,382	44,994	12,111	421,863
Champasack Province (No. 27, Munlouang)	30,560	189,946	10	161,576	38,837	6,465	427,394

Note: Group 1: Tuk Tuk; Group 2: Sedan, Jeep. Pick-up; Group 3: Sontheo Van and Bus (of less than 7 passengers); Group 4: Bus (for only 8 – 35 passengers), Light truck (of less than 7 tons); Group 5: Bus (for more than 36 passengers) and Heavy truck (of more than 7 tons); Group 6: Other heavy truck

Source: MPWT, 2010

Table 7.1.8 Air Quality in Vientiane Capital (2002)

Parameter	Unit	Range of Results	Average of Results	International Standards
Total suspended particulates (TSP)	mg/m^3	0.082 – 0.296	0.165	0.33
Particulate matter (PM 10)	mg/m^3	0.040 – 0.089	0.068	0.12 – 0.35
Sulfur dioxide (SO_2)	mg/m^3	0.025 – 0.276	0.108	0.32 – 0.36
Nitrogen dioxide (NO_2)	mg/m^3	<0.001-0.057	0.014	0.30

Source: Lao PDR Environment Monitor (2007), World Bank

(7) Water Quality

Table 7.1.9 shows the quality of the water caught at the intake of a water plant at Pakse City from the Mekong River. The plant is operated by the state-owned water supply enterprise, namely Nam Papa Champasack. As seen in the table, pH and turbidity meet the standard of water quality.

However, Cl_2 is higher than standard.

Table 7.1.9 Water Quality of Champasack

Parameters	Unit	Range of	Average	Standard
pH	-	6.13 – 7.49	6.90	6-9.5
Turbidity	NTU	1.28 – 5.72	2.79	< 10
Cl_2	mg/L	0.55 – 0.64	0.60	< 0.20

Source: Lao PDR Environment Monitor (2007), World Bank and Standard for wastewater discharge (1998), WREA

(8) Noise and Vibration

As discussed above, the traffic volume in Champasack Province is more or less the same as that in Vientiane Capital. Assuming proportional relationships between traffic volumes and noise and vibration levels, noise and vibration in Champasack Province might be at the same level as that in Vientiane Capital. Looking at the noise levels in Vientiane Capital shown in Table 7.1.10, parameters of noise in Champasack Province may exceed the international standards.

Table 7.1.10 Noise in Vientiane Capital

Parameter	Unit	Range of Results	International Standards
$L_{eq}8$ (average over 8 hrs)	dB(A)	60.1 – 63.0	60 – 70 dB(A)
L_{max} (maximum level)	dB(A)	79.5 – 85.0	< 70 dB(A)

Source: Ambient Air and Noise Monitoring in Vientiane Municipality (September 2002 – February 2003), Danida National Capacity Building Project

(9) Archaeological and Heritage Resources

Archaeological and heritage sites exist in Champasack Province. However, these have not been officially surveyed and registered by the Province with the exception of Wat Phou, one of the World Heritages in Lao PDR. According to the interview with the District Office at the Project Area, there is nothing worth preserving amongst the historical and cultural ruins, buildings and assets in and around the Project Area, with the exception of temples listed in Table 7.1.11. These temples are preserved by the District in support of the tourism sector.

Table 7.1.11 List of Temples in Phonthong District

Name	Village
Wathorphakeo	Wathor
Archansumletloun	Vernxay
Phouphaverng	Thaphosee

Source: Phounthong District

7.1.2 Social Environment

(1) Population Structure

The population and population density in Champasack Province in 2008 is shown in Table 7.1.12.

Table 7.1.12 Population and Population Density in Champasack Province (2008)

Area	Area (km^2)	Population	Male	Female	Density (person/km^2)
Lao PDR	236,800	6,000,379	2,993,041	3,007,339	25
Champasack Province	15,350	642,651	318,321	324,330	41.86

Source: Statistical Yearbook 2008 Champasack Province, Champasack Province, 2009

As for the ethnic composition in Champasack Province, Lao-Thai and Mon-Khmer are dominant, though their share over the total population in the Province is relatively lower than in other provinces[1]. The Lao-Thai group lives all over the Province, especially in the eastern area while the Mon-Khmer group lives mainly in the western area. Despite such ethnic diversities, the main spoken language in the Province is Lao, the official language of Lao PDR used in the compulsory education.

(2) Social services

1) Water supply

Table 7.1.13 shows the overview of the sources of water utilized for people's daily life, according to the Census in 2005. In Champasack Province, though some villages in Pakse City are provided with water supply services by Nam Papa Champasack, most of the population residing in the Province uses boreholes and rivers as sources of their living water.

Table 7.1.13 Distribution by Source of Water for Drinking and Cooking in Champasack Province

Area	Piped water in/out side	Well/ Borehole protected	Well /Borehole unprotected	River, stream of dam	Mountain source	Rain water from tank	Other	Not stated	Total
Lao PDR	12.9 %	22.0 %	23.8 %	20.5 %	19.1 %	0.1 %	0.6 %	0.9 %	100.0 %
Champasack Province	8.1 %	41.2 %	14.4 %	32.2 %	2.8 %	0.0 %	0.3 %	1.0 %	100.0 %

Source: Results from the Population and Housing Census 2005 (2006), Steering Committee for Census of Population and Housing

2) Electricity

Electricity service in Champasack Province is provided by Electricite du Laos (EdL). EdL Champasack has hydropower stations, such as Seset 1, Seset 2 and Saravan. However, due to the increase in the electricity demand in the Province, the EdL imports electricity from Thailand. According to the statistics as of the end of 2009, EdL Champasack distributes to around 76 % of the total households in the Province. It is expected that the service will be extended to rural areas by extending transmission networks under the Rural Electrification Project 1, funded by the World Bank.

Table 7.1.14 Distribution by Source of Water for Drinking and Cooking in Champasack Province

Area	With Electricity through Public Net		Own generator	Car Battery	Not Electrified	Not stated	Total
	Own meter	Shared meter					
Lao PDR	38.9 %	10.8 %	1.0 %	6.5 %	41.2 %	1.6 %	100.0 %
Champasack Province	41.5 %	8.2 %	0.8 %	8.0 %	39.8 %	1.7 %	100.0 %

Source: Results from the Population and Housing Census 2005 (2006), Steering Committee for Census of Population and Housing

[1] Socio-economic ATLAS of the Lao PDR (2009)

3) Solid management and Sanitation

In Champasack Province, solid waste management services work only in limited areas, which cover only 35% of the whole provincial population. There is one dumping site in Sanasomboon District with a size of around 6 ha. This site is managed by Champasack UDAA. People who are not provided with such services tend to burn and/or dump waste in their residential spaces.

Table 7.1.15 shows the types of toilets used over the Champasack Province as identified in the Census in 2005.

Table 7.1.15 Type of Toilets in Champasack Province

Area	Number of Households	Modern Toilet	Normal Toilet	Other	None	Not stated	Total
Lao PDR	952,386	1.8 %	38.5 %	8.9 %	49.0 %	1.6 %	100.0 %
Champasack Province	102,249	0.9 %	26.8 %	2.3 %	68.4 %	1.5 %	100.0 %

Source: Results from the Population and Housing Census 2005 (2006), Steering Committee for Census of Population and Housing

4) Health

As of February 2009, Champasack Province has public health facilities as shown in Table 7.1.16.

Table 7.1.16 Number of Public Health Facilities in Champasack Province (2007/2008)

Provincial Hospital	District Hospital	Dispensary	Pharmacy
1	9	61	

Source: Statistical Yearbook 2008, Champasack Province, Champasack Province, 2009

5) Education

Literacy rate in Champasack Province is higher than the national average, as shown in Table 7.1.17. Number of schools and school attendance rate in Champasack Province are indicated in Table 7.1.18 and Table 7.1.19, respectively.

Table 7.1.17 Literacy Rate for Population Aged 15 Years and Above in Champasack Province

Area	Female	Male	Total
Lao PDR	63.2 %	82.5%	72.7 %
Champasack Province	74.0 %	89.9 %	81.8 %

Source: Results from the Population and Housing Census 2005 (2006), Steering Committee for Census of Population and Housing

Table 7.1.18 Number of Schools in Champasack Province

Creche	Primary $1^{st} – 5^{th}$	Secondary $6^{th} – 12^{th}$	Upper Secondary $10^{th} – 12^{th}$	Vocational Education. and College
123	768	86	6	7

Source: Statistical Yearbook 2008 Champasack Province, Champasack Province, 2009

Table 7.1.19 School Attendance for Population Aged 6 Years and Above in Champasack Province

Area	Never been to school	At school	Left school	Unknown	Total
Lao PDR	22.8 %	28.4 %	46.7 %	2.1 %	100.0 %
Champasack Province	15.3 %	27.8 %	55.4 %	1.5 %	100.0 %

Source: Results from the Population and Housing Census 2005 (2006), Steering Committee for Census of Population and Housing

(3) Economic activities

Table 7.1.20 shows typical economic activities in Champasack Province and indicates that most of the economically active population in Champasack Province engages in agriculture as is the case with other areas in Lao PDR.

Table 7.1.20 Occupational Distribution of Economically Active Population in Champasack Province

Area	Economic active population	Distribution of occupation					Total
		Farmer	Fisherman	Livestock farmer mainly	Mixed farmer	Non-farm activity	
Lao PDR	2,738,892	64.3 %	0.1 %	0.2 %	14.0 %	21.5 %	100.0 %
Champasack Province	305,407	62.9 %	0.0 %	0.1 %	17.3 %	19.6 %	100.0 %

Source: Results from the Population and Housing Census 2005 (2006), Steering Committee for Census of Population and Housing

7.1.3 Detailed Social Environment (District Level)

The Project Area is located in the Phonthong District in Champasack Province. The existing profile of the district is summarized in Table 7.1.21.

Table 7.1.21 Existing Profile of the Phonthong District in Champasack Province

Item		Outline
1. Area of District		100,855 ha
2. No of villages		71
3. Population	Male	44,580
	Female	44,559
	Total	89,139
4. Public infrastructure conditions	Water supply	Nam papa provides water supply services to 10 villages in urban area. And the district will try to attain coverage for at least 50% of households.
	Electricity	EdL provides electricity service to 61 villages.
	Solid Waste	There is one dumping site but no collecting service of solid waste. The district has a plan to improve solid waste treatment in the future.
	Wastewater /sewerage	No sewerage treatment facility.
	Telecommunication	
5. Health	No. of hospitals	1
	No. of dispensaries	9
6. Education	No of crèche	15

Item		Outline
	No of primary schools	81
	No of secondary schools	16
	No of vocational education institutions and colleges	0
7. Economic activities		Main activity is agriculture which accounts for 82% of the whole district's economy.

7.2 Assessment of Champasack Logistics Park Project

7.2.1 Scoping

The Champasack Logistics Park (CLP) is proposed to cover an area of around 11.5 ha. It's also proposed that it will be located along the NR-13. The CLP will be equipped with customs clearance on chassis, heavy bulk cargo area, general cargo area, parking lots, administration and customs office, operator office, maintenance shop, gate and weight station, and fundamental infrastructure including water supply, sewage, drainage, electricity, and telephone lines.

Taking the detailed specifications of the Project into consideration, the scoping result is shown in Table 8.2.1. In addition to that, Table 8.2.2 shows current conditions related to infrastructure at the site of CLP.

Table 7.2.1 Scoping Matrix for the Proposed Champasack Logistics Park (CLP)

Item			Rating Preliminary	Description	Recommended actions by the Project Owner in the next phase
Social Environment	1	Involuntary Resettlement	B	No house is observed inside the Project Area, however, some houses which will be affected by the land preparation works are found around the Project Area. Their legal status and the anticipated impact on them need to be clarified prior to the construction phase.	Identification of land use and land ownership of project-affected people (PAP) Social survey Stakeholder meetings
	2	Local Economy such as Employment and Livelihood, etc	B (Construction)	Increase of construction vehicles, traffic jams and increase of employment opportunities may be expected during the construction phase	Social survey Stakeholder meetings
			D (Operation)	Increase of employment opportunities may be expected during the operation phase.	
	3	Land Use and Utilization of Local Resources	B	The Project Area was originally planned to be developed as a site for a logistics park. Therefore, the Project Area was empty and any significant impact on local resources may not be expected, on the other hand, the eastern-side of the Project Area will be required for land preparation works.	Social survey Stakeholder meetings
	4	Social Institutions such as Social Infrastructure and Local Decision - making Institutions	C	In the Project Area, social institutions may not be active at the moment.	Social survey Stakeholder meetings
	5	Existing Social Infrastructure and Services	B (Construction)	In the Project Area, basic infrastructure services, such as water supply, drainage, sewerage and electricity, are not provided. New implementation of those facilities may affect the Project Area.	Social survey Stakeholder meetings
			D (Operation)	After construction of infrastructure services, there may be no impact.	
	6	The Poor, Indigenous and Ethnic people	C	Though there are only some households and a school around the Project Area, there is no household in the Project Area. Therefore, no impact may occur on existing livelihoods around the Project Area.	Social survey Stakeholder meetings
	7	Mal-distribution of Benefits and Damage	C	Mal-distribution may not occur with consideration of the existing land use plan. However, it is necessary to clarify the land ownership status of the Project Area.	Social survey Stakeholder meetings
	8	Cultural heritage	C	The adjoining area of the Project Area used to be a temple, and a Buddhist statue is still standing there.	None
	9	Local Conflicts of Interest	C	At the moment, the Project Area does not have any house because the Project Area is owned by the District.	Social survey Stakeholder meetings
	10	Water Usage or Water Rights and Communal Rights	C	Because no water source exists for people's production activities and/or daily livelihoods, it is presumed that there isn't any communal right or water right.	Social survey Stakeholder meetings
	11	Sanitation	B	Effluent from the construction works and operation of the park may affect the Project Area and its adjoining areas in terms of sanitary conditions.	Social survey Stakeholder meetings
	12	Hazards (risk) Infectious Diseases such as HIV/AIDS	C	Increase in the influx and efflux of people may accelerate spread of infectious diseases in and around the Project Area.	Social survey Stakeholder meetings
	13	Accidents	B	Traffic accidents may increase due to the increase in traffic volume, especially of construction machineries. Traffic accidents may increase due to the increase in traffic volume.	Traffic survey Stakeholder meetings

Item			Rating Preliminary	Description	Recommended actions by the Project Owner in the next phase
Natural Environment	14	Topography and Geographical Features	B	The west-side of the Project Area has been prepared and flattened. On the other hand, the eastern-side will require land preparation works, especially embankment and deforestation works.	Topographic Survey Environmental Management Plan (EMP)
	15	Soil Erosion	B	There may be possibility that land preparation works, especially embankment, affect the present soil conditions especially over the down hills.	Soil and sediment survey EMP
	16	Groundwater	B	Groundwater is necessary for construction works and operation of the Park, the intake may influence the existing aquifer to some extent.	Water quality Survey EMP
	17	Hydrological Situation	C	The existing hydrological systems may not be affected; however it may affect the hydrological situation due to land preparation works.	Water quality survey EMP
	18	Coastal zone	D	No coastal zone exists.	None
	19	Flora, Fauna and Biodiversity	C	Some bushes exist in the Project Area and it may be necessary to clear them as a part of land preparation works. The Area is not categorized as a protected area. Effluents from the Area like daily waste and wastewater may affect biological conditions.	Flora and fauna survey EMP
	20	Meteorology	D	No meteorological impact.	None
	21	Landscape	B	Positive and negative impacts may arise due to the change of land use.	Landscape impact estimation
	22	Global Warming	C	Carbon dioxide may be discharged by working machinery and vehicles.	Greenhouse effect gases estimation
Pollution	23	Air Pollution	B (Construction)	Deterioration of air quality may occur due to construction machinery and vehicles.	Air quality survey EMP
			B (Operation)	Deterioration of air quality may occur due to traffic congestion in/around the Project Area.	
	24	Water Pollution	B (Construction)	Water pollution may occur due to the efflux of wastewater from the construction works.	Water quality survey EMP
			B (Operation)	It will be impossible to connect sewerage system. It will be required to treat wastewater in the site independently. Water pollution may occur due to the efflux of wastewater from the operation of the Park.	
	25	Soil Contamination	B (Construction)	Land preparation, especially embankment and deforestation works, may affect the present soil conditions.	Soil and sediment survey EMP
			B (Operation)	Effluents discharged from facilities in the Project Area may affect soil conditions in and around the Area.	
	26	Waste	B (Construction)	Construction works may generate waste and sludge. That may cause water pollution and offensive odor in and around the Project Area.	Waste emission estimation EMP
			B (Operation)	Waste and sludge may be generated from the operation of the Park and people's activities in/around the Project Area.	
	27	Noise and Vibration	B (Construction)	Construction machinery and vehicles may generate noises and vibration in and around the Project Area.	Noise and vibration survey EPM
			B (Operation)	Noise due to traffic congestion may increase to higher levels than at present.	
	28	Ground Subsidence	C	Water source will be groundwater, it is possible to abstract by pumping works.	None
	29	Offensive Odor	C	Effluents, such as waste and wastewater, may generate offensive odor.	Odor emission estimation EMP
	30	Bottom Sediment	C	No impact on sediments is expected.	Soil and sediment survey EMP

Evaluation Categories A: Serious impact is expected. B: Some impact is expected. C: Extent of impact is unknown. (Examination is needed. Impacts may become clear as study progresses.) D: No impact is expected. EIA is not necessary.
*: Positive impact is expected.
Source: JICA Study Team

Table 7.2.2 Current Conditions related to Infrastructure at the Site of CLP

Infrastructure	Conditions
Water supply	No water supply service around the site. Groundwater should be used.
Electricity	Electricity can be provided with 220 voltages.
Solid Waste	It will be required that solid wastes from the site are brought to the dumping site individually.
Wastewater /sewerage	It will be impossible to connect sewerage system. It will be required to treat wastewater in the site independently.
Telecommunication	There is no optic fiber cable. A telephone line is available.

7.2.2 Proposed Environmental Management Plan

Based on the scoping results and the present state of the Project Area, the following items would necessitate actions against anticipated impact on the environment. The following actions detailed in Table 7.2.3 are proposed as part of the environmental management plan.

Table 7.2.3 Proposed Environmental Management Plan

Items	Proposed action under environment management plan
Topography and Geographical Features	- to ascertain level of impact on topographic structures in the Project Area, especially on the eastern side of the area and the adjoining areas, by land preparation works such as deforestation and setting of embankment by utilizing the results of topographic (measurement) survey to be conducted - to mitigate the impacts on topographic structures through measures such as reforestation and greene-spots on the site and slopes which would be created by earthworks
Soil Erosion and Bottom Sediment	- to ascertain how much runoff will flow from the site especially during the construction phase so as to ensure that water quality standards are met - to take measures for mitigating the soil erosion by means such as making sedimentation ponds or green-spots at the construction phase - to implement sediment control through regular monitoring and maintenance during construction and operation phases
Groundwater Water Pollution	- to ascertain how much groundwater will be used during construction and operation phases because water supply service is not available around the site - to take measures to avoid contamination by solid waste and wastewater which may consist of concrete and other chemicals - to implement treatment of wastewater through treatment facility such as a septic tank at the site - to implement regular monitoring of water quality, if necessary, to take added measures to mitigate water pollution
Flora, Fauna and Biodiversity	- to ensure local workers not to harvest or hunt any forest resources of not only plants but also animals at the adjoining vegetative site - to take measures for improving nature environment by means such as reforestation and green-spots on the site and slopes which would be created by cutting soil and deforestation
Air Pollution	to ascertain how much air pollution will be discharged from operative work such as facilities and vehicles on the site especially during the construction phase and ensure that the air quality standards are met - to set and implement rules in construction and operation phases with respect to equipment maintenance, equipment operating procedures, utilization of vehicles which emit lower pollutants and gases, and avoidance of concentration of active vehicles in particular work-space - to implement regular monitoring of air quality, if necessary, to take added measures to mitigate air pollution
Soil Contamination	- to take adequate measures on wastewater and solid waste to ensure that the standards are met (refer to water pollution and waste)
Waste	- to transport solid waste discharged from the site to one dumping site located in the district

Items	Proposed action under environment management plan
	individually because collecting service is not available currently - to implement treatment of wastewater through treatment facility such as a septic tank at the site - to take measures to minimise liquid and solid waste especially during construction phase
Noise and Vibration	- to implement appropriate measures to minimise noise generated throughout construction phases, such as of determining operating hours and avoidance of concentration of vehicle operations in limited work-space - to notify relevant stakeholders around the site of possibilities of generating noise and making some disturbances
Offensive Odor	- to implement appropriate solid waste management in construction and operation phases (refer to waste)
Accidents	- to implement necessary cautionary measures to prevent accident occurrence on site and to plan preventive action and procedures against any event of accidents on site prior to the construction phase - to ascertain the contractor's mode of action as regards handling, storing safely and utilising hazardous materials - to implement instruction programs for all the workers on how to handle fuel, lubricating oil, hydraulic fluids and any other hazardous chemicals - to list equipment to be used on site by construction workers in emergency cases

Source: JICA Study Team

7.2.3 Outline of the draft Resettlement Action Plan

In addition to the environmental management plan, the Project Owner will be required to prepare the resettlement action plan. In order to do so, the following actions need to be taken as detailed in Table 7.2.4. It should be noted that some army buildings (used for residents' premises of the army) were observed adjacent to the project site and there is possibility that these buildings would be affected by the project. However, based on the interviews with local officers, it was confirmed that these impacts on the resettlement of the army buildings are considered to be less significant and that resettlement of these army buildings can be easily managed through agreement between concerned ministries.

Table 7.2.4 Further Actions Required of Project Owner to Finalise Resettlement Action Plan

Items	Actions required to fulfill the item	Description of the present situation
1. Introduction	- Description of project components - Summary description of adverse impacts and asset acquisition	This section should be written after the actions are considered.
2. Census and socioeconomic survey results	- Reviewing census and socio-economic baseline survey of all the people and/or households affected by the Project (PAPs) - Categorizing and Numbering of PAPs by type and degree of impacts - Preparing the inventory of assets of PAPs and/or households to be affected	No households were observed in the Project Site in the survey because the land officially belongs to the custom office. On the other hand, there are some households (army) in the adjoining area, and they will be affected by the construction activities. When the Project Plan is finalized, a detailed survey is necessary to clarify their profile and legal status.
3. Compensation entitlement criteria	- Establishing the cut-off date for entitlement eligibility - Examining and determining the methodologies for assessment of compensation for PAPs' assets	At the moment, the type and degree of impacts are not certain such that compensation description and mitigation measures are also unclear.

Items	Actions required to fulfill the item	Description of the present situation
4. Relocation plan (if necessary)	- Conducting consultations with the Project Owner, PAPs and stakeholders in the process of formulating relocation plan - Determining criteria for relocation and provision of satisfactory replacement land given characteristics of original land - Selecting sites for PAPs' relocation by conducting assessment and feasibility studies of alternative sites - Calculating administrative relocation cost	As mentioned above, there are some households (army) in the adjoining area. They will be affected by the Project, therefore relocation plan should be formulated through discussions with army.
5. Income restoration measures (as necessary)	- Planning an economic rehabilitation plan to restore income and livelihood to be lost by the Project - Implementation of the plan - Institutional set-up to conduct activities proposed in the plan	Though detail survey will be required, income restoration measures might not be needed because it seems that there are no households which get income from or the Project Area.
6. Public participation, consultation, disclosure and grievance redress mechanism	- Setting up grievance redress mechanism to guarantee women's assets, property and land-use rights, and to ensure the restoration of income and living standards - Establishing grievance redress committee	Project Owner needs to discuss with local authorities on how to coordinate information disclosure process and determining compensation systems
7. Organization setup	- Setting up and planning for training and capacity building	In addition no.6, Project Owner also needs to discuss with local authorities on how to set up organisation.
8. Monitoring and supervision	- Establishing external monitoring and evaluation systems by independent organizations	The organization to be discussed in no.7 will also be responsible for monitoring and supervision.
9. Cost estimates and budget	- Estimating resettlement costs, covering formulating resettlement plan, compensation, relocation, income restoration, administrative and monitoring costs	Resettlement costs are important for estimating cost and budget. Estimates of resettlement costs are required after collection of information listed above.
10. Implementation arrangements	- Preparing timetable and procedure for implementation of all activities	Timetable and procedure will be prepared.

Source: JICA Study Team, with reference to Technical Guidelines on Compensation and Resettlement in Development Projects (2005), STEA

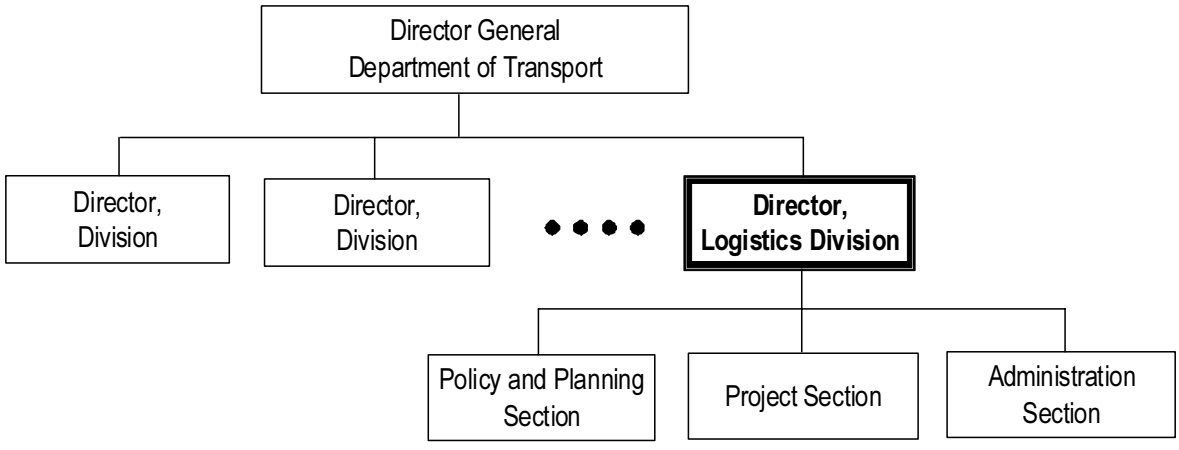
CHAPTER 8 PRELIMINARY IMPLEMENTATION PLAN

8.1 Implementation Body

As described in Chapter 6, Department of Transport of Ministry of Public Works and Transport will be the project owner and implementation body of the CLP project. Logistics Division is recommended to be newly established under the Department of Transport who will dedicate policy, planning and administration of logistics including logistics park development project. After establishment, the Logistics Division should be responsible for planning and implementing VLP, SLP and CLP projects with the following tasks:

- Project preparation (EIA, land acquisition, detailed design and tender documentation, management plan)
- Coordination with other agencies concerned
- Financing planning
- Selection of CLP-MC

Major tasks of Logistics Division will shift from logistics park development to realization of other actions under the national logistics strategy, and shift to be the organization which takes care of managing and supervising logistics parks and logistics businesses in the logistics parks.



Source: JICA Study Team

Figure 8.1.1 Logistics Division in MPWT (same as previous Figure 6.2.1)

8.2 Implementation Schedule

Implementation process is divided into the following four stages: preparatory stage, design stage, construction stage and operation stage. As indicated in Figure 8.2.1, it takes 64 months to complete CLP from commencement of the preparatory stage.

8.2.1 Preparatory Stage

This stage starts with building of consensus to develop CLP, and Lao PDR Government will establish organization for the management of CLP project. The government will also have to investigate and decide financing plan, and carries out a procedure for financial arrangement. Preparation to start design works is also important work in this stage. This stage may take 12 months period. The followings are the major works during this stage:

- Consensus building for development of CLP
- Determination of financing plan
- Determination of project owner
- Preparation of loan application
- EIA and Land Acquisition
- Compilation of TOR and tender documents for selection of consultants
- Procedure for financial arrangement

8.2.2 Design Stage

The government will take consultant section works including finalization of TOR and tender). The selected consultant will conduct detailed design for access road, land preparation, building, facilities and utilities. In the end of the detailed design, the consultant will prepare bid documents for contractors. Total months for the design stage will be 27 months with contract negotiation and concurrence process from donor. The followings are the major works during this stage:

- Short list and finalization of TOR of consultants
- Selection of consultants (including tender, contract negotiation, concurrence from donor etc.)
- Detailed design
- Preparation of bid documents

8.2.3 Construction Stage

The selected contractor will start construction of access road, and conducting land preparation and building and facility works. On the way of the construction works, the consultant will prepare bid documents and select operators. After clearance of the construction works, machines and equipment for operator will be installed. This stage may take 16 months period. The followings are the major works during this stage:

- Selection of contractors (including Contract negotiation, concurrence from donor etc.)
- Mobilization

- Access road works
- Land preparation works
- Utility construction Work
- Building and facilities works
- Gate and fencing works
- Machine installations
- Clearance

8.2.4 Operation Preparation Stage

In parallel with construction, project owner will select a company or a group which will work as CLP-MC. Selected CLP-MC will select tenants of CLP who directly provides logistics services to users. Selected tenants will install necessary machines and equipment for transshipment service, etc before starting operation of CLP. Total months in this stage will be 9 months. The followings are the major works during this stage:

- Operation and Management Plan
- Promotion Plan
- Operation Guideline
- Selection of CLP-MC
- Selection of tenants
- Operation

Source: JICA Study Team

Figure 8.2.1 Implementation Schedule

8.3 Project Package for Implementation

8.3.1 Project Lots

Although the CLP consists mainly of two components such as CLP itself and access road, the work volume of CLP project is limited compared to that of VLP. So that, the CLP should not be divided into project lots but be carried out with only one project.

Table 8.3.1 shows work item, components and their brief spec. and quantity in brief.

Table 8.3.1 Work Item, Components and quantity by Lot

Lot No.	Work Item	Contents	Summary (Quantity)	Cost (US$)
Lot 1	Civil Works	• Preparatory Work • Earth Work • Pavement • Utilities (Drainage, Waste Water, Water, Electricity, Telecommunication) • Green • Others	• Working Area: 11.6ha (located facing to the main road and already roughly developed) • Earth Volume: 334,200m3 of Excavation, 77,000m3 of Filling • Pavement: 7.9ha in CLP • Drainage: 2.1km • Waste Water: 800m pipes and a treatment plant • Water supply: 800m pipes, a well (20m depth) and a water tank • Electricity: 700m for 22kv, 2,000m for 400/220v, 3 transformers and 95 poles for electricity and light • Telecommunication: 500m of telecommunication line • Tree Planting and Green: 1.3ha • Fencing: 1.4km	5,223,975
	Building Construction	• Warehouse • Office • Maintenance Shop • Parking • Weighbridge • Gate	• Freight Station (FS): 6,000m2 • Fixed Temperature FS: 6,000m2 • Operator Office: 3,200m2 • Administration Office: 1,000m2 • Maintenance Shop: 600m2 • Parking: 2700m2 of parking area with roofs • Weighbridge: 4 • Gate: 1 gates (each gate has 2entrances and 2 exits)	7,017,760
Total				12,241,735

Source: JICA Study Team

8.4 Required Consultants Service

8.4.1 Necessity and Scope of Consultant Service

CLP is proposed to provide high quality and capacity of logistics services in Champasack in accordance with increased volume of freight cargo through the friendship bridge in future. CLP is also an indispensable facility to implement the national logistics strategy of “integration of cargo flow” and “business stimulation”. Accordingly, the success of CLP depend not only on the construction and operation of CLP but also on the mitigation of empty return cargo as well as the realization of competitive and transparent logistics market and participants (domestic and foreign logistics businesses). Meanwhile, CLP has an unique characteristics to support agricultural development and businesses in the southern region.

Looking at the current capacity of Lao government and relevant private businesses in Laos, it

unfortunately seems not to be achieved by their own capacity. It is therefore necessary to have a consultant to technically support Lao Government to carry out CLP with relevant institutions.

In this regard, there seems to be at least two aspects of consultant services to be attached such as:

- Consultant service for CLP development (hard component)
- Consultant service for management, operation and necessary institutions (soft component)

(1) Consultant service for CLP development (hard component)

The consultant will be responsible for all technical matter to construct CLP and provide with technical advices to the project owner (maybe MPWT) for their division makings. The scope of the consultants for this purpose is listed up below:

- Review of capacity and demand
- Basic design
- Detailed design
- Cost estimate
- Preparation of tender documents
- Tender management and evaluation supports
- Construction supervision (check of shop drawings, control of construction schedule, coordination between project owner and contractors, cost management, quality control, liaison to donor etc.)

(2) Consultant Service for Management, Operation and Necessary Institutions (soft component)

The consultant will be responsible for developing proposals on necessary institutions, organization and schemes to efficiently operate CLP as well as to sufficiently perform along the national logistic strategy (of mitigation of empty return cargo as well as the realization of competitive and transparent logistics market and participants), and for assisting MPWT to take necessary actions to realize them. The scope of the consultants for this purpose is listed up below:

- CLP Operation and management plan
- CLP promotion plan
- Supports to set-up organization of CLP
- CLP operation guideline
- Preparation of tender documents for CLP management company
- Tender management and evaluation supports for CLP management company
- Advice on management and operation after operation of CLP

8.4.2 Anticipated Inputs of Consultants

(1) Anticipated Consultants and their TOR

The following experts shall be at least considered to be included in the consultant tem to carry out the scope of service described in the previous section. There are

- Team Leader
- Deputy Team Leaders (hardware, software, and local)
- Highway Engineer (foreign and local)
- Water Supply and Drainage Engineer (foreign and local)
- Architect (for CLP facility) (foreign and local)
- Cost Estimator (foreign and local)
- Document Specialist (foreign)
- Resident Engineer (for construction supervision) (foreign and local)
- Transport Planner (foreign)
- Economist (foreign and local)
- Organization Specialist (foreign and local)
- Operation and Management Specialist (foreign and local)
- Investment Promotion Specialist (foreign and local)

Table 8.4.1 TOR by Expert for CLP Project

Experts	Foreign/Local	TOR
Team Leader	F	• Overall management of study Team • Liaison to project owner and donor • Review of capacity and demand • Basic design • Detailed design • Cost estimate • Preparation of tender documents • Tender management and evaluation supports • Construction supervision • CLP Operation and management plan • CLP promotion plan • Supports to set-up organization of CLP • CLP operation guideline • Preparation of tender documents for CLP management company • Tender management and evaluation supports for CLP management company • Advice on management and operation after operation of CLP
Deputy Team Leader (soft)	F	• Assistance to Team Leader • Review of capacity and demand • CLP Operation and management plan • CLP promotion plan • Supports to set-up organization of CLP • CLP operation guideline

Experts	Foreign/Local	TOR
		• Preparation of tender documents for CLP management company • Tender management and evaluation supports for CLP management company • Advice on management and operation after operation of CLP
Deputy Team Leader (local)	L	• Assistance to Team Leader • Review of capacity and demand • Basic design • Detailed design • Cost estimate • Preparation of tender documents • Tender management and evaluation supports • Construction supervision
Highway Engineer	F	• Review of capacity and demand • Basic design • Detailed design • Cost estimate • Preparation of tender documents
Highway Engineer	L	• Review of capacity and demand • Basic design • Detailed design • Cost estimate • Preparation of tender documents
Water Supply and Drainage Engineer	F	• Review of capacity and demand • Basic design • Detailed design • Cost estimate • Preparation of tender documents
Water Supply and Drainage Engineer	L	• Review of capacity and demand • Basic design • Detailed design • Cost estimate • Preparation of tender documents
Architect (for CLP facility)	F	• Review of capacity and demand • Basic design • Detailed design • Cost estimate • Preparation of tender documents
Architect (for CLP facility)	L	• Review of capacity and demand • Basic design • Detailed design • Cost estimate • Preparation of tender documents
Cost Estimator	F	• Cost estimate • Preparation of tender documents
Cost Estimator	L	• Cost estimate • Preparation of tender documents
Document Specialist	F	• Preparation of tender documents • Tender management and evaluation supports • Preparation of tender documents for CLP management company
Resident Engineer (for construction supervision)	F	• Tender management and evaluation supports • Construction supervision • Preparation of tender documents for CLP management company

Experts	Foreign/Local	TOR
Resident Engineer (for construction supervision)	L	• Tender management and evaluation supports • Construction supervision • Preparation of tender documents for CLP management company
Transport Planner	F	• Review of capacity and demand
Economist	F	• CLP Operation and management plan • CLP promotion plan • Preparation of tender documents for CLP management company • Tender management and evaluation supports for CLP management company • Advice on management and operation after operation of CLP
Organization Specialist	F	• CLP Operation and management plan • Supports to set-up organization of CLP • CLP operation guideline
Organization Specialist	L	• CLP Operation and management plan • Supports to set-up organization of CLP • CLP operation guideline
Operation and Management Specialist	F	• CLP Operation and management plan • Supports to set-up organization of CLP • CLP operation guideline
Operation and Management Specialist	L	• CLP Operation and management plan • Supports to set-up organization of CLP • CLP operation guideline
Investment Promotion Specialist	F	• CLP Operation and management plan • CLP promotion plan • CLP operation guideline • Preparation of tender documents for CLP management company • Tender management and evaluation supports for CLP management company • Advice on management and operation after operation of CLP
Investment Promotion Specialist	L	• CLP Operation and management plan • CLP promotion plan • CLP operation guideline • Preparation of tender documents for CLP management company • Tender management and evaluation supports for CLP management company • Advice on management and operation after operation of CLP

Note: F: Foreign expert, L: Local expert

Source: JICA Study Team

(2) Work Volume by Expert

To carry out the consultant service above described, the following inputs shall be taken into account as shown in Table 8.4.2. Approximately 24 MM of foreign exports and 35 MM of local experts shall be necessary for carrying out the “hard component”, while approximately 8 MM of foreign exports and 4 MM of local experts shall be necessary for carrying out the “soft component”. Accordingly foreign expert shall be required 32, man-months of total inputs, while the local consultants shall be required 39 man-months of total inputs

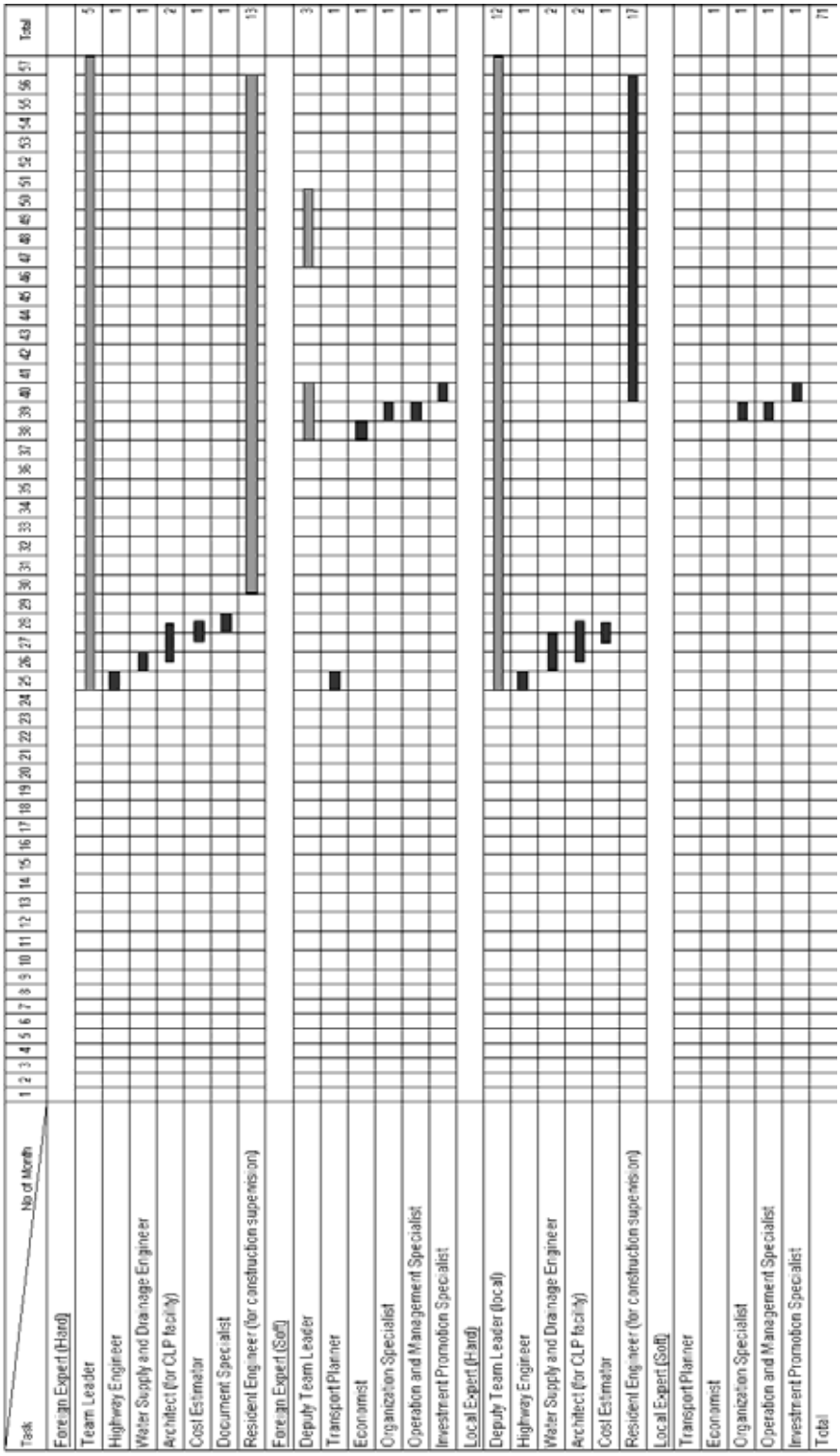
Table 8.4.2 Anticipated Inputs for "Hard Component" and "Soft Component" of CLP Project

	CLP Development (Hard Component)		CLP Relevant Institutions (Soft Component)	
	Foreign	Local	Foreign	Local
Team Leader	5			
Deputy Team Leader		5	3	
Highway Engineer	1			
Water Supply and Drainage Engineer)	1	1		
Architect (for CLP facility)	2	1		
Cost Estimator	1	1		
Document Specialist	1			
Resident Engineer (for construction supervision)	13	16		
Transport Planner			1	
Economist			1	1
Organization Specialist			1	1
Operation and Management Specialist			1	1
Investment Promotion Specialist			1	1
Total	24	35	8	4

Source: JICA Study Team

(3) Anticipated Consultants Input Schedule

Consultant assignment schedule is temporarily taken into account as shown in Figure 8.4.1.



Source: JICA Study Team

Figure 8.4.1 Consultant Assignment Schedule (Temporary)

CHAPTER 9 ECONOMIC AND FINANCIAL APPRAISAL

9.1 Operation and Effect Indicators for CLP Project

The following items are set as indicators to assess performance and effect of the CLP Project.

- Cargo handling volume (ton/day),
- Number of handling trucks and trailers (vehicles/day)
- Handled volume at warehouse (ton/day)

Figures in Table 8.1.1 indicate performance in 2009 and the target year 2018.

Table 9.1.1 Operation and Effect Indicators for CLP Project

	Unit	2009	2018	Remarks
Cargo Handling Volume	000 ton/year	70.0	144.6	Volume in 2009 comes from custom data (Table 4.1.1). Figure in 2018 is estimated from demand forecast in 2015 (106,400 ton, Table 4.3.5) and 2025(295,800 ton, Table 4.3.6).
No of handling trucks and trailers	Vehicles/day	89	89	Estimated from cargo handling volume in 2009, 2015 and 2025, and under an assumption that vehicles transport 24 tons for full loading and 12 tons for mixed loading. Nos of vehicles are 74 in 2015 and 143 in 2025.

Source: JICA Study Team

9.2 Financial Analysis

9.2.1 Introduction

In this section, financial feasibility of CLP Project is analyzed in the first step, and then financial feasibility of two organizational bodies of CLP is assessed separately. The organizational bodies are the Project Owner and CLP-MC. The roles of each body were explained in Chapter 6. In order to assess financial feasibility, the discount cash flow method was adopted and the Financial Internal Rate of Return (FIRR) was used as an evaluation indicator (IRR method).

9.2.2 Basic Assumptions

The basic assumptions below were employed in the analysis.

(1) With-project and without-project

In “with-project” case, CLP development project is implemented, and activities at warehouse at national border were perfectly substituted by the CLP. On the other hand, “without-project case” means CLP development project will not be implemented, and the warehouse at Vangtao border point will be used at current capacity in the future.

(2) Conditions to calculate project revenue

Based on freight demand forecast in Chapter 4, JICA Study Team prepared figures on number of 2 axle trucks, 3 axle trucks and trailers at CLP in 2015 and 2025. The freight volumes and number of vehicles in other years were interpolated, and financial revenue was calculated annually.

(3) Implementation Schedule

The implementation schedule presented in section 6.8 was used in this analysis. The JICA Study Team assumed that consensus building for development of CLP would start in January 2011, and construction works of CLP would be completed in May 2014. From June 2014, CLP would start full operations.

(4) Project Life

The project design life is 20 years after the start of operations. That is to say, operations of CLP would start in June 2014 and end in December 2033.

(5) Price

Project cost as of November 2009 was used in this analysis. The exchange rate was determined from average rate in the 3rd quarter of 2009. USD1.00 is equivalent to JPY93.57, LAK8,507.61 and THB33.84.

9.2.3 Financial Analysis of CLP Development Project

At first, Financial Internal Rate of Return for the CLP project was calculated under the assumption that the project implementation body is a single unit (project FIRR). In this case, project revenue and cost items indicated in Table 9.2.1 were identified in calculation of IRR.

Table 9.2.1 Cash Inflow and Cash Outflow to Calculate Project FIRR

Cash Outflow	Construction Cost of CLP Investment Cost for Cargo Trans-shipment O&M Cost for CLP
Cash Inflow	Revenue from Transport Operator

Source: JICA Study Team

(1) Project Revenue

Major revenue from CLP project is trans-shipment charges and storage charges. Unit tariffs of trans-shipment and storage were set as indicated in Table 9.2.2. These tariffs were set from tariffs applied in Lat Krabang and Leam Chabang Ports.

The trans-shipment charges consist of lift-on/lift-off charge and stuffing/unstuffing charge. In case of a trailer with imported cargo, the containers[1] are trans-shipped to another trailer or trucks at CLP. If the containers are transshipped to another trailer, lift-on/lift-off charge is charged twice when containers are lifted off and lifted on. In addition to the lift-on/lift-off charge, stuffing/unstuffing charge is collected twice when the cargo inside of container is trans-shipped. In case of a truck carrying imported cargo, cargo is transshipped to another truck at CLP. In this case only stuffing/unstuffing charge will be charged twice when cargo is unloaded and loaded. In case a truck or a trailer carries transit cargo, the vehicle would just stop at CLP for CIQ process without trans-shipment of cargo.

The storage charge consists of storage charge at warehouse, cold storage, heavy bulk cargo area and general cargo CY area. Extra cargo movement charge is collected when cargo is moved from/to warehouse and cold storage.

The other revenue items considered were parking fee and container wash charge. All vehicles using CLP pay parking fee which is THB33 per vehicle.

The 4th and 6th columns of Table 9.2.2 indicate volumes of tariff items and revenues in 2025. Total revenue will amount to USD 1,179,000 in the year.

Table 9.2.2 Tariff Items and Revenue in 2025

Tariff Items	Unit Price (THB)	Handling Volumes in 2015	Handling Volumes in 2025	Revenue in 2015 (USD 000)	Revenue in 2025 (USD 000)
Lift-on/lift-off charge	400 per 20' container	20 containers per day	47 containers per day	123	289
Stuffing/unstuffing charge	1,200 per 20' container	70 containers per day	139 containers per day	1,254	2,379
User charge of warehouse	10 per ton	143 tons per day	358 tons per day	125	312
Extra cargo movement	350 per 20' container	24 containers per day	60 containers per day	46	114
Cold storage charge	110 per ton				
Extra cargo movement	350 per 20' container				
Parking fee	33 per vehicle	74 vehicles	143 vehicles	13	24
General cargo storage charge	160 per 20' container per day[2]	3 containers per day	11 containers per day	4	14
Heavy bulk storage charge	160 per 20' container per day[3]	3 containers per day	3 containers per day	4	4
Container wash charge	300 per 20' container per day	6 containers per day	6 containers per day	53	53
Total	-	-	-	1,727	3,455

Source: JICA Study Team

(2) Project Expenditure

Annual disbursement of the total development cost which includes the total construction cost, administration cost, consultancy cost and contingency is indicated in Table 5.6.1. The development cost was distributed as indicated in Table 8.2.3 under project implementation plan presented in Figure 6.7.1.

[1] It is assumed that a trailer has two 20' containers.
[2] Containers and cargo which are placed at CY will be charged from 4th day at CY.
[3] Containers and cargo which are placed at bulk cargo area will be charged from 4th day at bulk cargo area.

Table 9.2.3 Annual Disbursement of CLP Development Cost

Unit: USD 000

	2011	2012	2013	2014	Total	Remarks
Total Construction Cost	-	-	8,569	3,673	12,242	-
Administration Cost	105	105	105	52	367	3% of Total Construction Cost
Consultant Cost	-	514	257	86	857	7% of Total Construction Cost
Contingency	-	51	883	376	1,310	10% of Total Construction Cost and Consultant Cost
Total of Financial Cost	105	670	9,814	4,186	14,776	-

Source: JICA Study Team

Table 9.2.4 Investment Cost for Trans-shipment

Unit: USD 000

Items	Unit Price	Numbers (Unit)	Total
Crane	300	2	600
Forklift	30	20	600
Reach Stacker	450	2	900
Total	-	-	2,100

Source: JICA Study Team

Other investment items for CLP that had to be considered were cranes and forklifts purchased by CLP-MC as indicated in Table 9.2.4. The investment amounts to USD 2.1 million in the first year of the operation, and this trans-shipment equipment will be replaced every 10 years.

As regards operation and maintenance expenditure, the major items were personnel expense of CLP-MC and diesel fuel for cranes and forklifts. These costs were calculated as shown in Table 9.2.5. Annual cost of these items reaches USD 709,000. The other item considered was utility charge at CLP-MC working area and public space inside the CLP. Utility cost at CLP-MC working area was included as indirect cost of CLP-MC, which was assumed as 30% of personnel expense and diesel fuel. It amounts to USD 212,700 per year. Utility cost at public space of CLP was assumed as 1% of total development cost. The cost amounts to USD 45,600 per year.

Table 9.2.5 Operation and Maintenance Cost

	Unit Price (USD 000/year)	Persons	Amount (USD 000)	Remarks
Manager	100.0	2	200.0	
Assistant Manager	24.0	2	48.0	
Office Staff	6.0	8	48.0	
Operator	6.0	30	180.0	
Worker	2.4	50	120.0	
Diesel fuel			113.0	USD0.7 x 4 liter x 7 hours x 260 days x 22 cranes/forklifts
Sub-total			709.0	
Total cost including indirect cost utility charges, etc)			921.7	30% of indirect cost

Source: JICA Study Team

(3) Calculation of Project FIRR

Table 9.2.6 indicates annual revenue, annual expenditure and net cash flows used to calculate FIRR. The following assumptions where applied when revenue and cost items were listed.

- Operation of CLP will start in June 2014. Therefore 7/12 of revenue and cost amounts were listed in 2014.
- In the final year of operation, residual value (USD 2,612,000) of logistics facility was listed. The amount was calculated from amount of land preparation work (USD 5,224,000) with an assumption that lifetime of the land preparation work is 40 years[4].
- Revenue amount would increase from 2015 to 2025 in accordance with increase in handling volume. After 2025, the revenue would remain constant. On the other hand, O&M cost remain constant during the operation and maintenance period.

As indicated in the final row of Table 9.2.6, calculated project FIRR is 9.1%.

Table 9.2.6 Calculation of Project FIRR

(Unit: USD 000)

Years from Construction	Years from Operation	Cash Inflow	Cash Outflow			Net Cash Flow
		Revenue	Develop-ment Cost	Investment for Trans-shipment Equipment	O&M Cost	
1			105			-105
2			670			-670
3			9,814			-9,814
4	1	1,051	4,186	2,100	511	-5,746
5	2	1,897			922	976
6	3	2,037			922	1,115
7	4	2,205			922	1,284
8	5	2,345			922	1,423
9	6	2,516			922	1,595
10	7	2,725			922	1,803
11	8	2,909			922	1,987
12	9	3,118			922	2,196
13	10	3,371			922	2,449
14	11	3,623		2,100	922	601
15	12	3,881			922	2,959
16	13	3,881			922	2,959
17	14	3,881			922	2,959
18	15	3,881			922	2,959
19	16	3,881			922	2,959
20	17	3,881			922	2,959
21	18	3,881			922	2,959
22	19	3,881			922	2,959
23	20	3,881	-2,612		922	5,571
				Project FIRR		9.1%

Source: JICA Study Team

[4] Calculated from the following formula: USD5,224,000 x 20 / 40 = USD2,612,000.

(4) Sensitivity Analysis

The following items are risks of the projects:

- Fluctuation of cargo handling volume which brings about increase and decrease of annual revenue,
- Fluctuation of operation and maintenance costs, and
- Shortage of project funds

Table 9.2.7 indicates change of Project FIRR caused by these risks; they are changes in annual revenue, annual expenditure and investment expenditure.

Table 9.2.7 Result of Sensitivity Analysis

Cases	Increase of Annual Revenue (10%)	Decrease of Annual Revenue (10%)	Increase of Annual Expenditure (10%)	Decrease of Annual Expenditure (10%)	Increase of Investment Expenditure (10%)	Decrease of Investment Expenditure (10%)
Project FIRR	10.8%	7.3%	8.5	9.6	8.2	10.2

Source: JICA Study team

Increase of annual revenue would have a large impact on the Project FIRR. It would increase to 10.8% in accordance with 10% increase of annual revenue. On the other hand, the impact of annual expenditure is limited. Project FIRR would drop by 0.9% point due to 10% increase in investment expenditure.

9.2.4 Financial Analysis for Project Owner and CLP-MC

In this section, FIRRs of the Project Owner and the CLP-MC are calculated separately. Cash outflow and cash inflow items for the Project owner and the CLP-MC were compiled as shown in Table 9.2.8 and 8.2.9, respectively. These tables indicate that the values of FIRRs for the Project Owner and the CLP-MC are dependent on the annual amount of concession payment, which is paid by the CLP-MC to the Project Owner.

Table 9.2.8 Cash Outflow and Cash Inflow for Project Owner

Cash Outflow	Construction Cost of CLP
Cash Inflow	Concession payment from CLP-MC

Source: JICA Study Team

Table 9.2.9 Cash Outflow and Cash Inflow for CLP-MC

Cash Outflow	Investment Cost for Trans-shipment Equipment O&M Cost for CLP Concession payment to Project Owner
Cash Inflow	Revenue from Transport Operators

Source: JICA Study Team

Table 9.2.10 indicates cash inflow, cash outflow and net cash flows used to calculate FIRR for Project Owner. Concession payment from CLP-MC which is expressed as “Revenue” was set at USD1.4 million annually. Cash outflow is construction cost of CLP in Table 9.2.6. The calculated

FIRR for the Project Owner in this analysis was 7.8%.

Table 9.2.10 Calculation of FIRR for Project Owner

Unit: USD 000

Years from start of Construction	Years from start of Operations	Cash Inflow	Cash Outflow	Net Cash Flow
1			105	-105
2			670	-670
3			9,814	-9,814
4	1	1,400	4,186	-2,786
5	2	1,400		1,400
6	3	1,400		1,400
7	4	1,400		1,400
8	5	1,400		1,400
9	6	1,400		1,400
10	7	1,400		1,400
11	8	1,400		1,400
12	9	1,400		1,400
13	10	1,400		1,400
14	11	1,400		1,400
15	12	1,400		1,400
16	13	1,400		1,400
17	14	1,400		1,400
18	15	1,400		1,400
19	16	1,400		1,400
20	17	1,400		1,400
21	18	1,400		1,400
22	19	1,400		1,400
23	20	1,400	-2,573	3,973
		7.8%		

Source: JICA Study Team

Table 9.2.11 indicates indicate cash inflow, cash outflow and net cash flows used to calculate FIRR for CLP-MC. Concession payment from the CLP-MC to the Project Owner was included under “O&M Cost” and was set at USD1.4 million annually. Revenue and Investment cost for trans-shipment equipment was set to the same values in Table 9.2.6. Calculated FIRR for CLP-MC in this analysis was 12.2%.

Table 9.2.11 Calculation of FIRR for CLP-MC

Unit: USD 000

Years from start of Construction	Years from start of Operations	Cash Inflow	Cash Outflow		Net Cash Flow
		Revenue	Investment for Trans-shipment Equipment	O&M Costs	
1					0
2					0
3					0
4	1	1,051		2100	1,911
5	2	1,897			2,322
6	3	2,037			2,322
7	4	2,205			2,322
8	5	2,345			2,322
9	6	2,516			2,322
10	7	2,725			2,322
11	8	2,909			2,322

Years from start of Construction	Years from start of Operations	Cash Inflow	Cash Outflow		Net Cash Flow
		Revenue	Investment for Trans-shipment Equipment	O&M Costs	
12	9	3,118			2,322
13	10	3,371			2,322
14	11	3,623		2100	2,322
15	12	3,881			2,322
16	13	3,881			2,322
17	14	3,881			2,322
18	15	3,881			2,322
19	16	3,881			2,322
20	17	3,881			2,322
21	18	3,881			2,322
22	19	3,881			2,322
23	20	3,881			2,322
		FIRR for CLP-MC			12.2%

Source: JICA Study Team

Table 9.2.12 indicates changes to the FIRRs of the Project Owner and CLP-MC in response to changes in concession payments from the CLP-MC. If the CLP-MC would pay USD1.7 million per year, the FIRR of the Project Owner would increase to 10.4%, and the FIRR of the CLP-MC would drop to 6.1%. On the contrary, if the CLP-MC would pay USD1.1 million per year, the FIRR of the Project Owner would drop to 5.0%, and the FIRR of the CLP-MC would increase to 19.3%.

Table 9.2.12 Change of FIRRs for Project Owner and CLP-MC

Annual Concession payment (USD 000)	1,100	1,200	1,300	1,400	1,500	1,600	1,700
FIRR for Project Owner (%)	5.0	6.0	6.9	7.8	8.7	9.5	10.4
FIRR for CLP-MC (%)	19.3	16.7	14.4	12.2	10.1	8.1	6.1

Source: JICA Study team

Key figures to set appropriate level of annual concession payment are opportunity costs of capital which are expressed by interest rates for the Project Owner and CLP-MC. Since the Project Owner is a government entity, the government bond rate is the most appropriate indicator. However, the government of Lao PDR has not issued government bonds such that this indicator is not available. Therefore, it is possible to use loan rate from international financial institutions as an indicator.

On the other hand, CLP-MC operations, which would be borne by a private company or a joint venture, would probably necessitate borrowing from private financial institutions to cover investment outlay.

Table 9.2.13 indicates USD LIBOR (6 month) which is a base for lending rate of the World Bank and ADB, USD SIBOR (3 month), and USD loan (3 to 6 years) at commercial banks in Lao PDR. USD LIBOR and USD SIBOR are very low but USD loan rate at commercial banks is nearly 10%. Therefore it is necessary to secure an FIRR of more than 10% for CLP-MC.

The government of Lao PDR can procure a soft loan from international financial institutions. For example, Yen Loan to Lao PDR provides very soft condition: 0.01% of interest rate and 40 years of loan period (with 10year grace period).

Table 9.2.13 Interest Rate of LIBOR, SIBOR and USD in Lao PDR

	Rate (%)
USD LIBOR (6 month) as of 30 June 2010	0.75250
USD SIBOR (3 month) as in June 2010	0.54
USD Loan of Commercial Banks (3 to 6 years)	9.10

Source: BBA LIBOR Web Page, Singapore MAS Web Page and Bank of Lao PDR Web Page

9.3 Economic Analysis

9.3.1 Introduction

The objective of the Economic Analysis was to assess the economic effect of CLP Project from the perspective of the national economy, and to clarify economic feasibility of the project. Discount cash flow method was adopted in this analysis and Economic Internal Rate of Return (EIRR) was used as an evaluation indicator (IRR method).

9.3.2 Basic Assumptions

As regards the basic assumptions for this economic analysis, the same assumptions applied in section 9.1 were employed for this economic analysis. Economic benefit of the project was articulated by the contrasting the economic benefits of “with-project” case and “without-project” case.

9.3.3 Economic Benefits

(1) Assessment of the economic effects

By implementing CLP project, the following economic effects would be realized:

- Creation of value added at CLP,
- Opportunity cost of cargo,
- Opportunity cost of vehicles (trucks and trailers),
- Stable provision of consumer goods and capital goods to Lao people and Lao companies,
- Improvement of investment environment by reducing logistics cost at Champasack Province, and
- Development of logistics industry at Champasack Province

Out of these economic effects, items excluding stable provision of goods were identified as economic benefits. Detailed explanation of each economic benefit and its amount will be presented in the following sections. Stable provision of consumer and capital goods is very important from the viewpoint of steady national economic development: however, it is not regarded as economic benefit due to complexity of computation.

(2) Creation of Value Added

After completion of CLP, quality of service will be improved and handling volume will be increased. The amount is calculated from incremental volume of value added. If logistics industry had already developed in Lao PDR, it would not be appropriate that value added generated at CLP be considered as an economic benefit. Another logistics facility would handle the cargo in case the CLP Project was not implemented. However, logistics industry in Lao PDR is a developing industry and the CLP would be the only logistics facility in this area[5].

Additional revenue and expenditure of cargo handling service were analyzed in section 9.2.3. Incremental amount of value added was determined from the difference between annual revenue and annual O&M costs and estimated value added at existing warehouse at CCA area.

Expected value added in 2025 would be USD 3,881,000. From existing service and proportion of handling volume at the warehouse at CCA, value added at the existing warehouse was estimated as USD 776,200, 20% of CLP in 2025. Therefore, additional value added in 2025 would be 3,105,000. It would increase from USD 579,000 in 2015, but would remain constant from 2025 onwards until 2033.

(3) Opportunity Cost of Cargo

If CLP is not developed, the number of trucks and trailers coming to the warehouse at border point would exceed the warehouse's capacity. Currently it takes 0.75 hours for a truck or trailer to load and unload cargo: however, it would take more time if the number of trucks increased in the future. As a result, trucks and trailers would have to wait longer to load and unload. In this situation, the waiting time for trucks and trailers and their cargo is loss of opportunity cost. If the CLP project were to be implemented, such opportunity cost would be recovered.

Table 9.3.1 Number of Trucks and Trailers and Opportunity Cost of Cargo

Item	Unit	2015	2020	2025
No of Trucks (2 axles)	Vehicles/year	4	7	14
No of Trucks (3 axles)	Vehicles/year	48	61	80
No of Trailers	Vehicles/year	22	34	49
Difference of waiting time between with-project and without-project	Hours/vehicle	2.07	23.25	23.25
Unit Opportunity Cost of Cargo (2 axles)	USD/hr	0.39	0.39	0.39
Unit Opportunity Cost of Cargo (3 axles)	USD/hr	1.08	1.08	1.08
Unit Opportunity Cost of Cargo (Trailers)	USD/hr	2.73	2.73	2.73
Time Value of Cargo	USD 000	61	980	1,366

Source: JICA Study Team

Table 9.3.1 indicates number of trucks and trailers, difference in waiting time between 'with-project' and 'without-project' cases, unit of time value of cargo and total time value of cargo. The 2nd to 4th rows show change in vehicle numbers (2 axle trucks, 3 axle trucks and trailers) in years 2015, 2020 and 2025. The 5th row shows difference in waiting time between 'with-project' and 'without-project' cases. The Queue Method was applied to determine the waiting time differences. The 6th to the 8th rows show the unit opportunity cost of cargo. It was calculated from the OD survey conducted by the JICA Study Team. The last row shows the total time value of

[5] Value added generated by operators of logistics facility and train operator was included in one of economic benefits in the guidelines prepared by Ministry of Land, Transport and Infrastructure.

cargo. It will increase from 61,000 in 2015 to 1.4 million in 2025 in accordance with increase in difference in waiting times and number of trucks and trailers. Since capacity of CLP was set to meet freight demand in 2025 and unit opportunity cost of cargo is constant, opportunity cost of cargo will stay constant after 2025

(4) Opportunity Cost of Vehicles

As well as cargo, difference in waiting times for trucks and trailers between 'with-project' case and 'without-project' case was also identified as an economic benefit for the project. Table 9.3.2 indicates unit opportunity cost of vehicles. Some parameters, number of trucks and trailers, and difference in time savings are the same with the opportunity cost of cargo. Unit opportunity cost of trucks and unit opportunity cost of trailers will increase similarly to the findings of the ADB Transport Sector Strategy Study. Unit opportunity cost of trucks/trailers continues to increase after 2025 at a rate of 3.7% per annum. It will be USD 1.45/hour for a trailer, USD 1.22/hour for a 3 axle truck and USD 0.80/hour for a 2 axle truck in 2033.

The 4th row of the table indicates total time value of vehicles. It will increase from USD 26,000 in 2015 to USD 812,000 in 2025. After 2025, the time value continues to increase due to increase in unit opportunity cost of vehicles.

Table 9.3.2 Opportunity Cost of Vehicles

Item	Unit	2015	2020	2025
Unit Opportunity Cost of Trucks (2 axle)	USD/hr	0.41	0.50	0.60
Unit Opportunity Cost of Trucks (3 axle)	USD/hr	0.63	0.76	0.91
Unit Opportunity Cost of Trailers	USD/hr	0.75	0.90	1.08
Total Time Value of Vehicles	USD 000	26	488	812

Source: JICA Study Team

9.3.4 Economic Cost

(1) Estimation of Economic Investment Cost

Economic investment cost was calculated from financial investment cost presented in section 5.6. Contingency of the financial investment cost was excluded, and non-trade portion of the investment cost was converted by use of standard conversion factor (hereinafter referred to SCF). According to "Study on Integrated Distribution Center in Savannakhet and Vientiane in Lao PDR", conducted by JETRO, the SCF was calculated as 96.4%. That value was applied in this analysis.

Table 9.3.3 indicates economic investment cost of CLP Development Project. Total economic investment cost is USD13.3 million, 90% of the financial investment cost. Annual cost was distributed in accordance with Project Implementation Schedule presented in the section 6.7.

Table 9.3.3 Economic Investment Cost of CLP Project

Unit: USD 000

Items	2011	2012	2013	2014	Total
Construction Cost			8,472	3,631	12,102
Administration cost	105	105	105	52	367
Cost for Consultant Service		514	257	86	857
Annual Total Cost	105	619	8,834	3,769	13,326

Source: JICA Study Team

The other investment items are cargo trans-shipment equipment such as crane, forklifts and reach stacker. The investment amount is the same as shown in Table 9.2.4, and will be replaced every 10 years.

(2) Operation and Maintenance Cost

Operation and maintenance (hereinafter referred as O&M) costs for economic analysis consist of O&M cost of CLP-MC. Most O&M cost items are the same as items in financial analysis indicated in Table 9.2.5. However, handling of personnel cost for workers (unskilled labour) was different. Salaries for workers (around 50 persons in total) was excluded from operation and maintenance costs because monthly salary for workers (USD 200 per month) is higher than minimum wage (KIP 638,000), and the CLP project would generate new employment which is higher than economic cost for unskilled labor. In the analysis, O&M cost of CLP-MC was disbursed every year after starting operations in 2014.

9.3.5 Calculation of EIRR

Table 9.3.4 indicates economic benefits, economic cost, net cash flow and EIRR.

Table 9.3.4 Cash Flow for Calculation of EIRR

Years from Start of Construction	Years from Start of operations	Economic Benefit			Economic Cost			Net Cash Flow
		Opportunity Cost of Cargo	Opportunity Cost of Vehicle	Additional Value Added	Economic Construction Cost	Investment Cost for Trans-shipment	O&M Costs	
1					105			-105
2					619			-619
3					8,834			-8,834
4	1	18	8	571	3,769	2,100	615	-5,887
5	2	61	26	1,518			1,055	550
6	3	99	44	1,629			1,055	718
7	4	235	106	1,764			1,055	1,050
8	5	490	230	1,876			1,055	1,541
9	6	894	434	2,013			1,055	2,286
10	7	980	488	2,180			1,055	2,593
11	8	1,038	536	2,327			1,055	2,847
12	9	1,102	591	2,494			1,055	3,132
13	10	1,205	664	2,697			1,055	3,511
14	11	1,282	733	2,898		2,100	1,055	1,759
15	12	1,366	812	3,105			1,055	4,227
16	13	1,366	842	3,105			1,055	4,258
17	14	1,366	873	3,105			1,055	4,289
18	15	1,366	906	3,105			1,055	4,321
19	16	1,366	939	3,105			1,055	4,355
20	17	1,366	974	3,105			1,055	4,390
21	18	1,366	1,011	3,105			1,055	4,426
22	19	1,366	1,048	3,105			1,055	4,464
23	20	1,366	1,087	3,105	-2,573		1,055	7,076
							EIRR	12.5%

Source: JICA Study team

Items from the 4th to the 6th column are economic benefits calculated in section 9.3.3 while those from the 7th to 9th column indicate economic costs calculated in section 9.3.4. In the final year of operations, residual value of economic construction costs, which would be USD 2,573,000, is listed[6]. The 10th column shows net cash flow. Calculated EIRR from the net cash flow is 12.5%.

9.4 Conclusion of Financial Analysis and Economic Analysis

9.4.1 Financial Analysis

(1) Project FIRR

Project FIRR, which could be translated that the CLP Project would be conducted by a single implementation body, is 9.1%. Since loan rate in USD from 3 to 6 years is 9.1%, the project is not financially attractive if a private company develops and operates the facility. In addition, the CLP Project faces a significant risk because the amounts of annual revenue and expenditure are huge in comparison with initial investment. Therefore, the project should be implemented and managed under cooperation between public sector and private sector.

(2) FIRR for Project Owner

FIRRs for Project Owner and CLP-MC depend on the annual concession payments from the CLP-MC to the Project Owner. If the CLP-MC disburses USD 1.4 million annually, FIRR for Project Owner would be 7.8%. If the Project Owner, a government entity, procured development funding from international institutions, the value of FIRR for the project owner would be sufficient to justify the commencement of the CLP Project.

(3) FIRR for CLP-MC

FIRR for CLP-MC is 12.2%. In order to attract CLP-MC, which would be a private company or a joint venture, a certain level of FIRR would be needed. As mentioned above, loan rate of US dollar from 3 to 6 years is 9.1%. Considering risk factors, FIRR of more than 10% would be favorable in attracting private investment. The FIRR for CLP-MC exceeds 10%, hence the component of CLP-MC is financially feasible.

9.4.2 Economic Analysis

Calculated EIRR is 12.5%, and higher than the opportunity cost of capital which is 12%. Therefore, the CLP Development Project is economically justifiable.

9.4.3 Recommendation of Financing

As described above, the CLP Development Project would not be financially feasible if a loan were procured from the commercial base. However, the project would be financially feasible if a soft loan were procured. One major candidate for the soft loan is yen loan. The loan condition of the yen loan for Lao PDR is the most favorable. It is at a 0.01% interest rate with 40 years loan period

[6] Listing residual value of economic construction cost in the final year of operation and maintenance period is mentioned in the guidelines prepared by Ministry of Land, Transport and Infrastructure. The residual value is calculated from the following formula: USD5,146,000 x 20 / 40 = USD2,573,000.

(including 10 years grace period). If the yen loan were applied for the project, the project would progress steadily towards realisation.

CHAPTER 10 CONCLUSIONS

CLP project is rationalized under Lao National Logistics Strategy, National and Provincial Social and Economic Development Plan and urgent requirement of improvement of current shortage of well-functional ICD facilities in Champasack Province.

CLP should be established with “Triple Multi” development concept such as: (1) Multi-Target, (2) Multi-Activity, and (3) Multi-Service, in order to perform five major roles: (1) acting as interface for international trade, (2) provision of transport options, (3) supporting further development in agriculture and industry at Champasack Province, (4) acting as efficient domestics hub and (5) logistics business incubation.

It is preferable that CLP be located near national border with Thailand at Vangtao, but conforming to existing plans and availability of land.

CLP is expected to handle cargo of about 1,140 tons/day in 2025 by both truck and railway. It is assumed that it will handle traffic of approximately 140 trucks a day. CLP will provide CIQ, storage, inventory management, trans-shipment and multi-modal transport services with container yard, container freight station, truck terminal, etc. Total area of CLP will be 10.2 ha. The CLP project will require approximately 12.2 million USD to cover construction costs and 2.6 million USD to cover miscellaneous costs, for a total project cost of 14.8 million USD.

Private participation will be crucial in realising good management and operation in CLP. The Lao Government shall select the project owner of CLP. The project owner will then be expected to assign a CLP management company to take care of operations, management and logistics business at CLP.

Regarding economic and financial feasibility, CLP is a meaningful project in terms of the national economy. EIRR which is 12.5%, is over the level of opportunity cost of capital (12%). Levels of Project FIRR and FIRR for CLP-MC are 8.9% and 11.8%, respectively, which are significant enough to attract private sector. In order to secure participation of private sector, Lao PDR Government should put in order measures to mitigate project risks. FIRR for project owner is 7.8%. It is financially feasible if soft loan like yen loan is used for the project.

Accordingly, it is deduced that the CLP project is a financially, technically and environmentally feasible project.