
Study Report

March 2010

Engineering and Consulting Firms Association, Japan
Japan Development Institute (JDI)
PICTURES

<table>
<thead>
<tr>
<th>Plantation Site of Eucalyptus in Central Laos</th>
<th>Plantation Site of Eucalyptus in Central Laos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agro-Forestry Processing SEZ site in Thakek</td>
<td>Agro-Forestry Processing SEZ site in Thakek</td>
</tr>
<tr>
<td>The road connecting to SEZ in Thakek</td>
<td>The road connecting to SEZ in Thakek</td>
</tr>
</tbody>
</table>
3rd Friendship Bridge Construction Site
Bridging between Nakhon Phanom (Thailand) and Thakek (Laos)

Road 12: Laotian Side

Road 12: Laotian Side

Road 12: Laotian Side

Road 12: Laotian Side
Thakek-Vung Ang Gateway
The New East-West Corridor for North-Eastern Thailand, Lao PDR, and Vietnam

Road 12: Laotian Side
Sign board of the future construction plan

Road 12: Laotian Side
Mountaneous area

Road 12: Laotian Side
Agriculture field along Road 12

Road 12: Laotian Side
Houses scattered along the Road

Road 12: Laotian Side
The border control at the Laotian Side
Thakek-Vung Ang Gateway
The New East-West Corridor for North-Eastern Thailand, Lao PDR, and Vietnam

The border control at the Vietnamese Side
Section between the border and HCM Hwy
Unpaved road due to be improved

Section between the border and HCM Hwy
HCM Hwy (Road 15)

Intersection of HCM Hwy and Road 12
Road 12: Vietnamese Side
Thakek-Vung Ang Gateway
The New East-West Corridor for North-Eastern Thailand, Lao PDR, and Vietnam

- **Road 12: Vietnamese Side**
- **Section between the border and HCM Hwy**
- **Newly constructed section of Hwy #1**
- **Hwy #1 Near the entrance of the Vung Ang Port**
Road 12: Vietnamese Side
Agriculture field and houses along the Road

Vung Ang Port (Berth No.1)
Loading woodchips exported to Japan

Vung Ang Port (Berth No.1)
Loading woodchips exported to Japan

Vung Ang Port (Berth No.2)
Start operating in January, 2010

Vung Ang Port (Berth No.2)
Ware houses
<table>
<thead>
<tr>
<th><strong>Vung Ang Port (Berth No.2)</strong></th>
<th><strong>Vung Ang Port (Berth No.2)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Project site for the New Woodchip Yard and Berth No.3</td>
<td>Son Duong Port under construction</td>
</tr>
<tr>
<td>Son Duong Port under construction</td>
<td>Son Duong Port</td>
</tr>
<tr>
<td></td>
<td>Oil tanks under construction</td>
</tr>
</tbody>
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Thakek-Vung Ang Gateway
The New East-West Corridor for North-Eastern Thailand, Lao PDR, and Vietnam

The Woodchip Storage Yard of a Japanese trade company near the Vung Ang Port

Preparing to load them to trucks

Collected timbers to be processed

Timbers processed into woodchips

The View of Ha Tinh City
60km from the Vung Ang Port

The Beach Resort near the Vung Ang Port
At the time of off-season
## ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>AFTA</td>
<td>ASEAN Free Trade Area</td>
</tr>
<tr>
<td>CDF</td>
<td>Custom Declaration Form</td>
</tr>
<tr>
<td>DOH</td>
<td>Department of Highways of Thailand</td>
</tr>
<tr>
<td>DWT</td>
<td>Dear Weight Tonne</td>
</tr>
<tr>
<td>EWEC</td>
<td>The East West Economic Corridor</td>
</tr>
<tr>
<td>EZ</td>
<td>Economic Zone</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GMS</td>
<td>Greater Mekong Sub-region</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>JBIC</td>
<td>Japan Bank for International Cooperation</td>
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<td>JICA</td>
<td>Japan International Cooperation Agency</td>
</tr>
<tr>
<td>MOT</td>
<td>Ministry of Transport of Vietnam</td>
</tr>
<tr>
<td>MPI</td>
<td>Ministry of Planning and Investment of Laos/Vietnam</td>
</tr>
<tr>
<td>NBCA</td>
<td>National Biodiversity Conservation Area</td>
</tr>
<tr>
<td>NSEC</td>
<td>The North-South Economic Corridor</td>
</tr>
<tr>
<td>LPRP</td>
<td>Lao people’s Revolutionary Party</td>
</tr>
<tr>
<td>SEC</td>
<td>The Southern Economic Corridor</td>
</tr>
<tr>
<td>SEZ</td>
<td>Special Economic Zone</td>
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<tr>
<td>TEDI</td>
<td>Transport Engineering Design Inc.</td>
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<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>UNIDO</td>
<td>United Nations Industrial Development Organization</td>
</tr>
<tr>
<td>UNLK</td>
<td>United Nations Layout Key</td>
</tr>
<tr>
<td>VAT</td>
<td>Value-Added Tax</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network</td>
</tr>
<tr>
<td>WMV</td>
<td>Woodchip Maximum Vessel</td>
</tr>
<tr>
<td>WTO</td>
<td>World Trade Organization</td>
</tr>
</tbody>
</table>
INDEX

PREFACE ..................................................................................................................................... 1

1 EXECUTIVE SUMMARY .................................................................................................. 3

2 BASIC INFORMATION OF LAO PDR AND VIETNAM .............................................. 7
  2.1 Lao PDR .......................................................................................................................... 7
    2.1.1 Geography............................................................................................................... 7
    2.1.2 Economy ................................................................................................................. 7
    2.1.3 Politics .................................................................................................................... 9
    2.1.4 Population and Culture ........................................................................................... 9

  2.2 Vietnam .......................................................................................................................... 9
    2.2.1 Geography............................................................................................................... 9
    2.2.2 Economy ............................................................................................................... 10
    2.2.3 Politics .................................................................................................................. 12
    2.2.4 Population and Culture ......................................................................................... 12

3 BACKGROUND AND OBJECTIVE ............................................................................... 13
  3.1 The Agro-Forestry Industry and the Woodchip Production in Lao PDR ............. 13
    3.1.1 Overview of the Agro-Forestry Industry in Laos .................................................. 13
    3.1.2 The Development of Agro-Forestry Processing Zone in the Khammouane Province, Lao PDR .............................................................................................................. 14
    3.1.3 The Potentiality of Woodchip Production for the Economic Growth of Lao PDR 18

  3.2 Greater Mekong Subregion (GMS) Economic Corridor Development Program. 21

  3.3 The East-West Corridor and for the Land Locked Country Laos ..................... 24
    3.3.1 Mawlamyine - Dang Nang Gateway ................................................................. 24
    3.3.2 Thakek-Vung Ang Gateway .................................................................................. 25
    3.3.3 The Advantage of the Thakek-Vung Ang Gateway .............................................. 26

  3.4 Study Objectives ........................................................................................................... 27

4 CONDITION AND FUTURE DEVELOPMENT PLAN OF ROAD NO. 12 .......... 28
  4.1 The Existing Transportation Volume and Future Demand Projection ............. 28
    4.1.1 Traffic Count: 2001-2008 ..................................................................................... 28
    4.1.2 The Future Demand from Agro-Forestry Companies in Laos .......................... 30
    4.1.3 The Future Demand from North-Eastern Thailand .......................................... 32

  4.2 The Current Condition of Road No.12 ................................................................. 33
    4.2.1 At the Lao PDR’s Side .......................................................................................... 34
    4.2.2 At the Vietnam Side ............................................................................................ 35
4.3 The Development Plan of the Third Friendship Bridge .......................................................... 37
4.4 The Future Development Plan of Road No.12 .................................................................... 38
  4.4.1 The Road Improvement Plan in Two Phases ................................................................. 38
  4.4.2 The Development Plan of Connecting Road No.12 to Vientiane ............................. 39
  4.4.3 Improvement in the Custom Process at the Border .................................................... 39
  4.4.4 Railway Development Plan from Thakek to Vung Ang .............................................. 41
5 CONDITION AND FUTURE DEVELOPMENT PLAN OF THE VUNG ANG PORT 42
  5.1 The Location of the Vung Ang Port ................................................................................. 42
  5.2 The Current Condition and Capacity of the Vung Ang Port ........................................... 42
    5.2.1 The Start of the Development in 2001 ...................................................................... 42
    5.2.2 The Improvement of the Port in 2004 ..................................................................... 43
    5.2.3 The Current Capacity and Demand of the Vung Ang Port ....................................... 43
    5.2.4 The Development Plan of the Son Duong Port ......................................................... 44
  5.3 Industries in the Vung Ang Port ...................................................................................... 46
    5.3.1 The Vung Ang Economic Zone .............................................................................. 46
    5.3.2 Woodchip Companies ........................................................................................... 47
    5.3.3 Thermal Power Plant ............................................................................................... 47
    5.3.4 Industries in the Son Duong Port ............................................................................ 48
  5.4 Proposed Concept of the Woodchip based Processing, Storage and Exporting Terminal: 2010-2020 .............................................................................................................. 49
    5.4.1 The Role of the Woodchip Company for the Development of Vung Ang Corridor 50
    5.4.2 The Future Plan of Expanding the Vung Ang Port .................................................. 50
    5.4.3 The Development Plan of the Woodchip Storage Yard .......................................... 50
    5.4.4 The Development Plan of Berth No.3 .................................................................... 52
6 SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS OF THE PROPOSED DEVELOPMENT PLAN .................................................................................................................. 55
  6.1 The Socio-Economic and Environmental Data of Khammouane Province, Lao PDR 55
    6.1.1 Population .............................................................................................................. 56
    6.1.2 Livelihood and Economy ....................................................................................... 57
    6.1.3 Education and Health Care .................................................................................... 57
    6.1.4 Environment ........................................................................................................... 58
  6.2 The Environmental Impacts to the Khammouane Province .......................................... 58
  6.3 Socio-Economic Impacts in the Khammouane Province .............................................. 59
6.3.1 Impacts to Income and Livelihood ................................................................. 59
6.3.2 Impacts to Education and Health Care ........................................................... 60

6.4 The Socio-Economic Data of the Ha Tinh Province, Vietnam ......................... 60
6.4.1 Population ....................................................................................................... 61
6.4.2 Livelihood and Economy ............................................................................... 61
6.4.3 Education and Health Care .......................................................................... 62
6.4.4 Environment ................................................................................................. 63

6.5 The Environmental Impacts to the Ha Tinh Province ........................................... 64

6.6 The Socio-Economic Impacts to the Ha Tinh Province ......................................... 65
6.6.1 Impacts to the Livelihood and Income ......................................................... 65
6.6.2 Impacts to Education and Health Care ......................................................... 66

7 Economic Analysis of the Port Development ............................................................ 67
7.1 Basic Conditions .................................................................................................. 67
7.1.1 Export Volume Forecast of Woodchips ......................................................... 67
7.1.2 Logistic Plan .................................................................................................. 68

7.2 Phase One: Vung Ang Port Storage Yard Development Project ......................... 68
7.2.1 Construction Cost and Engineering/Civil Costs .............................................. 68
7.2.2 Operational Costs .......................................................................................... 70
7.2.3 Expected Revenue Projection from Woodchip Storage Yard Lease and Handling at the Port ............................................................................................................................. 71
7.2.4 Financial Internal Rate of Return (FIRR) ....................................................... 71
7.2.5 Sensitivity Analysis ....................................................................................... 74
7.2.6 Implications .................................................................................................. 74

7.3 Phase Two: Development Project of Berth No. 3 ................................................. 75
7.3.1 Financial Internal Rate of Return (FIRR) ....................................................... 75
7.3.2 Sensitivity Analysis ....................................................................................... 77
7.3.3 Cash Flow Analysis ...................................................................................... 78
7.3.4 Implications .................................................................................................. 78

8 Stakeholders Analysis ............................................................................................ 80
8.1.1 Stakeholder Analysis on National Level ....................................................... 80
8.1.2 Stakeholder Analysis on Local Level ............................................................. 81

9 Future Action Plan .................................................................................................. 82
9.1 Preparation Study Phase: 2010 ......................................................................... 83
9.2 Phase I Development Plan: 2011-2012 ................................................................ 83
9.2.1 Agro-Forestry Processing SEZ in Thakek, Lao PDR ...................................... 83
9.2.2 Woodchip Storage Yard at the Vung Ang Port ............................................. 84
9.3..... Phase 2 Development Plan: 2020 or after................................................................. 84
9.4..... Possible Funding Scheme......................................................................................... 85
  9.4.1  Funding for the Woodchip Storage Yard................................................................. 85
  9.4.2  Funding for Berth No.3 at the Vung Ang Port ....................................................... 85
9.5..... Recommendation to the Vietnamese Government ................................................. 86
9.6..... Recommendation to the Lao Government............................................................ 87
10  CONCLUSION................................................................................................................. 88
LIST OF FIGURES

Figure 2-1: GDP Growth of Lao PDR ................................................................. 8
Figure 2-2: GDP Growth of Vietnam .................................................................11
Figure 3-1: Breakdown of the Forestry Use .......................................................14
Figure 3-2: Potential Locations and Themes for Lao SEZ program in 2010-2025 ....15
Figure 3-3: Map of the Agro-Forestry Processing SEZ in the Khammouane Province ....16
Figure 3-4: The Change in Paper Demand in Japan: 1995-2008 ............................18
Figure 3-5: The Change in Imported Woodchips Volume ....................................19
Figure 3-6: Major Woodchip Import Countries of Japan: 1998 and 2008 ...............20
Figure 3-7: Greater Mekong Subregion Economic Corridors ..............................22
Figure 3-8: Map of the East West Corridor in GMS ...........................................24
Figure 4-1: Average Annual Daily Traffic on Road No.12 ...................................29
Figure 4-2: Average Annual Daily Traffic on Road No.12 by Vehicle Type ............30
Figure 4-3: Estimated Average Daily Truck Transportation on the Third Friendship Bridge ..............................................................33
Figure 4-4: Route from Thakhek – Lao/Vietnam Border – Vung Ang Port .................34
Figure 4-5: Road No.12 from Vung Ang to Cha Lo (Border) .................................36
Figure 4-6: Two Alternative Routes from the Vung Ang Port to Cha Lo (Border) ......37
Figure 5-1: The Layout of the Vung Ang Port (in 2010) ........................................43
Figure 5-2: Locations of the Vung Ang Port and the Son Duong Port ........................45
Figure 5-3: Location of the 3 Possible Development Sites for a Woodchip Storage Yard ...52
Figure 5-4: Location of Breakwaters at the Vung Ang Port .....................................53
Figure 6-1: Map of the Sample Population .......................................................56
Figure 6-2: Vegetation Type of the Ha Tinh Province .........................................64
Figure 8-1: Organizational Structure of Maritime Business in Vietnam ..................81
Figure 9-1: The Flow-Chart of Seaport Investment and Development Approval .......82
LIST OF TABLES

Table 3-1: Change in Forest Coverage .................................................................13
Table 3-2: Projected Cash Flow by Using Loan for SEZ Development ...............17
Table 3-3: Schedule of the Woodchip Plantation and Harvesting .......................21
Table 4-1: Required Trucks Per Day to Transport Woodchips from Central Laos ....31
Table 4-2: Required Trucks Per Day to Transport Other Agro-Forestry Products ....31
Table 4-3: Demand Projection from Agro-Forestry Companies on Road No.12 .......32
Table 6-1: Changes of Possessions in 1997/98 to 2006 ........................................62
Table 7-1: Export Volume Forecast of Woodchips .............................................67
Table 7-2: Estimated Preparation Cost of EIA .....................................................68
Table 7-3: Estimated Cost for Civil Engineering Services and Supervision ...........69
Table 7-4: Construction Cost for the Woodchip Storage Yard .............................69
Table 7-5: Total Investment Cost of the Woodchip Storage Yard Development ....70
Table 7-6: Operation Cost of the Woodchip Project Per Year ..............................70
Table 9-1: Rough Development Schedule of the Agro-Forestry SEZ in Thakek ....84
PREFACE

Japan Development Institute (JDI) is currently leading Lao PDR’s national Special Economic Zone (SEZ) development plan funded by the Asian Development Bank (ADB). This project aims to attract sustainable foreign and local investments as the engine of growth and industrial development of Lao PDR by establishing SEZs in strategic areas. Among the Laotian economy, recently the agro-forestry industry is growing steadily as several private companies from China, Vietnam, and Japan have invested in the development of timber and rubber. Especially woodchip production has been focused in this study in that companies in central Laos are planning to start processing and exporting large quantity of their agro-forestry products in immediate future by 2012.

As an export route of woodchips, the corridor starting from Thakek in Laos to the Vung Ang Port in Vietnam is deemed to be the most advantageous, in terms of the distance and the availability of a deep sea port. Considering the interest of those agro-forestry companies in central Laos, it is likely that they would use the getaway route through the Vung Ang Port once the financial viability and efficiency is assured with utilizing the corridor. Consequently, it is important to first study as to what is the current conditions of the corridor in correspondent with critical factors for transporting agro-forestry products, and how to attain the efficiency of the Thakek-Vung Ang Gateway for agro-forestry companies in central Laos, especially the woodchip processing and exporting companies. Also to ensure the cooperation from the Vietnam side on establishing the optimal transportation system at the port, a project team was formed to fulfill the mission.

Team Members

1) Dr. Shoichi Kobayashi: Project Leader and Chief Economist
2) Mr. Nobuo Kawamura: Port Development Expert
3) Mr. Pisanu Tongtub: Road Construction and Development Expert
4) Mr. Sumiyuki Otsuki: Economic and Financial Analyst
5) Ms. Yumiko Ota: Social and Environmental Analyst

During the study, the team received warm supports from corresponding governmental and private organizations in Laos and Vietnam. Herewith, we would like to express our special thanks and gratitude to the following officials:

1) Ministry of Public Works and Transportation of Lao PDR
2) Khammouane Provincial Government of Lao PDR
3) Management Board of Vung Ang Economic Zone
4) Maritime Administration of Ha Tinh, Vietnam
5) Ha Tinh Port Stock Company of Vietnam
6) Transport Engineering Design Inc. (TEDI)

Finally, we are hoping that this study will be useful for developing the Thakek-Vung Ang Gateway by means of socio-economic uplift for both Lao PDR and Vietnam.

Sincerely Yours,

Shoichi Kobayashi Ph.D.
Chairman of Japan Development Institute (JDI)
1 EXECUTIVE SUMMARY

Lao PDR, having its capital in Vientiane City, is economically less developed among the countries in Southeast Asia. However, utilizing the rich natural resources the country has, the agro-forestry industry, which is growing steadily in recent years, could be the pull to lead the country to an economic growth. Still, because of its land-locked situation, Laos needs to identify an advantageous transport route, in terms of cost of money and time. In this manner, the Thakek-Vung Ang Gateway, connecting the north-eastern Thailand through central Laos to the South China Sea using the Vung Ang Port in north-central Vietnam, was identified as the export route for agro-forestry industries in central Laos. This is because with the completion of Road No. 12 directly connecting central Laos to the Vung Ang Port in June, 2009, the Vung Ang Port became the closest gateway port for industries in central Laos. For industries in a land-locked country Laos, which incurs additional transportation cost than industries in a country equipped with a port, the cost efficiency could better reached through shorter distances.

Secondly, the Vung Ang Port is known as a natural deep seaport that has little influence by waves and winds because of the presence of Ron Cape Peninsula which works as a natural breakwater. In addition, because the port has not yet densely used, there is a room for agro-forestry industries to build a storage yard in the vicinity of operating berths. Therefore, this study was conducted to confirm the financial viability and the efficiency of using the Thakek-Vung Ang Gateway for agro-forestry industries in central Laos. At the end of the study, it is our purpose to identify necessary improvements need to be conducted at the Gateway to attain the efficiency, and to ensure the cooperation from the Vietnam side on establishing the optimal transportation system at the Vung Ang Port.

In 2005, the total forestry coverage of Laos was about 16,142,000 ha, which is nearly 70% of the total land. Among it, though the production plantation area is still limited to 1.4% of the total forestry, it is increasing at the rate of 5,500% from 4,000 ha in 1990 to 224,000 ha in 2005. In central Laos, several private companies from China, Vietnam, and Japan have invested in the development of timber, rubber, and woodchips. This study particularly focuses on the woodchip production as the main agro-forestry industry, because it is planned to start harvesting woodchip materials and process into woodchips from 2012. Though the exporting volume will be 180,000 tons in the first year, considering the plantation area of woodchip trees completed by 2009, the export volume is projected to grow steadily and reach to 800,000 tons per year between 2014 and 2018. Thus, there is a pressing need for the woodchip industry in central Laos to identify an economical export route, and prepare necessary infrastructures to ensure the export start by 2012.

In order to ensure the start of export from 2012, there are two important urgent
projects that need to be completed by the end of 2011. The first is the completion of the
Agro-Forestry Processing SEZ in Thakek, Laos. In the national SEZ development program
currently conducted under the funding of Asian development Bank (ADB) and United Nations
Industrial Development Organization (UNIDO), a development of an Agro-Forestry
Processing Zone was proposed as one of the 12 SEZs leading the economic development of
Laos. The agro-forestry processing zone is planned to be constructed in the 100ha of the total
of 350ha SEZ, located at the merger point of Road No. 12 and No. 13 in the Khammouane
Province in Laos. By 2010, it is crucial to receive a formal approval from the Laotian National
Government on the development, and conduct a Feasibility Study and Engineering Design
Work of the processing zone. By 2011, the construction of the processing zone should be
completed to be in time of the harvest of woodchip trees in 2012.

The second important project is to develop a woodchip storage yard in the vicinity of
the operating berths at the Vung Ang Port. At March 2010, there are two operating berths at
the Vung Ang Port. The first is Berth No.1 which was constructed in 2001, and upgraded in
2004 to accommodate 45,000DWT vessels. The second is Berth No.2, which was just
completed its construction in 2009, and will be started operating in March, 2010, by the joint
venture company between Laos and Vietnam. Berth No. 2 is able to accommodate vessels upto
50,000DWT. Under the Master Plan organized by three organizations in Ha Tinh
Province—the Vung Ang Economic Zone Authority, Maritime Administration of Ha Tinh, and
Ha Tinh Port Joint Stock Company—where the Vung Ang Port is located, there is a plan to
construct additional berths, from Berth No. 3 to No.6, in the future.

Through the discussions with stakeholders at the Vung Ang Port during the study, it
was generally understood that a feasibility study should be conducted soon to develop a 5 ha
storage yard at the backland of the project site of Berth No.3 and No.4. These two berths are
planned to be constructed next to Berth No.2, thus until Berth No.3 is constructed, the
woodchip industry can utilize Berth No.1 and No.2 as exporting berths. This position of the
woodchip storage yard is especially important to ensure efficiency of exporting woodchips all
the way from central Laos. If the storage yard is constructed close enough from the operating
berths to directly load woodchips from the storage yard to arriving vessels utilizing conveyer
belts, the transportation cost could be cut dramatically to ensure an internationally competitive
price in the market. Therefore, a feasibility study and a detail engineering design should be
conducted within 2010, after receiving an approval from the Prime Minister through a formal
submission of a proposal to the Ministry of Transport (MOT) of Vietnam. Following the study,
the reclamation and the construction of the 5 ha storage yard should start in 2011, and should
be completed within 2011 or early 2012.

The above two development projects are considered as urgent tasks need to be taken
to ensure the steady growth the agro-forestry industries in Laos to led to the further economic growth of the country. Suppose the two urgent projects comprises Phase 1, in the long-run, the following two projects should be conducted as Phase 2 to sustain the increasing volume of woodchip export through the Vung Ang Port.

1) The Development of Berth No.3
If the woodchip industry succeeds in exporting woodchips through the Thakek-Vung Ang Gateway, other agro-forestry industries in central Laos, as well as other smaller scale woodchip companies in central Laos and central Vietnam were to follow the same route, and gather their products at the Vung Ang Port. Ultimately, this project aims to handle about 1.5 million tons per year of woodchips at the Vung Ang Port. Thus, the Berth No.3 should be constructed as a specialized port to handle woodchips either when Berth No.1 and No.2 hit the full capacity, or when the export volume of woodchips reached to 1.5 million tons per year. Based on the financial analysis, it was also proved that the profitability of developing and operating Berth No.3 can be attained when the yen loan from the Japan Bank for International Cooperation (JBIC) was applied as the project financial scheme. The operation of a new specialized berth for the woodchip industry will benefit both Laos and Vietnam by providing a stable export route for Laos, and by creating employment and income opportunities for Vietnam. At the end, this project of utilizing the Thakek-Vung Ang Gateway will improve the socio-economic condition of both countries.

2) The Improvement of Road No.12
At the current plan, woodchips will be transported using 20 tons size trucks crossing the Lao/Viet border at Na Phao. Once the transportation of woodchips from central Laos to Vietnam starts in 2012, not only the traffic volume on the road will increase, but also, there will be more heavy trucks on the road. Though the current road condition—2 lanes at 3.5 meters—may be enough to hold increased traffic volume at the first several years, a constant improvement of the road surface as well as the increase of lanes becomes necessary to ensure a smooth traffic flow in the future when the transport volume of woodchips reaches to 800,000 tons per year between 2014 and 2018. Considering the time left until the volume hits 800,000 tons per year, the improvement of Road No.12 could be approached by using Japanese money, such as Japan International Cooperation Agency (JICA).

By becoming the second gateway of the East-West Corridor after the gateway through the Da Nang Port in Vietnam, the Thakek-Vung Ang Gateway possesses a potential of improving the socio-economic status of central Laos and north central Vietnam, which are both identified as poorer regions of the country. Therefore, to promote the utilization of the
gateway, it is important to establish the export route for woodchip industry as the trigger.
2 BASIC INFORMATION OF LAO PDR AND VIETNAM

2.1 Lao PDR

Lao PDR, having its capital in Vientiane City, is economically less developed among the countries in Southeast Asia. However, if using the situation and the resources strategically, there is a chance to improve its economical situation. First, Laos is an important transit route for neighboring countries exporting goods within and outside the Mekong Region. If Laos can also use this route as her export route, there is a good chance to connect its economy with the international market. Secondly, the rich forestry and agricultural resources of Lao PDR has been attracting foreign and national investors recently. If supported by governmental policies together with infrastructural development, the industry could grow further to lead the country’s economic growth.

2.1.1 Geography

The most prominent geographic characteristic of Laos is its landlocked situation, surrounded by five countries. However, the country is not just landlocked, but in between the two prominent countries in Southeast Asia—Thailand in the west and Vietnam in the east. The country is also thickly covered by forests, and consists mostly with rugged mountains, and some plains and plateaus. The Mekong River works as the boundary with Thailand in the west, while the mountains of the Annamite Chain form the boundary with Vietnam in the east.

The climate is tropical with monsoon during the rainy season. The rainy season starts from May and lasts till November, followed by a dry season from December to April. People have been supporting their lives by mainly growing agricultural and forestry products adjusting to this climate characteristics. Although the agriculture sector in Laos accounts for about 50% of the country’s GDP, only 4.01% of the land is arable, and 0.34% among it is used as permanent crop land. This is the lowest among the Greater Mekong Sub-region (GMS).

2.1.2 Economy

Although the country itself is known as one of the few remaining one-party Communist states, it began alleviating the control over economy, and encouraging private enterprise in 1986. After that decentralization over economy, the average Gross Domestic Product (GDP) growth marked 6% per year from 1988-2008, except for 1997 when the Asian Financial Crisis occurred. However, the world wide fiscal crisis that started from late 2008 caused a rapid drop in commodity prices. Especially copper, one of the main mining resources of Lao PDR, has slowed down investments from foreign countries, and thus the economic growth of the country.
As stated in the chapter above, although people in Laos have supported their lives self-sufficiently by mainly growing agricultural and forestry products, in industrial level, its economy is heavily dependent on investments from neighboring countries like Thailand, Vietnam, and China. Especially, Thailand and Vietnam have been casting large influences on Lao PDR’s political and economical decisions. Infrastructures, such as roads, railways, and telecommunications, have developed along with their favor more than to people in agriculture sector, which accounts for about 80% of the Laotian population.

The country also receives development aid from international organizations such as International Monetary Fund (IMF) and Asian Development Bank (ADB), and foreign direct investments from bilateral aid agencies, such as Japan International Cooperation Agency (JICA). Financial aids and foreign direct investments account for about 80% of the country’s capital expenditures in investment. Such expenditures are mostly used for the development of manpower, industry, hydropower, and mining. Lao PDR is also known by its rich natural resources, such as timber, hydropower, gypsum, tin, gold, and gemstones. Among them, most notably, the country’s large water resources and mountainous terrain traditionally enabled the country to produce and export large quantities of hydroelectric power, and provide electricity cheaply to the domestic market. However, recently, the potential of the forestry industry has been growing as many private companies from China and Vietnam are investing in the development of timber and rubber.
In recent years, Lao PDR has been aiming to join the World Trade Organization (WTO). By joining WTO and improving trade policies, Laos expects to achieve a better business environment needed for its economic growth. The government’s effort to improve the country’s economic prospects among the investors is also likely to contribute in simplifying the investment procedures. Furthermore, the government’s fiscal resource is also expected to improve with the introduction of Value-Added Tax (VAT) regime from early 2009. Because of all these efforts, the World Bank has declared that Laos’s goal of graduating from the United Nations Development Program’s (UNDP) list of least-developed countries by 2020 is achievable.

2.1.3 Politics
As it is mentioned above, Lao PDR is a communist single-party socialist republic. The only legal political party is the Lao people’s Revolutionary Party (LPRP). President of the country is also the head of the LPRP. Government policies are determined by the party through the all-powerful nine-member Executive Committee, and the 49-member Central Committee. The central government in the Vientiane Capital also governs the administrative divisions in the 16 provinces.

2.1.4 Population and Culture
Compared to the size of the country, the population is relatively small. In July 2009, there were about 6.9 million people with a 2.3% annual growth. The average median age is about 19 years, and the average life expectancy at birth is 56 years old between male and female. There are more than 100 ethnic groups including minor groups, however, 55% can be counted as Lao, and 11% is Khmou. The population is also largely dominated by Buddhist, which accounts about 67% of the population. The average literacy rate between male and female is 68.7%. The educational expenditures are only about 3% of the GDP.

2.2 Vietnam
Although the country was divided, and experienced a conflict controlled by interests of the two super powers, namely the United States and the Soviet Union, after the withdrawal of the U.S. troops in 1973, Vietnam has been experiencing a steady economic growth. Therefore, together with Thailand, the country is known as a successful country in Southeast Asia. Following chapters shows the overview of the country.

2.2.1 Geography
Vietnam is known as a gateway country for Southeast Asian nations, bordering the
Gulf of Thailand, Gulf of Tonkin, and South China Sea in the east. In the west, the country shares borders with China, Laos, and Cambodia. The total coastline is about 3,500km. The topography of the country is mostly hills and densely forested mountains, covering just below 20%. The northern part of the country consists mostly of highlands and the Red River Delta. The south is divided into coastal lowlands, Annamite Chain peaks at the border with Laos, extensive forests, and poor soil. However, Vietnam has the highest land use for permanent crops (7%) in any nation in the Greater Mekong Subregion.

Because of these differences in topography, the climate tends to vary considerably from place to place. However, in general, it is tropical in south, and monsoonal in north with hot and rainy season from May to September, and warm and dry season from October to March. The temperatures in the southern plains varies less, going between 21 and 28°. On the contrary, the temperatures in northern mountains and plateaus vary from 5 to 37°.

2.2.2 Economy

The country experienced a significant shift in the economy from the Communist government planned economy to the Socialist-oriented market economy since the enactment of “Doi Moi” (Renovation) policy in 1986. This new policy aimed to increase economic liberalization and an enactment of structural reforms needed to modernize the economy and to create more competitive, and export-driven industries. Subsequently, in the past 30 years, Vietnam is recovering from the ravages of war, and freeing from the rigidities of a centrally-planned economy. Vietnam achieved around 8% GDP growth from 1990 to 1997, and continued to grow at around 7% from 2000 to 2008. This made Vietnam the second-fastest growing economy in the world. Today, Vietnam is one of Asia’s most open economies, of which two-way trade accounts around 160% of GDP. This is more than twice the ratio for China, and over four times of India.
In 2001, Vietnam further increased her presence in the international market by becoming a member of the ASEAN Free Trade Area (AFTA), and entering into the force of the US-Vietnam Bilateral Trade Agreement. This partnership with US increased Vietnam’s exports to the US by 900% from 2001 to 2007, and led to the membership of WTO in 2007. The elimination of quotas on textiles and clothing of WTO partners through the WTO membership enabled Vietnam to grow their textile and clothing industries. To the contrary, the share of the agriculture industry among the country’s economic output has continued to shrink about 25% in 2000 to less than 20% in 2008. Still, Vietnam is the largest producer of cashew nuts (1/3 of the global share), the largest producer of black pepper (1/3 of the global market), and the second largest rice exporter after Thailand. Besides rice, the key exports are coffee, tea, rubber, and fishery products, but the fast-growing part of the economy is manufacturing, information technology, and high-tech industries. In addition, Vietnam enjoys the position of the third-largest oil producer in Southeast Asia with an output of 400,000 barrels per day.

The next challenge of the country is to create jobs to meet the demand from a growing labor force, which is increasing by 1.5 million people per year (the current unemployment rate is 4.7% in 2008). However, considering the export-oriented economy—exports account for 68% of the economy in 2007—this initiative is expected to slow down in the time of the global financial crisis.
2.2.3 Politics

The country is a single-party state governed by the Communist Party of Vietnam (CPV). There are several political groups advocating democracy, but they are not recognized by the government. However, the socialistic characteristic in politics is diminishing since the 1990s. The President is the titular head of state, and the nominal commander in chief of the military. The Prime Minister is the head of government, controlling over a council of ministries composed of three deputy prime ministers, and 26 ministries and commissions. The administrative divisions are divided into 58 provinces, placing its capital in Hanoi.

2.2.4 Population and Culture

The population of the country amounts to 86 million, which is the 13th largest population in the world. The population is growing at the rate of 1% in 2009. The average median age is about 27 years old, and the average life expectancy at birth is 71 years old between male and female. Female tend to live longer which average is 6 years longer than that of male. Though there are several ethnic groups, it is largely dominated by Kinh (Viet) which amounts for 86% of the population. There is no particular religion dominating the population. Buddhist is the largest but only 9.3% of the population, Catholic is 6.7%. About 80% of the population belongs to others. As the economy grew, the education level also improved. The average literacy rate between male and female is 90%. However, the gap in the literacy level between male (94%) and female (87%) has remained as an issue.
3 BACKGROUND AND OBJECTIVE

The Greater Mekong Subregion (GMS), comprised by Cambodia, China, Laos, Myanmar, Thailand, and Vietnam, has been receiving supports financially and technically from advanced nations and aid agencies in past years, because of its peaceful political climate, and the potentiality of providing cheap labor source to industries in advanced nations. Among those countries, Laos had been economically lagging behind because of its land locked situation. Although this is about to change due to increasing attentions to the country’s agro-forestry resources, Laos still needs to identify an advantageous transport route, in terms of cost of money and time. In this chapter, the potential of the agro-forestry industry in Laos, and possible transport route will be discussed. Then, based on the identified route, the research objectives will be explained.

3.1 The Agro-Forestry Industry and the Woodchip Production in Lao PDR

3.1.1 Overview of the Agro-Forestry Industry in Laos

In 2005, the total forestry coverage of Laos was about 16,142,000 ha, which is nearly 70% of the total land. The rich forestry resources have been important sources of food or income for people in Laos for a long time. For example, people eat forestry fruits or plants when they could not cultivate enough rice, or sold forestry products for cash. However, recently the forests in Laos are threatened. Slash-and-burn agriculture, uncontrolled fires, commercial and illegal logging, and fuel wood collection resulted in the loss of 6.8% of the country's forests between 1990 and 2005.

<table>
<thead>
<tr>
<th>Table 3-1: Change in Forest Coverage</th>
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<tbody>
<tr>
<td>Forest Area (ha)</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>% Change</td>
</tr>
</tbody>
</table>

(Source: Mongbay.com)

For Laotian people who have been counting on the forest resources, this lost casts a serious problem to their lives. People between different villages sometimes fought over the limited resources for survival. Thus, with the help from international aid organizations and NGOs, the Lao government started implementing projects to teach farmers how to manage and conserve forests, and modified her Forestry Law to tighten regulations over forestry preservation. In areas where forests were cleared, because of agriculture and logging, plantations for production use have been promoting. By promoting plantations, the
government seeks to revitalize the forests, and increase employments at the plantation site.

As it is shown in Figure 3-1, though the production plantation area is still limited to 1.4% of the total forestry, it is increasing at the rate of 5,500% from 4,000 ha in 1990 to 224,000 ha in 2005. In fact, a Japanese paper manufacturing company just signed an agreement with the Lao Government in February, 2010 to plant Eucalyptus and Acacia in about 25,000 ha unused land.

![Figure 3-1: Breakdown of the Forestry Use](Source: Mongbay.com)

By utilizing the unused empty land that is suitable for forestry plantation, the role of the agro-forestry industry in Laos is expected to grow larger in the future.

3.1.2 The Development of Agro-Forestry Processing Zone in the Khammouane Province, Lao PDR

In relation to the increasing commercial plantation, the Lao government is also seeking to change its agro-forestry industry from a mere material provider to a value-added processor. This intention is also supported in a project called “Building Lao PDR’s Capacity to Develop Special Economic Zones (SEZs)”, which was implemented from June, 2009 funded by ADB/United Nations Industrial Development Organization (UNIDO). This project aims to attract sustainable foreign and local investments as the engine of growth and industrial development of Lao PDR. As a driver to reach this aim, the project seeks to establish SEZs in strategic areas, and provide necessary infrastructures and services to attract investors. A development of an Agro-Forestry Processing Zone was proposed as one of the 12 SEZs leading the economic development of Laos.
The Agro-Forestry SEZ proposed in the ADB/UNIDO project is planned to be developed in Thakek, Khammouane province by using the 350 ha land between Road No.13 and No.12. Because Khammouane is endowed with rich forestry and agricultural land, some agro-forestry companies invested by China, Vietnam, and Japan have already started planting trees for woodchips, timber, and rubber, and Cassava in the past. Since the Laotian law requires investors in Laos to process at least part of their agro-forestry products within Laos to help create employments, and transfer skills to local people, Laos is seeing a potentiality in the contribution to the economic development this agro-forestry SEZ can provide.
Based on the discussions with the provincial governor, the study team for the ADB project agreed that among the 350 ha proposed land, 100 ha will be allocated for industrial uses, another 100 ha for commercial/residential/hotel, and the remaining 150 ha for golf course/sport and green zone. A detailed proposal will be submitted within 2010 to the Prime Minister through the provincial government, and expected to be developed in 2011. The Detailed plan of the industrial zone is explained below.

1) Development Phase

**Phase 1:** After the approval from the Prime Minister, 100 ha Industrial Zone shall be developed from January, 2011, and to be completed by December, 2011. The operation of the industrial zone completed in Phase 1 shall be started from January, 2012.

**Phase 2:** The development of the commercial/residential/hotel zone and the golf course/sport and green zone should start.
2) Type of Industries to be expected for the Thakhek SEZ

Considering the location of SEZ, the province and the study team for the ADB project expect to attract the following industries:

1. Forestry based industries such as woodchip processing industry, lumber processing and furniture manufacturing industries.
2. Agro-processing industries such as cassava processing, vegetable oil processing and bio-ethanol and bio-diesel production plants.
3. Rubber Processing and manufacturing of rubber products.

3) Cost Estimation

- Land Cost: $3.00 per sq meter
- Land development cost: $10.00 per sq meter
- Interest and management cost: $1.00 per sq meter
- Total Cost $14.00 per sq meter (Net Area)
- Cost Example for 55 ha land = 550,000 sq meter x $14.00 = $7.7 Million

4) Sales Price and Possible Return to Investment

- Sale’s price: $22.00 per sq meter:
- Price example for 50 ha land = 500,000 sq meter x $22.00 = $11 million

5) Possible Concessional Loan from ADB and JBIC

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td>Survey Construction Operation</td>
<td>0.25</td>
<td>7.15</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
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<tr>
<td>Equity (Land) Loan</td>
<td>2.0 (1.5)</td>
<td>7.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Revenue Advance: Service fee</td>
<td>2.0</td>
<td>8.0</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Cash Flow Loan PayNet Profits</td>
<td>0.25</td>
<td>1.85</td>
<td>8.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
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<td></td>
<td>7.7</td>
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(Source: JDI Study Team)
3.1.3 The Potentiality of Woodchip Production for the Economic Growth of Lao PDR

Among those agro-forestry companies in the Khammouane Province, the woodchip production is planned to be the first of processing and exporting in a large volume. The position of this woodchip production is important in terms of the economic growth of Laos since the demand for woodchips for paper production has generally kept high, except for 2009 when the world was slowly healing from the economic recession from the end of 2008. However, seeing the gradual recovery from the economic loss around the world since the end of 2009, the paper demand is expected to increase again this year. Especially, the paper demand in countries with a faster economic recovery rate, such as China, ASEAN countries and India, is expected to grow steadily again. Japan, the main export destination of woodchips growing in central Laos, is expanding its business in these countries recently. Thus, by studying the paper demand in Japan, and the volume of paper export from Japan, the future expectancy for woodchip production in Laos will be known.

The paper demand in Japan itself has been slightly decreasing in these few years because companies are reserving to spend much on advertising, such as flyers and brochures, after the economic recession. Still, the demand for paper is kept in a high percentage as shown in Figure 3-4 below.

![Figure 3-4: The Change in Paper Demand in Japan: 1995-2008](Image)

* in thousand tons
(Source: Japan Paper Association)
To meet the demand in and outside the country, Japan has been producing woodchips among its own land, and importing from other countries. Although the paper demand itself in Japan is slightly decreasing, the amount of imported woodchips has been growing over the past years.

Figure 3-5: The Change in Imported Woodchips Volume
(Source: Japan Paper Association)

By countries, Australia and New Zealand have been ranked among the top countries from where Japan is importing woodchips. However, when studying by the tree type, it can be seen that volume of imports from Asian countries are increasing in broad-leaf trees. The Eucalyptus, which is growing in the central Laos, is also listed among the broad-leaf trees. Therefore, if a cost-effective export route from Laos is established, Laos can also follow the successful woodchip export model of other Asian countries.
Seeing the suitability of land in Laos for woodchip production, a Japanese company is producing woodchips in central Laos with a planting, harvesting, and exporting plan as given in Table 3-3. The plantation size of woodchip trees in Khammouane Province, and Bolikamxai Province in the neighbor has reached over 20,000 ha by the end of 2009, and is planned to be expanded further to 40,000 ha within the next few years. The operation of the woodchip company in central Laos will continue at least until the next 50 years.
Table 3-3: Schedule of the Woodchip Plantation and Harvesting

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</thead>
<tbody>
<tr>
<td>Plantation (ha)</td>
<td>1,600</td>
<td>276</td>
<td>3,430</td>
<td>6,040</td>
<td>6,572</td>
<td>8,500</td>
<td>7,000</td>
<td>7,000</td>
<td>7,000</td>
<td>7,000</td>
<td>7,000</td>
<td>7,000</td>
</tr>
<tr>
<td>Cumulative Plantation Area (ha)</td>
<td>1,876</td>
<td>5,306</td>
<td>11,346</td>
<td>17,918</td>
<td>26,418</td>
<td>33,418</td>
<td>40,418</td>
<td>47,418</td>
<td>54,418</td>
<td>61,418</td>
<td>68,418</td>
<td></td>
</tr>
<tr>
<td>Harvesting (ha)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Cumulative Harvested Area (ha)</td>
<td>1,876</td>
<td>3,430</td>
<td>6,040</td>
<td>6,500</td>
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(Source: Japanese Forestry Company in Central Laos)

Because woodchips will be the first to be exported to the international market among agro-forestry companies in central Laos, its export route and plan can be the model for other companies to follow in the future. Thus, the JDI research team has declared that the success of Lao agro-forestry industry relies on whether the woodchip production can achieve an economically viable transport route through neighboring countries. For this purpose, the economic corridor currently being developed through ADB’s assistance, will be studied closely to identify an advantageous transport route.

3.2 Greater Mekong Subregion (GMS) Economic Corridor Development Program

In 1992, with ADB’s assistance, the six countries in GMS entered into a program of sub-regional economic cooperation, designed to enhance economic relations among the countries. Until today, the program has contributed to the development of infrastructures to enable the development and sharing the resource base, and promoting freer flow of goods and people in the subregion. It has also led to the international recognition of the GMS as a growth area.

In order for a successful economic cooperation, trans-national road linkages have been recognized as especially an important element to be strengthened. In 1998, three main focal corridors in terms of transportation, namely North-South, East-West, and Southern economic corridors, were set as in figure 3-7.
Figure 3-7: Greater Mekong Subregion Economic Corridors
(Source: Asian Development Bank)
The North-South Economic Corridor (NSEC) has been receiving the largest attentions from investors connecting Bangkok to Hanoi. It involves three different routes along the north-south axis of the GMS geography as listed below. Constructions and renovations of road are processing in an ideal pace with four countries involving in the corridor changing their road standards to the sub-regional standards.

1) The Western Sub-Corridor: Connects Kunming (China)-Chiang Rai (Thailand) -Bangkok (Thailand) via Lao PDR or Myanmar. This section completed its construction in 2007, except for the part lying in Myanmar.

2) The Central Sub-Corridor: Connects Kunming-Ha Noi (Vietnam)-Hai Phong (Vietnam), which connects to the existing Highway No. 1 running from the north to the south of Vietnam. The constructions of expressways are duly progressing.

3) The Eastern Sub-Corridor: Connects Nanning (China)- Ha Noi via the Youyi Pass or Fangcheng (China)-Dongxing (China)-Mong Cai (Vietnam) route. The construction of the expressway in some sections was completed, and the railway rehabilitation in Vietnam is also progressing.

The Southern Economic Corridor (SEC) runs through southern Thailand, Cambodia, and southern Vietnam. Originally, the SEC consisted only with one route—the Bangkok-Phnom Penh-Ho Chi Minh City-Vung Tau corridor. However, at the request of member countries, the following two routes were also included:


2) The Southern Coastal Sub-Corridor: Connects Bangkok - Trat (Thailand) - Koh Kong - Kampot (Cambodia) - Ha Tien - Ca Mau - Nam Can (Vietnam).

SEC is important in its way allowing direct route from southern Laos to Sihanoukville port in Cambodia. Currently, the Southern Corridor’s key sections, which are mostly located in Cambodia, are being upgraded and rehabilitated by respective governments. Assistance is also being provided by ADB, Japan, World Bank, Korea, China, and Thailand.

The East-West Economic Corridor (EWEC) runs from the Mawlamyine Port in Myanmar to the Da Nang Port in Vietnam through Laos and Thailand. The total distance is 1,450 km, partially intersecting with NSEC. This corridor enables GMS to have a direct route connecting the Indian Ocean and the South China Sea. Since the start of Economic Corridor
development in GMS, Japan has long been supporting the development of EWEC. Japan and ADB have been mainly providing assistance to Laos and Vietnam for upgrading roads, and Thailand offering assistance to Myanmar. EWEC is particularly important for the land-locked country like Laos to secure the route access to the sea.

Recently, in addition to the on-going EWEC having the Da Nang Port as a gateway to the Eastern Sea, the gateway through the Vung Ang Port in central Vietnam has also caught attentions as a new section in the East-West Corridor since the start of the port operation in 2001. Geographically, for the woodchip company in central Laos, either gateway in EWEC will be the center of focus when considering the transport route. Therefore, the two gateways will be studied in details in the next chapter to identify which corridor is more suitable.

3.3 The East-West Corridor and for the Land Locked Country Laos

The relationship between the plantation area of woodchip trees in central Laos, and the two gateways in the East-West economic corridor are shown in the map below. For convenience, each gateway will be named after the origin in Laos and the destination port.

![Figure 3-8: Map of the East West Corridor in GMS](Source: Asian Development Bank)

3.3.1 Mawlamyine - Dang Nang Gateway

The development of this gateway is consisted with various transportation
improvement projects, such as the Second Mekong International Bridge construction between Laos and Thailand in Savannakhet, the Mekong Bridge access roads in Thailand, the National Road No.9 rehabilitation in Laos, the National Highway No.1 periodic maintenance in Vietnam, and the Da Nang Port improvement funded by various agencies, including ADB, JICA, Japan Bank for International Cooperation (JBIC), and private companies, but all coordinated under ADB’s initiative. The project did not only aim to build a road link among Thailand, Laos, and Vietnam, but also to reduce governmental constraints in crossing borders to encourage transport and trade flow.

Among this gateway, the part from Laos to the Da Nang Port is especially important for woodchip export from the central Laos. By the end of 2008, the rehabilitation of Road No.9 from Phin in Laos to Dong Ha in Vietnam, and the construction of the Second Mekong Bridge were completed. The Da Nang Port upgrade project is still ongoing, scheduled to be finished by the end of 2010. The Da Nang Port is comprised of two ports, namely Tien Sa Port and Song Han Port. Currently, it can accommodate vessels weighing up to 40,000 tons and having a capacity of 2,000 TEUs. In 2000, the port handled about one million tons of goods, which were low considering the capacity of the port. This was partially due to the presences of other good ports in surrounding regions. However, since the EWEC under ADB project specifically identifies the Da Nang Port as the gateway, it expects to receive more goods in the future. Thus, the Da Nang Port started an upgrade project, aiming to handle four million tons/year of goods by 2010, including 120,000 TEUs of cargo. The port have been investing large sums to upgrade infrastructures, improve loading and unloading facilities, and simplifying administrative procedures through 2010. In details, it will build a container terminal able to handle ships upto 50,000tons at the Tien Sa Port, and a 20ha inland container depot outside the port.

3.3.2 Thakek-Vung Ang Gateway

This gateway is not developed under the GMS Economic Corridor Plan funded by ADB, but under the agreement between Vietnam and Laos in 1996. The Vung Ang Port at the end of the gateway was constructed specifically to help Laos gain a route out to the sea to promote their trade business. While the port facility completed its construction in 2001, the direct road, called Road No.12, connecting Thakek to the Vung Ang Port have just completed in June, 2009, though minor sections are still under the process of paving. In addition to the direct connection between Laos and Vietnam, the project of connecting north-eastern Thailand is also progressing. In 2007, the Thai government agreed with the Lao government to build the Third Friendship Bridge from Nakhom Phanom in Thailand to Thakek, enabling a vertical transport route from north-east Thailand to Central Vietnam. The bridge is scheduled to be completed in
2011 funded by the Thai government.

At the end of the gateway, there are two sea ports in the Vung Ang area. The first is called the Vung Ang Port, which currently has two operating berths. Berth No.1, which can handle up to 45,000 DWT vessels, was completed in 2001, and already operated by the Ha Tinh Port Joint Stock Company. Berth No.2, which is able to accommodate as large as 50,000DWT vessels, will start its operation from March, 2010 by a joint company called Vung Ang Port Viet-Lao Joint Stock Company, which is invested by 10 different entities from Vietnam and Laos. The second port is called the Son Duong Port. Vung Ang and Son Duong are situating next to each other, but geographically divided by the Ron Cape Peninsula (See Chapter 6 for details). The Son Duong Port is still under construction funded by a Taiwanese Formosa Group scheduled to be completed by 2012. The area has a potential of accommodating ships as large as 200,000-400,000DWT, which is potentially the largest port in Asia.

3.3.3 The Advantage of the Thakek-Vung Ang Gateway

When considering for a transportation route of woodchips from central Laos, there are two important factors that have to be evaluated. First is the distance from the woodchip processing site to the exporting port. When exporting goods from Laos, because the country is surrounded by five countries, the transportation cost will be higher than exporting from a country equipped with a sea port. While the distance from the woodchip processing site in central Laos to the Vung Ang Port is below 300km, the distance to the Da Nang Port is more than 500km.

The second factor is the capacity of the exporting port. First, there should be enough space to develop a stock yard for woodchips in a close distance to operating berths. Because transporting woodchips from Laos to a port is already costly, the cost of loading woodchips to vessels should be kept low by building the yard close to a berth. In this point, because it is relatively new in the region, the Vung Ang Port has not yet been densely in use, thus sites near operating berths are still available. In addition, the port has to be able to accommodate a vessel expected to be used when the woodchip production hits the maximum. In this case, the assumed maximum vessel size (at least until 2019) is 51,000 DWT Woodchip Maximum Vessel (WMV). The Vung Ang Port already has a berth that can accommodate vessels upto 50,000DWT, while the Da Nang Port is expected to finish upgrading one of its berths to hold a vessel as large as 50,000DWT as well.

Between the two gateways, there are not many differences except for the distance between the woodchip processing site to the exporting port. The 200km gap between the distances of two gateways brings a lot of differences in cost that could influence the
profitability of the woodchip business. As stated above, the woodchips export is a pilot project that other agro-forestry companies in central Laos could follow if economic efficiency was reached. Therefore, JDI study team identified the Thakek-Vung Ang Corridor as more suitable to serve for the woodchip exports from central Laos in the future. The choice of which port in the Vung Ang area should be used—either the Vung Ang Port or the Son Duong Port—will be discussed later in this report. In the meantime, the common condition between the Vung Ang Port and the Son Duong Port—the road network—is discussed in Chapter 5.

3.4 Study Objectives

If successfully planned, the development of the Thakek-Vung Ang Gateway benefits both Laos and Vietnam in a long term. For Laos, it is the route out to the sea, especially for agro-forestry companies in central Laos. If the route is proved to be an efficient and economical transport route, it will serve to develop a sustainable business for agro-forestry companies, which in return contribute to the economic development of Laos. For Vietnam, agro-forestry companies, especially the woodchip production in Laos, are currently the largest potential users of the Vung Ang Port. In addition, according to their plantation plan, the export will continue even after 2019 at about 1,000,000 tons/year rate. Thus, for Vietnam, serving for agro-forestry products export ensures a long-term profit at the Vung Ang Port.

In order to establish this win-win situation between two countries, there must be a successful example utilizing the Thakek-Vung Ang Gateway. The exports of woodchips could be a pilot project that establishes a new export route for other agro-forestry companies in central Laos to follow. For a successful trans-shipment, the cost efficiency must be achieved, first by securing a storage yard for agro-forestry companies at the vicinity of operating Berths. Secondly, an expansion or improvement of road and port infrastructures should be carefully studied and planned to keep up with the growth in the volume of transported goods on the corridor. Therefore, in order to certify these two elements, the study objective was set as follow.

1) To identify and calculate the future export demand through the Thakek-Vung Ang Gateway from central Laos.
2) To compare the above demand to future development plans of Laos and Vietnam on Road No.12, and Vung Ang Port.
3) To identify and provide specific plans of necessary infrastructural improvement projects at the Vung Ang Port to meet the demand from Laos with preliminary development schedule.
4) To identify possible donors of future infrastructure development projects, and build basic understanding on the project.
4 CONDITION AND FUTURE DEVELOPMENT PLAN OF ROAD NO. 12

Road No.12 starting from Thakek in Laos through the Vung Ang Port in Vietnam enabled Laos to gain direct route to a sea port. The road has one lane in each direction, which is enough to serve the current traffic volume, but assumed to be insufficient once woodchip starts being exported in large volumes. In order to design the Road No.12 improvement plan so that woodchips can be exported without a major traffic concern, first the future demand on road will be explained, then the current road condition summarized, and finally the proposed improvement plan will be presented in this chapter.

4.1 The Existing Transportation Volume and Future Demand Projection

According to the daily traffic record taken by the Department of Road, Ministry of Public Works and Transportation of Laos, daily number of vehicles on Road No.12 increased from 1,500/day to 4,000/day after the road connected to the Lao/Viet border in 2008. Still, the one lane road in each direction, is enough to keep a smooth traffic. However, as the transportation of agro-forestry products start from 2012, the traffic on Road 12 is expected to increase as in the table below.

To hold such volume in addition to the existing traffic volume, a widening of the road or increase in lanes, and a constant improvement of the surface may be needed to ensure smooth traffic flow from central Laos to the Vung Ang Port. In order to project the future demand and identify necessary road improvement projects, the current traffic count is studied, then the projection was made based on information from potential users of Road No.12 in the following paragraphs.

4.1.1 Traffic Count: 2001-2008

Based on to the traffic data on Road No.12 provided by the Department of Road, Ministry of Public Works and Transportation of Laos, the daily traffic on Road No.12 in the Laotian side was calculated as in Figure 4-1. Seeing the large increase of traffic between year 2004 and 2008, it can be assumed that the traffic flow increased after the completion of the construction of Road No.12 to the border. This suggests that there is a certain amount of potential users of Road No.12, if directly connected with Vietnam. Considering the fact that the Vietnamese part of Road No.12 just completed in June, 2009, users of Road No.12 is likely to be kept increasing in the future as well. If the transportation of agro-forestry products starts from central Laos within the next few years, the volume will further increase.
In Figure 4-2 below, the average annual daily traffic by vehicle types is shown. Besides the increase in the volume of “car”, traffic volume of trucks—light, medium, and heavy—is also increasing steadily. It is assumed that some of the trucks are involved in border trade carrying cattle and limestones from Laos to Vietnam. Both can be purchased cheaper in Laos, then transported and marketed into Vietnam. At this moment, because the Road No.12 in Vietnam has just completed, the traffic volume in Vietnam is not yet summarized. Still, since the woodchips are planned to be transported from central Laos by using 20 tons size truck, the volume of “Heavy Trucks” is expected to grow in the future.
4.1.2 The Future Demand from Agro-Forestry Companies in Laos

Although there are other products transported from central Laos to Vietnam through the Road No.12, such as limestones and cattle, since this project proposal is to ensure economically sound export route for agro-forestry companies, especially woodchips, in the future, the demand forecast will be based on the demands from such companies. Agro-forestry companies in Laos are mainly dealing with woodchips, timber, rubber, and cassava. According to preliminary hearings from companies in the area, by year 2009, the plantation area of woodchips, rubber, and cassava in central Laos has reached more than 30,000ha to 40,000ha. In terms of export through the Road No.12, the woodchip export volume is especially prominent and urgent. The export of woodchips is planned to start from 2012, expecting to transport about 180,000tons of woodchips in the first year, and 400,000tons in the second year. The export volume will increase steadily, and projected to reach to about 800,000tons/year between 2014-2018, and 900,000tons/year after 2019.

Since woodchip is rather voluminous commodity, it would require trucks with larger loading space, such as trailers and long bodies. Hence, the expected truck volume on Road No.12 to transport woodchips from central Laos was calculated in the following table by given three options—10 ton trucks, 15 ton trucks, and 20 ton trucks.
Table 4-1: Required Trucks Per Day to Transport Woodchips from Central Laos

<table>
<thead>
<tr>
<th>Year (s)</th>
<th>Production (based on MT per year)</th>
<th>Required trucks per day based on truck capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10- tonner</td>
</tr>
<tr>
<td>2012</td>
<td>180,000</td>
<td>50</td>
</tr>
<tr>
<td>2013</td>
<td>400,000</td>
<td>110</td>
</tr>
<tr>
<td>2014 -18</td>
<td>800,000</td>
<td>220</td>
</tr>
<tr>
<td>2019 onwards</td>
<td>900,000</td>
<td>246</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

By the time the volume of woodchip transportation reaches to 900,000 tons/year in 2019, the number of daily trips to the Vung Ang Port will increase to 123 trips/day in addition to the average daily traffic today (in case of using 20 tons trucks). However, the above table is for woodchips alone. If the economic efficiency of the Thakek-Vung Ang Gateway is verified through the woodchip transportation, other agro-forestry products are also likely to take the same transport route in the following volume.

Table 4-2: Required Trucks Per Day to Transport Other Agro-Forestry Products

<table>
<thead>
<tr>
<th>Year (s)</th>
<th>Production (based on MT per year)</th>
<th>Required trucks per day based on truck capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10- tonner</td>
</tr>
<tr>
<td>2012</td>
<td>340,000</td>
<td>100</td>
</tr>
<tr>
<td>2013</td>
<td>800,000</td>
<td>220</td>
</tr>
<tr>
<td>2014 -18</td>
<td>1,600,000</td>
<td>440</td>
</tr>
<tr>
<td>2019 onwards</td>
<td>1,800,000</td>
<td>492</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

If all added up, the minimum traffic volume, based on the assumption that all companies will use 20 tons trucks for transportation, and other vehicles on the road will increase for 1,000 vehicles per day every year, the future traffic demand on the Road No.12 can be summarized as below.
Table 4-3: Demand Projection from Agro-Forestry Companies on Road No.12

<table>
<thead>
<tr>
<th>Year</th>
<th>Volume (tons)</th>
<th>Volume (vehicles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>—</td>
<td>4,000 vehicles/year</td>
</tr>
<tr>
<td>2012-2014</td>
<td>520,000tons</td>
<td>5,075 vehicles/year</td>
</tr>
<tr>
<td>2013</td>
<td>1,200,000tons</td>
<td>6,165 vehicles/year</td>
</tr>
<tr>
<td>2014-18</td>
<td>2,400,000tons</td>
<td>7,330 vehicles/year</td>
</tr>
<tr>
<td>2019 onwards</td>
<td>2,700,000tons</td>
<td>8,369 vehicles/year</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

4.1.3 The Future Demand from North-Eastern Thailand

After the completion of the Third Friendship Bridge at the border with Thailand/Laos in Thakek in 2011, the export volume from the north-eastern Thailand will also become a crucial determinant of the development plan of the Road No.12.

The total area of north-eastern Thailand, which is known as “Isan” by locals, is slightly larger than England. In Isan, agriculture is the main economic activity, generating about 22% of Gross Regional Product. The main crop is sticky rice, which endures even in the poorly drained paddy field. However due to the low socio-economic conditions and hot, dry climate, the output lags behind that of other parts of the country. As a result, Isan is considered as Thailand's poorest region. Recently, farmers are increasingly diversifying into cash crops, such as sugar cane and cassava which are cultivated on a vast scale, and to a lesser extent, rubber. Silk production is an important cottage industry and contributes significantly to the economy as well. Pineapples, tomatoes, and tobaccos are also occupying an important part of economy, particularly in the Nong Kai Province.

Considering the capacity and the advantage of the location of the Vung Ang Port, once the Third Friendship Bridge at Nakhom Phanom/Thakek is constructed, it is likely that the traffic volume from the North-Eastern area of Thailand increase year by year. In addition, once the route to Thailand is opened, the traffic flow from Vietnam, such as trucks carrying oil, is likely to increase as well. Based on the data taken by the Department of Highways (DOH) of Thailand, the estimate of the future traffic volume crossing the bridge is calculated as below.
Because of the strategic location of the bridge, the exchange of commodities and materials among Thailand, Laos, and Vietnam is expected to increase in the future. Thus, it is assumed that the traffic volume for larger trucks will increase at higher rates than smaller trucks. Considering this estimate on the traffic volume, it may be necessary to improve the condition of Road No.12 in the future to endure the volume of heavily loaded trucks to pass by without delay. In addition, a constant maintenance of the road may be also needed. Based on these assumptions on the future traffic volume on the Road No.12, the current condition of the road will be studied to identify the need for improvement.

4.2 The Current Condition of Road No.12

The construction of the Road No.12 was planned and processed based on the agreement between Laos and Vietnam, which stated Vietnam’s intention of cooperating with Laos for it to have an access to the Eastern Sea. In terms of road construction, compared to the steady progress in Laos, the construction in Vietnam took a while. The details of the condition of Road No.12 in both countries are explained in following paragraphs.
4.2.1 At the Lao PDR’s Side

The distance of Road No.12 between Thakhek and Cha Lao, the Vietnam-Lao Border (Na Phao), is 147 kilometers. This section of the road is generally in a good condition, which is in accordance with the Road Standard, design class IV – 2 lanes @ 3.5 meters (DBST), 2*1 meter shoulder. Starting from Thakhek, the construction of the first section from 0 Km to 55 Km was finished in 2008. This section was constructed as a part of the Nam Thuen II Hydro Power Project. The road condition in this section is generally a flat terrain. In some sections, it can be observed that the high voltage power line, and down streams crossing the road. If the traffic volume on Road No.12 to be increased in the future, there may be a need to
widen the bridges, which is hanging over streams, to ensure smooth traffic flow.

The second section from 56 Km to 147 Km (Lao – Viet Nam Border) was finished earlier in 2007, planned under the road development plan of the Department of Road, Ministry of Public Works and Transportation of Laos. According to the sign board indicating the entire road improvement plan on the street, this section will be further improved during the time period of 2007-2010. Among this section, from 55 Km to 91 Km is flat, while, the section from 92 Km to 147 Km enters into a mountain area. There are many sharp curves, and the elevation varies from 180 m to 370 m. Still, generally the road surface is kept in good condition. During the field study, some area was identified as a possible construction site of by-pass tunnels to shorten the distance and lessen the traffic cost.

4.2.2 At the Vietnam Side

As shown in Figure 4-5 below in a red line, from the border of Laos and Vietnam, Road No.12 is temporarily connected to Ho Chi Minh Hwy (Road 15), and extended from Dong Le, temporarily taking Road No.12A again, and connected to the Vung Ang Port. The road from Dong Le to the Port is only recently finished constructing in June, 2009. The distance from the Vung Ang Port to Dong Le (the connection point to Road No.12A) is 76 Km, the Distance from Dong Le to Ho Chi Minh Hwy is 36 Km. and the distance from Ho Chi Minh Hwy to the border is 37 Km. The total distance is 149 Km.
Starting from the Vung Ang Port, the first 2 Km of the distance is sharing the road with Highway No.1, thus has 4 lanes. When Highway No.1 connects to the newly constructed Road No.12, it will change to design class IV with two standard lanes (DBST). In this segment, the road is kept in a good condition. Between 40km to 50km from Highway No.1, the road enters into a mountain area, thus some sections of the road are tilted by the mountain slope. In addition, the concrete slope protection in this area is not in a good condition and some parts were broken and moved down to road surface, thus should be improved in the future. At the segment from Ho Chi Minh Hwy to Lao-Vietnam border, the road is under construction to improve the surface condition. The construction of a side ditch, and a widening of a carriage way has already finished, except for the distance between 16 Km to 22 Km from the ending of the Ho Chi Minh Highway. The segment between Ho Chi Ming Hwy and the border is paved, but not in a good quality compared to the road close to the port. In the future, it is likely that a lot of heavy trucks carrying agro-forestry products passing by this section to the Vung Ang Port. Therefore, this section either has to be under a constant maintenance, or to be improved.

As the road approaching to the border, the road becomes curvier and less maintained. If the traffic to be increased in the future, accidents may occur when heavily loaded large trucks pass by each other. In fact, during the research, the team encountered an accident site of two trucks
colliding with each other. The two trucks, unable to move, were partly blocking the road, and causing traffic jam in a short distance. To avoid a delay in transportation, a widening of the road at this section will be crucial.

There is also an alternative route connecting to the Vung Ang Port from the Loa-Vietnam border. The alternative road is connected to Highway No.1 from the Vung Ang Port to Ba Don, and extended to Dong Le through Road No.12. The total distance is 195Km, and generally have a smooth surface. However, the distance is 46Km longer than taking Road No.12, thus likely to be used lesser than the new road. Still, it is always ideal to have an alternative route in case there is an emergency on the other route.

### Figure 4-6: Two Alternative Routes from the Vung Ang Port to Cha Lo (Border)

(Source: JDI Study Team)

#### 4.3 The Development Plan of the Third Friendship Bridge

When the agreement between Laos and Vietnam was made in 1990s, both countries aimed to connect the Road No.12 with north-eastern Thailand, and receive freight transfers going through the Vung Ang Port. The situation is moving just as the two countries assumed. Seeing the improvement in the Vung Ang Port and on Road No.12, Thailand decided to build the Third Friendship Bridge connecting Nakhon Phanom in Thailand to Thakek in Laos. It is assumed that the route through the Vung Ang Port is much less costly for north-east provinces of Thailand than they are now incurring by taking the route through Laem Chabang Port or the
Bangkok Port. The bridge is planned to finish its construction in September, 2011.

In addition, the Lao government is also planning to connect Road No.12 with Vientiane Capital by extending the road. As it can be seen in Figure 3-2 in Chapter 3, there are currently three SEZs planned to be developed in Vientiane—Industrial SEZ, Tourism based SEZ, and Border Trade SEZ—under the national SEZ plan. The extension of Road No.12 will enable the Vung Ang Port to serve the industries in Laotian SEZs, or tourists to come to central Vietnam more than today. If this plan is to be materialized, the importance of, and attentions to the Vung Ang Port and the surrounding regions will likely increase.

4.4 The Future Development Plan of Road No.12

According to the increase in the expected transport volume between Central Laos and the Vung Ang Port, the development of Road No.12 should be planned in different phases to deal with the correspondent volume. The custom process at the border also needs to be improved by large to ensure trucks a minimum waiting time at the border during transportation. The possible road development plans with improvement plans of the custom process will be discussed in details below. In addition to the road transportation, there is also a plan to construct railway network between Thakek and the Vung Ang Port. As one of the possible transport route, the progress in the railway project will be also summarized.

4.4.1 The Road Improvement Plan in Two Phases

Since there has not yet a large volume of transport going through the Thakek – Vung Ang Gateway, both Laotian and the Vietnamese governments have not yet materialized a plan of improving Road No.12. Yet, based on the expected traffic volume to transport woodchips identified in sections above, the study team recommends both government to start planning future road development plan to ensure smooth traffic flow in the future. Based on a preliminary study conducted during the field research, the improvement of Road No.12 could be divided into two phases.

1. Phase 1 (2012-2014): Partial Widening of the Road

In the first phase, Road No.12 is expected to have an average of about 5,075 vehicles per day. In order to handle increasing volume of traffic, the team proposes to widen the road at some sections to allow larger sizes trucks to pass by each other. Partial widening of the road is considered to be a temporary treatment to meet the increasing demand on the road before adding lanes in the future, since it takes less time and cost. The widening of road should happen where the traffic volume expects to increase, such as the merging point with other roads, or at places where road becomes slightly narrower. These sections could be near the
mountainous border where road gets steep and winding.

### 2. Phase 2 (2015-2020): Widening of the Whole Route and Construction of Tunnels

The expected traffic volume at this phase will likely to hit an average of 7,000-8,000 vehicles per day. The total distance of the Road No.12 is close to 300 km, making the two-lane development planning and construction costly and lengthy. Thus, it is considered to be more suitable if funded by governmental or aid agency money. In addition, since there is still some time until the road development enters into this second phase, the time plan is also suitable for government funding, which generally takes longer time from planning till construction. Because a large quantity of woodchips produced in central Laos and exported through the Thakek-Vung Ang Gateway is shipped to Japan, adding lanes to increase traffic flow will ultimately profit Japan. Therefore, it could be funded by using Japanese Official Development Aid (ODA). However, a more detail study is necessary to identify appropriate funding agency.

#### 4.4.2 The Development Plan of Connecting Road No.12 to Vientiane

During the field research, JDI study team received the news that the Department of Road, Ministry of Public Works and Transportation of Lao PDR is willing to connect the Road No.12 to Vientiane Capital. By allowing Lao’s center of economy to connect to the Vung Ang Port, Laos expects to boost its economy further. In addition, the integration of the countries within the GMS matches with the intention of each country and ADB.

The direct connection between Vientiane and the Vung Ang Port will have a positive influence on Vietnam, especially the Ha Tinh Province. It will allow people to travel. If visitors increased in the Ha Tinh Province, any business related to tourism and service industry, such as restaurants, hotels, and travel agencies, will benefit. It will also allow residents of Ha Tinh to travel to Vientiane easily too. If Road No.12 connects with north-eastern Thailand with the Third Friendship Bridge, it will also allow residents from three countries to travel more freely.

#### 4.4.3 Improvement in the Custom Process at the Border

In the initial stage of the transport of woodchips, although the road standard may be enough to hold an average of 4,000-5,000 vehicles per day, the custom process at the border is not efficient enough, especially at the Laotian side. Therefore, more efficient systems need to be applied at the border for both Laos and Vietnam side to reduce the transportation time, and thus the cost.

At present, the Customs system is manually completed on a form as per United Nations Layout Key (UNLK), and the custom office does not have a software system. For this
reason, at the Laotian custom office at the border with Vietnam (Cha Lao) in Na Phao, the
custom process takes about 1 hour to complete. However, the custom office of Lao PDR
signed a MOU to replace this manual system by a UNCTAD Custom Software called
ASYCUDA in February, 2010. It is expected that all systems will be replaced within two to
three years. At Na Phao, this system should be implemented by the time the first woodchip
export starts in 2012. At this stage it is not clear what modules (Direct Trader Input, Risk
Assessment and Management) or the systems (Wide Area Network (WAN) or Stand alone) of
ASYCUDA (ASYCUDA ++ or ASYCUDA World) will be implemented at the Na Phao border,
hence it cannot be said whether the customs will be fully upgraded to handle and clear cargo
electronically by 2012. However the clearance procedure is projected to be more efficient.

The procedures to receive border crossing permission can also be shortened if a
customs office at the border with Vietnam (Cha Lao) in Na Phao, the
company exporting goods prepare a master list. Preparing for a master list is the best way to
custom process at the border if transporting in large volume by several trucks.
complete the custom process at the border if transporting in large volume by several trucks.
The master list contains all the information of goods transported through the border including
total volume and trucks used. The first truck arriving at the border hands in the list to the
customs, and then the subsequent trucks merely have to be noted on the list and the total
 tonnage reduced from the total declared cargo for export (per shipment basis).

Under the present system, there are five documents that needs to be prepared by
woodchip exporters before preparing a Master List: 1-2) Invoice and Packing lists, 3) A
permission to cut woods and export woodchips from the Ministry of Agriculture and Forestry,
4) A permission to export from the Ministry of Commerce and Industry, and 5) Export Custom
Declaration Form (CDF) endorsed by the Custom Head Quarter Office. After the Head
Quarter receives all of these documents, the Master List is prepared and sent to the border
office with all other five documents. It will be better if a one-stop institution (single window)
is in place to clear all of these documents in the Agro-Forestry SEZ in Thakek to further
shorten the customs process.

The office hours at the custom border are also a problem for efficient transportation
of goods. The customs office in Laos only opens from 08:00AM to 12:00PM and 13:00PM to
18:00PM. During lunch hours the office is completely closed and trucks need to wait until it
opens. If a truck needs to pass the border after office hours, a driver needs to pay unofficial
charges of upto US$100.00 to the duty officer. The office hour is reasonable for now because
the current traffic flow is very low at the border, however, as the vehicle volume increases in
the future together with the start of woodchip export, operation time should be changed to
allow vehicles pass through 24 hours.

The parking space and traffic flow at the Lao border should be improved too.
Currently all vehicles crossing the border are parking at the open space, without much
organization. Thus, microbuses carrying tourists and residents, and trucks carrying commodities and cattle are mixed parked. If no improvement is taken, as the traffic volume increases in the future, this may lead to traffic accidents. In addition, partial sections of the road connecting to the Vietnamese side custom process, especially near the Lao border, are very narrow. To avoid congestion in the future, this road should be improved too with the Road No.12 improvement plan.

The Vietnamese side seems to be better equipped with enough space to park large size trucks, and efficient computerized custom process. During the course of the development of the road, the custom process can be further improved by increasing the numbers of officers and changing the operational hours to 24 hours.

4.4.4 Railway Development Plan from Thakek to Vung Ang

In 2007, the Vietnam Railway Corporation, and Minister of Land Transportation of Lao PDR announced that they are jointly planning to build a railway connecting the Vung Ang Port to Cha Lao, the border with Laos and Vietnam. This project is a part of the Agreement on Economy, Culture, Science and Technology signed between Vietnamese and Lao Governments in 2003. The project will be processed by the Vietnam Railway Corporation offering technical assistance to the Lao Railway Authority.

The development was estimated to cost about US$ 247 million. The Vietnam Railway Corporation is intending to connect this railway to the line connecting Cha Lao and Thakek, owned by the Kumming Rail Link of Singapore. The Vietnamese government aims to cover about 15-20% of the share of transport volume in the region by railway. For private companies in central Laos which plans to transport goods through the Vung Ang Port, if this railway project is to be realized, it will enable them to have safe, efficient, and economical transport method, in addition to the current road transportation method.
5 CONDITION AND FUTURE DEVELOPMENT PLAN OF THE VUNG ANG PORT

Based on the agreement between Vietnam and Laos, the construction of the Vung Ang Port started from 1997. In 2001, the port started its operation, and immediately caught attentions from investors, especially in Asia because of its natural depth ideal to accommodate Panamax size ships frequently used in international trade, and minimum influence from winds and waves. The port was improved in 2004 with construction of an additional pier, and the development plan of an Economic Zone adjacent to the port was approved in 2006 by the government of Vietnam. The Port holds a large potential of becoming one of the hub ports in GMS.

5.1 The Location of the Vung Ang Port

The Vung Ang Port is located in Mui Ron in Ky Loi commune, Ky Anh district, Ha Tinh Province. It is about 60km from the Ha Tinh City, the capital of the Province, connected through a well-paved two-lane road. The port is also economically accessible from various logistic modes: 9 km from the National Road 1A, 120 km from the Vinh Airport, and 100 km from the Gia Pho railway station. The easy access is not the only advantage it has. Protected against typhoons and the North-Eastern winds, the port location is also the most favorable in the northern part of central Vietnam.

5.2 The Current Condition and Capacity of the Vung Ang Port

5.2.1 The Start of the Development in 2001

The plan of developing a cross-border transit was formed and agreed by Laos and Vietnam to give the land-locked country Laos a gateway to the sea. The plan also included an idea of giving free accesses to vehicles from any country to facilitate the use of the Port. After the agreement in 1996, the development plan of the Vung Ang Port was agreed by the Vietnam government in 1997. The construction of the Port was completed in 2001, with Berth No.1 capacity being 185.5m long, 28m wide, and -10.7m deep with eight anchorage piles ensuring the berthing of 10,500-30,000 DWT ships. Ships larger than 30,000DWT were planned to temporary anchor at Son Duong, which is located at the north of Berth No.1 of the Vung Ang Port at the other side of the Ron Cape Peninsula. The Son Duong area has more depth, thus ideal for anchorages of larger ships. The expected volume through capacity by the year 2000 was estimated to be 0.4-0.5 million tons per year.
5.2.2 The Improvement of the Port in 2004

Seeing the attention to the port, and the possibilities of increased use after the completion of the Third Friendship Bridge, the development plan of Berth No.2 started in 2004. This Berth is scheduled to start operating from March, 2010. The following shows the layout of the Vung Ang Port with the completion of Berth No.2. The Berth No.3 and No.4 in the layout is just a future plan, and yet to be materialized.

Figure 5-1: The Layout of the Vung Ang Port (in 2010)
(Source: Ha Tinh Port Joint Stock Company)

5.2.3 The Current Capacity and Demand of the Vung Ang Port

According to the Vung Ang Port Handling Enterprise, the current capacity of the Port is as follow. Compared to the expected handling volume, the actual volume is still low.
1. Area
1) Total Area: 17,740 m²
2) Storage: 3,200 m²
3) Yard: 7,040 m² (DFS 8,200 m²)
4) Roads Inside Port: 5,168 m²
5) Road Width: 10m

2. Water in Front of Berth

<table>
<thead>
<tr>
<th></th>
<th>Turning Basin</th>
<th>Port Anchorage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breadth</td>
<td>230m</td>
<td>70m</td>
</tr>
<tr>
<td>Length</td>
<td>200.5m</td>
<td>200.5m</td>
</tr>
<tr>
<td>Depth</td>
<td>-9.0m</td>
<td>-10.0m</td>
</tr>
</tbody>
</table>

3. Berth

<table>
<thead>
<tr>
<th></th>
<th>Berth No.1</th>
<th>Berth No.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>185.5m</td>
<td>270m</td>
</tr>
<tr>
<td>Width</td>
<td>28.0m</td>
<td></td>
</tr>
<tr>
<td>Tide</td>
<td>Diurnal Tide</td>
<td>Diurnal Tide</td>
</tr>
<tr>
<td>Difference</td>
<td>2.0m</td>
<td></td>
</tr>
<tr>
<td>Height from Water</td>
<td>+4.5m</td>
<td>+4.5m</td>
</tr>
<tr>
<td>Depth</td>
<td>-10.8m</td>
<td>-13.0m</td>
</tr>
<tr>
<td>Vessel Accepted</td>
<td>46,000DWT</td>
<td>50,000DWT</td>
</tr>
</tbody>
</table>

4. Handling Rate
1) Bagged Cargo: 1,500tons per day
2) Bulk Cargo: 2,000-7,500 tons per day
3) General Cargo: 2,500tons per day

5.2.4 The Development Plan of the Son Duong Port

As introduced in the earlier chapter, there are two ports in the Vung Ang region. The first is the Vung Ang Port, which is already in operation as explained above. The second is the Son Duong Port, which is currently under construction. Although Son Duong started as a temporary anchorage for Vung Ang users, the naturally deep sea port of Son Duong turned the area into a large investment destination. Starting from July 2008, the Taiwanese Formosa
Group has been processing the construction of the Son Duong Port to make it as a specialized port for steel production, ship-building, oil refining, warehousing, and oil services. The plan was agreed between the Vietnam government and the Formosa Group as a part of the requirement of starting a petrochemical and oil refinery project in the area. Under the plan, the port will have a passage way 400m wide and 6,748m long, scheduled to finish by 2012. The Formosa Group is expected to be the operator as well. Upon the completion, together with the Vung Ang Port serving as a commercial port, it will become a Port Complex that can serve wide varieties of industries.

Although the two ports, Vung Ang and Son Duong, are adjacent, the depth of water is different. The average depth of the Son Duong Port is 10-12m, however some places could be as much as 24m deep, and able to accommodate 200,000-400,000 DWT ships. This is very favorable for heavy industries planning to come into the Vung Ang area: 200,000-300,000 DWT (coal and ore), 300,000 -400,000 DWT (crude oil), 30,000-50,000 DWT (oil products, steel and others). Under the first construction phase, Formosa aims the Son Duong Port to handle 30 million tons annually. If successful, the port will be upgraded to handle 60 million tons per annum.

![Figure 5-2: Locations of the Vung Ang Port and the Son Duong Port](Source: Maritime Administration of Ha Tinh)
Based on the meeting with three organizations in charge of managing the development of the Vung Ang Port and Son Duong Port—namely the Maritime Administration of Ha Tinh, Ha Tinh Port Joint Stock Company, and the Vung Ang Economic Zone Management Board, which is in charge of managing the development of the Vung Ang Port and the Son Duong Port—because many of the industries planned to invest in the area and use the Son Duong Port in the future use oil and fire for production, it does not want the woodchip storage yard be in the close vicinity of those industry to avoid any potentiality of fire. Therefore, the JDI study team designated the Vung Ang Port as the main export port for woodchips from central Laos, rather than using the Son Duong Port. In terms of the capacity of the port facilities, the Vung Ang Port, which can accommodate up to 50,000DWT vessels, is also well qualified to hold the Woodchip Maximum Vessel (WMV) intended to be used for the export.

5.3 Industries in the Vung Ang Port

Although the Vung Ang Port has been receiving increasing attentions from investors with the development of the Son Duong Port, until very recently, the main users of the Vung Ang Port were mostly limited to woodchip industries. About 5km from the Port, there are two woodchip storage yards, one owned by a Japanese trading company, and the other shared by a Korean company and a local company. However, this industrial landscape at the Port is about to change with the development of the Son Duong Port next to the Vung Ang Port, and the Vung Ang Economic Zone (EZ) in the vicinity. In order to secure a position of the woodchip industry’s transshipment throughout the Vung Ang Port, it is important to understand the trends of other industries’ investment.

5.3.1 The Vung Ang Economic Zone

The idea of developing the area as an economic zone was long held, and approved by the Prime Minister in April, 2006. The total area mounts to 22,781ha, situating in 9 southern communes of Ky Anh district. The EZ is now eventful with 60 projects licensed, of which total investment capital registered becomes above US$ 10 billion (VND 180,000 billion). Some of the main projects include a steel mill project with US$ 8 billion investment by Taiwanese Formosa Group, Tau Voi lake tourism service center valued about US$ 70 million, Vung Ang I thermal electricity plant valued as US$ 1.2 billion, and a steel refining plant with US$ 100 million investment by Ha Tinh Iron and Steel Joint Stock Company. In addition, some other major projects which are to be licensed are US$ 12 billion petro-refining and chemistry mill project invested by the Formosa Group, US$ 5 billion steel complex project...
invested by TATA group, India, billet fining project invested by Thach Khe Steel JSC.,
industrial zone and vocational training school project invested by Dream City KVD Company
of Korea. Because of the possession of an ideal deep sea port, the Ha Tinh Province, one of the
poorest province in Vietnam, is about to become the center of foreign direct investment of
Vietnam.

5.3.2 Woodchip Companies

Although many industrial development projects are going on in the Vung Ang EZ,
until the completion of the factories, woodchips companies remained to be the main clients of
the Vung Ang Port. As introduced above, there are mainly three woodchip companies in the
area—Japanese, Korean, and Vietnamese. The Japanese company entered into the area first,
and handles the largest amount. The company keeps about 70,000 tons of woodchips at the
yard, but it says the supply cannot keep up with the demand. The main destination of shipping
is either to Japan or China. The Korean company also ships a part of woodchips to Japan.

In the future development plan of the Vung Ang Port planned by the Maritime
Administration of Ha Tinh Province, Berth No.5 is planned to be constructed next to the
woodchip yard currently owned by a Japanese trading company. However, there is no specific
time frame as to when to be built, thus until then, it needs to repeat unloading and reloading by
trucks several times, rather than directly conveying woodchips to ships from the stock yard.
The shipping cycle from Vietnam to Japan takes about 45 days, using 20 trucks per loading.
The distance between the yard and the Port makes the Japanese company to bear extra
transporting cost—once when collecting from individual timber suppliers, the next when
transporting to the ship from the yard. Thus, if the agro-forestry companies in the central Laos
were to make profitable transshipment, securing a closer woodchip storage yard to the
operating berths is crucial.

5.3.3 Thermal Power Plant

In the northern side of the Vung Ang Port, the Vung Ang Thermal Power Plant No.1
was started to be implemented from the end of 2006, and is still under construction. Being
invested by the Vietnam National Oil and Gas Group (Petro Vietnam), this is currently the
largest coal power plant in Vietnam. It comprises of two turbines with a combined capacity of
1,200MW, which is expected to contribute 8 billion KWH of electricity to the national grid per
year. Upon the completion, it will be the third power plant in Vietnam after those in Hanoi and
Ho Chi Minh. This Power Plant is expected to save power and cost of providing electricity to
central provinces rather than transmitting in a long distance either from Hanoi or Ho Chi Minh.
The construction is processed by the Vietnam Machinery Erection Corporation (Lilama) and
the Babcock & Wilcox Beijing Company, scheduled to be completed by 2013.

It was also reported that Lilama and PACO were approved by the Vietnamese government to invest in the Vung Ang Thermal Power Plant No.2, and to create a Thermal Power Plant Center having a total capacity of 4,800 MW with the capital of US$ 3 billion. However, according to the local source, this development plan has not yet solidified. In addition, according to the Ha Tinh Port Joint Stock Company, there is also a plan to develop two berths for the power plant at the west of the Vung Ang Port. If completed, the power plant will be an important electricity provider to industries expected to come into the Vung Ang Economic Zone in the future.

5.3.4 Industries in the Son Duong Port

Because of the deep sea port’s capacity of berthing about 200,000-400,000 DWT size ships, multi-national corporations like Formosa and TATA decided to conduct large scale capital investment projects in the Vung Ang EZ. Although steel and oil industries are planning to use the Son Duong Port in the future, for agro-forestry companies in central Laos, a competition over available land for the woodchip storage yard is likely to happen between the following industries.

1) Steel Industry
In the west of the Vung Ang Economic Zone, a steel rolling plant of Van Loi Corporation is being under the completion stage that will provide products in the beginning of 2010. The Vung Ang EZ Authority is also currently under the process of finalizing and giving investment license to a steel project invested by TATA (India) having a capacity of 4.5 million tons/year, with a total capital of 5 billion USD. In addition, there is another steel rolling project invested by Thach Khe Iron Ore Joint Stock Company having a capacity of 2 million tons/year with a total capital of 2 billion USD. Considering that the Van Loi Corporation is producing 500 thousand tons per year, and Formosa producing 7.5 million tons per year, all together, the emersion of the large scale steel industry in Vung Ang will surely speed up the investment of many auxiliary enterprises.

2) Oil and Petroleum Industry
In between the Son Duong Port and the Vung Ang Port, the Vung Ang Oil and Petroleum Company is setting connected oil tanks and finishing off the construction of their oil center by putting operation buildings. Once completed, it is ready to supply gas and petroleum to industries coming in the Economic Zone, and addressing to the market in Laos and North Eastern Thailand as well.
The Formosa group received a basic approval by the Vietnamese government on its 12.47 billion USD Petrochemical and Oil Refinery Project in the Vung Ang Economic Zone. The refinery will be constructed at the 1,600 ha site next to their steel plant, now under construction. The project was originally approved based on the condition that the group will invest in the development of the Son Duong Port, which has started from 2008 as explained in the chapter above. Once the project is completed, it is expected that the refinery will have a capacity of producing 300,000 barrels of oil per day and 16 million tons of petrochemicals. After coming into operation, the project will employ up to 9,000 workers and churn out a wide range of products such as benzene, gasoline, ethylene and propylene.

3) Tourism
Although a concrete plan is not yet in picture, the area has a potential to grow its tourism business. As in the chapter above, Tau Voi Lake Tourism Service Center was agreed to be constructed by the EZ Authority in the Economic Zone. In addition, the completion of Road No.12 connecting the Ha Tinh Province all the way to Thailand increased the possibility of growing trans-national tourism plan experiencing varieties of culture and cuisine. The nature around the area, if preserved along with industrial development, allows a growth of eco-tourism and beach resort. The beach resort in the south of Vung Ang Port, which is currently known only by locals, could be improved to attract tourists from wide areas.

4) Others
Other possible industries include the Metal Refining Industry using rich natural and material resources in the area, such as Thach Khe iron ore, Titanium, and Manganese, Industries of mechanics, motor producing, consumer goods production, electronics, construction materials, ship building and repairing, labor consuming industries and other export oriented industries that could also be competitors at the Vung Ang area for the woodchip industry.

5.4 Proposed Concept of the Woodchip based Processing, Storage and Exporting Terminal: 2010-2020
Based on the site observation, and interviews to agro-forestry companies and Vietnamese governmental organizations, the concept of the future development plan of the Vung Ang Port was drawn as in the following paragraphs.
5.4.1 The Role of the Woodchip Company for the Development of Vung Ang Corridor

Although Road No.12 is completed from Thakek to the Vung Ang Port, and Berth No.2 will start its operation in March, 2010, and the area has been receiving more attentions together with the development of the Son Duong Port, there has not yet been a serious user of the Vung Ang Port. This is partly because; there is not yet an industry in the area that can produce a collective volume of exporting goods. Therefore, the agro-forestry companies in central Laos, expecting to produce about 1,000,000 tons of products per annum are so far the largest potential users. Considering the cost of operating and maintaining two berths, for Vietnam, they are the source for sustainable operation of the Port, at least until the heavy industries start operating. Therefore, it is important to understand woodchip industries’ infrastructural demands at the Port and offer an efficient and economical exporting method.

If the Port can satisfy the earlier agro-forestry users, there may be more agro-forestry users to be followed to take the same export route. In addition, increasing number of users will also reward the two countries effort in developing and improving the road network. The woodchip exports starting from 2012, is thus considered as an important milestone.

5.4.2 The Future Plan of Expanding the Vung Ang Port

Based on the Master Plan of the Vung Ang Port, which is under the process of approval from the Chair of the People’s Committee of Ha Tinh Province, the Maritime Administration, the Vung Ang Economic Zone Authority, and the Ha Tinh Port Joint Stock Company have shown intentions to expand the Vung Ang Port by constructing four more berths (No.3-No.6) in addition to the already existed two berths in the future. The pre-feasibility study of Berth No.3 and No.4 was already conducted by Transport Engineering Design Inc (TEDI), which is the engineering company for constructing Berth No.1 and No.2, in 2008. According to the Maritime Administration, the development of Berth No.3 and 4 will be allowed once investors are found.

5.4.3 The Development Plan of the Woodchip Storage Yard

Strategically, the location of the current two woodchip storage yards operating in the Vung Ang area is not the most economical choice. Because there is about 5 km distance between the storage yard currently operated and Berth No.1 and No.2, trade companies operating in the current woodchip storage yard incur additional loading/unloading cost by first collecting timbers from neighbor communities, and secondly when the ship arrives. For agro-forestry companies in inland central Laos already incurring a large sum of transportation cost, the cost of loading and unloading the goods twice may impose a critical economic burden.
on agro-forestry companies’ decision of using the Vung Ang Port. Therefore, securing a site near the operating berths is essential for both Laos and Vietnam. A closer storage yard to berth enables direct transfer from the yard to ships through a conveyer belt and economical loading/unloading process.

In this line, during the discussions with the Maritime Administration of Ha Tinh Province, three possible sites were suggested as below by the JDI study team, and received the permission to start a study on developing the site indicated in Option No.3.

Option 1: Behind Berth No.1
The site is already occupied by the oil jetty and tank yard owned by the Vung Ang Oil and Petroleum Company, thus not available.

Option 2: the Bulk Yard at Berth No.2
The site is already partly occupied by ware houses and water supply tower, and the remaining space is too limited. The Maritime Administration also fears that the space is too close from the oil jetty and tanks, thus there may be a risk of woodchips catching fire. (However, in such case, fires can be prevented by a proper management and equipments).

Option 3: the land behind Berth No.2
The site is currently not a land, but part of the sea. If this site were to be developed, reclamation is necessary. According to the woodchip company in Laos, the company needs about 5ha of land as a storage yard based on their woodchip production schedule. Since the site in the backland of Berth No.3 has only about 3 ha, the study team proposed to use the backland of Berth No.4 as well to secure 5 ha of land. During the field study, the research team received a basic understanding from the Maritime Administration and the Ha Tinh Port Joint Stock Company on conducting a study to build yard at the backland of Berth No.3 and No.4 for woodchip export.
In case of developing storage yard at the backland of Berth No.3 and No.4, along with the cost of reclamation, pavement, and grading, and equipments (light, fire extinction, and water), the cost of building bank protection should also be considered. This is because, based on the wave study, although there is a 260m breakwater near Berth No.1, the position of the stock yard can be affected by waves in certain season. The size of rocks to be used of the bank protection could be the same as the ones used for Berth No.2. The extension of the breakwater will be done when Berth No.3 is constructed in the future.

5.4.4 The Development Plan of Berth No.3

Considering the expected export volume of woodchips and other agro-forestry products through the Vung Ang Port in the future, it is more efficient to construct a Berth that is specialized for those industries in the future. However, since the berth operation cannot be profitable unless products are exported at least 1,500,000tons per year through the port, it is recommended to use Berth No.1 and No.2 until both berths reach to full capacity, or the export volume of woodchips and other agro-forestry companies reached to 1,500,000tons per year. If the economic efficiency of the Thakek-Vung Ang Gateway is proved, the JDI study team
estimates that by around 2020, the export volume of agro-forestry products reach to 1,500,000 tons per year, and 2,000,000 tons per year around 2025. Therefore, though the actual condition will change according to the market, the development of Berth No.3 is recommended to start to be in time of the 2020 operation.

In order to serve for agro-forestry industries, Berth No.3 needs to be able to accommodate 51,000 DWT Woodchip Maximum Vessel (WMV) in the future. More specifically, the berth should have 200m length, maximum of 11.5m draft, 270m of required berth length, and -13m of a water depth. During the feasibility study of Berth No.3, a more detailed study on the spec of Berth No.3 will be identified along with the estimated cost.

The location of Berth No.3 project site is blessed with so many advantages that it only requires minimum protections from the impacts of winds and waves. First, the Ron Cape Peninsula naturally protects the prevailing north to north-east waves from the East China Sea. Berth No. 1, which has a length of 185.5m, and the existing breakwater near Berth No.1, which has the length of 260m, also protects Berth No.3 by intruding waves diffracting from north to north-north-west waves. Thus, the only protection that needs to be added when Berth No.3 is constructed is the extension of the current breakwater for about 110 m.

Figure 5-4: Location of Breakwaters at the Vung Ang Port
(Source: JDI Study Team)
Since the project site of Berth No.3 locates near Berth No.2, it is assumed that the soil basin is as same as the data collected when constructed Berth No.2. Based on the information from TEDI, which designed Berth No.2, the soil layers at the bottom of the sea is consisted by dense fine sand. This is one of the best kinds of sand to be used for reclamation. In addition, by using the soil at the sea basin, there is no need to bring sands from other area, thus the cost of reclamation can be saved to the minimum. A more detailed action plan for the development of Berth No.3 will be explained in later chapters.
6 SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS OF THE PROPOSED DEVELOPMENT PLAN

In this chapter, the Khammouane Province in Laos where woodchips are produced, and the Ha Tinh Province in Vietnam, where the Vung Ang Port is located will be observed closer in terms of socioeconomic, and environmental aspects. It is assumed that the two provinces will largely benefit economically once the processing and exporting of agro-forestry products start. However, it is also a concern that increased traffic on the road will degrade the environment in the concerned region. When the actual development starts, it is recommended to conduct a closer study on socioeconomic and environmental impacts.

6.1 The Socio-Economic and Environmental Data of Khammouane Province, Lao PDR

The Khammouane Province is located in central Laos, sharing its border with Bolikamxai to the north, and Savannakhet to the south. The province is also divided by the Mekong River with Thailand in the west, and the Annamite Mountain Range with Vietnam in the east. The total area of the Province is approximately 16,315 km$^2$, and covers about 6% of the country. The province is divided into nine districts, and has its provincial capital in the Thakek City, which is about 4-5 hours drive from the Vientiane Capital of Laos. In this development plan, the main population that will be influenced the most is assumed to be those living around the projected area of the Agro-Forestry SEZ, and those living along Road No.12. In order to measure the socioeconomic and environmental impacts to this population, two areas near the SEZ and Road No.12 was identified: 1) Nakai Plateau, near the hydro power station and 2) Xe Bang Fai, area along the Xe Bang Fai Rever.
6.1.1 Population

The Khammouane Province has about 330,000 population, among which the sample population covers about 47,000. Residents in the Khammouane Province are generally well-off as the area becomes closer to the Mekong River, the border with Thailand, and less connected to social infrastructures, such as education, health care, electricity, and water supply, toward the mountainous area bordering with Vietnam. This is understandable considering that the capital, Thakek, where political and economical activities mainly occur, locates near the Mekong River.

The population in the Nakai Plateau is much smaller having only 6,783, but the ethnicity is more diverse. The two main ethnicities residing in the area are Brou (40%), and Tai Bo (40%). On the contrary, Xe Bang Fai is populated mainly by Lao Tai. However, the ethnic identity in this area is less pronounced since it is close to the capital, and the population is much more mixed than rural areas.
6.1.2 Livelihood and Economy

In general, although the province is experiencing a steady growth in the economy, Khammouane still remains as a poor province. Investments from foreign companies are increasing, but most of it involves an exploitation of natural resources. Major economic sectors are crops, animal husbandry, fishery, forestry and hydropower. However, in terms of socio-economic aspect, because of the Nam Thuen II Hydro Power Project, and Lao-Viet’s effort to connect the province with the Vung Ang Port, infrastructural development, such as road, power, and water is improving.

The livelihood is distinctively different between the Nakai Plateau and Xe Bang Fai. People in the Nakai Plateau are engaged into various economic activities including cultivation of Swidden rice, fishing, livestock raising, hunting and fathering of forestry products. Since this area is characterized under rain-fed condition, poor soils, adverse weather conditions, and lack of modern technology, only 17% of the household can produce sufficient amount of rice. The average household income in the Nakai Plateau is about $450/year, which is well below the national poverty line of $800/year. Most of the households was without electricity during the study conducted by ADB in 2004, however, this condition is planned to be solved by 2012 with the start of rural poverty alleviation project funded by the World Bank. In addition, about 60% of the household uses river or stream water as the only domestic water source.

The economic activity in the Xe Bang Fai area is more dependent on agriculture, mainly paddy rice. About 84% of the villages are equipped with irrigation pumps. There are some households also engaging in animal husbandry and fishing. In addition, the off-farm income, such as shops and services, is considered more important in this area than other regions. According to the study conducted by ADB, the average household income in the area was $664/year, and about 40% of the population lived below the poverty line. Most of the households are connected to the electricity grid, or at least planned to be connected soon. 40% of the household relies on river for domestic water source.

6.1.3 Education and Health Care

In Nakai Plateau, schools are only functioning in larger villages, and the attendance rate is very low. According to the research conducted in 2004 by ADB, 63% of the population had no schooling at all, while 31% only had education until primary schools. Literacy level in this region is generally higher among men than women. In the Xe Bang Fai area, the situation is slightly better than the Nakai Plateau though schools often do not function due to a lack of resources in this region too. Approximately 31.6% of adults are literate, and 12.4% went secondary schools. 6% of them progressed to higher education. The lower Xe Bang Fai area has the highest education levels among the province.
6.1.4 Environment

The forestry area of Khammouane is covering about 812,600 hectares, which is 47% of the total area of the Province. Climate and the diversity of geological conditions in the area have led to an extraordinarily high diversity of species, isolation and endemism. The Annamite Mountains at the border with Vietnam are recognized as an area of global significance in terms of biodiversity. In addition, the province also holds three National Biodiversity Conservation Areas (NBCA): Nakai-Nam-Theun, Hin Nam No, and Phon Hin Poune NBCAs.

However, recently the forest diversity is degrading because of intense logging, settlement expansion, and hunting. Between 1973-2003, logging reduced forest cover in the reservoir area of the Nakai Plateau from 61% to 48%. Because of this, species is under an increasing pressure of population decrease in the past three decades. In addition, a constant shifting of cultivation area by villagers are also being the cause of forest and soil fertility decreases. Since people tend to move their cultivation area due to weeds, pests, animals and drought, a solution to those adverse situations becomes important for future environmental protection.

6.2 The Environmental Impacts to the Khammouane Province

In terms of the development of Agro-Forestry SEZ, the environmental impacts seemed to be low. The proposed land for the Agro-Forestry SEZ is close to the urban area of Thakek surrounded by Road No.12 and 13, and not in the vicinity of three NBCAs. The closest facility is an airport which is not commercially in use today. As a result, in terms of the impacts to endangered species, it is assumed to be low. In addition, since the land has went through a research by developers, and already been dedicated as a project site for an Industrial Zone/Entertainment facilities site by the provincial government, it is assumed that no serious environmental harm was identified by the provincial government as well by developing the area. However, since the Agro-Forestry SEZ plan is different from the original industrial zone/entertainment facilities proposal by the provincial government, it is recommended to conduct another preliminary environmental impact analysis upon submitting a revised SEZ proposal to MPI.

In terms of the future road improvement plan, and increasing traffic volume on Road No.12, the highest concern is in the mountain area. As it is explained in the chapter above, The Annamite Mountains at the border with Vietnam is known as houses for various species. In case of widening roads or constructing tunnels in the mountain area, the impacts to inhabited biodiversity should be carefully studied. In addition, increasing traffic volume on Road No.12 as a result of the start of exports of agro-forestry products in a few years, and the opening of the
Third Friendship Bridge in 2011, it is possible to have more contacts with animals on the Road. The awareness on careful driving should be raised in the area.

6.3 Socio-Economic Impacts in the Khammouane Province

The socio-economic impacts of the project to the area cannot be simply stated since, the project site covers two distinctively contrasted region. The first region is Xe Bang Fai area close to Thakek, where people have relatively better access to social infrastructures, and have higher income in the province. The second region is the area midway between the Mekong River and the Lao-Vietnam border called the Nakai Plateau. People in this area are well below the national poverty line, and have a very limited access to social infrastructures. Therefore, when conducting a feasibility study in the future, it is recommended to conduct a detail study on the socio-economic impacts to people according to different residential areas. However, at this stage, the expected impacts and changes to the society in general will be discussed.

6.3.1 Impacts to Income and Livelihood

The development of a woodchip storage yard and Berth No.3 at the Vung Ang Port means a secure export route for agro-forestry companies in central Laos. For companies operating in the land-locked country Laos, securing the export route leads to sustainable operation of business. For Khammouane Province where there is no particular industry other than forestry, the employment at forestry industries is crucial for the healthy economic activities and livelihood of residents.

In 2007, the local employees at the woodchip company were 200 for ordinary business, and increased to 4,000 when they need extra temporary workers for plantation. A same increase in workers is expected to happen during the harvest season too. In addition, it is also important to note that the woodchip company holds an intention of hiring local people as workers, rather than bringing in workforce from surrounding countries. Since Laotian people are not skillful in forestry business, this may result in extra cost and time for the woodchip company, at least in the beginning. However, in turn, hiring local people also benefits the company by ensuring a long-term labor source, as Laotian people have a limit to move across provinces frequently without the permission from the government.

In terms of the livelihood, the benefit agro-forestry companies bring to the Province seems large as well. Agro-forestry companies usually operate in an area in a long-period that requires a healthy partnership with the local government and residents. As a result, their intention to contribute to improve the surrounding environment and community is large. In fact, the woodchip company operating in the area has contributed to the community by building wells, roads, and community centers since its operation in 2005. It is also providing materials to
build schools, and offering assistance to conduct medical check-ups for local residents.

6.3.2 Impacts to Education and Health Care

The impacts to education will be more indirectly than the impacts to economy and livelihood. It is a general statement that the more a family earns income, the higher the education level is. This is because if a household earns sufficient income to support the family, there is no need to use children as an additional labor. Thus, the economic benefit the agro-forestry companies bring to the community will indirectly support households to attain higher education. In addition, increased economic activity in the Province will ultimately increase the presence of the Province among the central government, which may lead to an increased budget allocation to the Province to improve social infrastructures, including educational facilities.

On the contrary, increasing industrial activities at the Agro-Forestry SEZ, and traffic volume will likely to increase health concerns in the region. Currently, the area rarely experiences traffic jam, thus health care concerns regarding to gas emissions from vehicles is absent. However, with the start of exports of agro-forestry products in a few years, and the opening of the Third Friendship Bridge in 2011, the area is expected to receive more vehicles passing by. Households in the Province tend to gather around the trunk road because it has a higher chance of connecting to the electricity, as well as better accesses to hospitals, schools, and shops. Therefore, unless certain measures taken, there is a chance that health concern rises because of the increasing industrial activity. When a detailed research conducted in the future, the measure on how to deal with negative impacts of increased traffic volume should be addressed clearly.

6.4 The Socio-Economic Data of the Ha Tinh Province, Vietnam

The Ha Tinh Province is located in central Vietnam, about 340km south from Hanoi. The Province is divided with 10 districts, and having its provincial capital in the Ha Tinh City. For long, the Province had no particular industry, but small scale agriculture. However, this situation is expected to change with the development of the Vung Ang Port, and the Son Duong Port. Industries are gathering in the city, by seeing a lot of potential in the area a new hub port to the Eastern Sea. The agro-forestry products from Laos will be the first large size export out from the Vung Ang Port, and expected to last till the next few decades. Thus, it is expected that the socio-economic impacts of the project, which was studied by the team, to the area will be large and long-term.
6.4.1 Population

In 2008, the population of the province reached to about 1,300,000, among which 87% lives in the rural area. The birth rate is generally higher in the urban area, and the death rate is higher in the rural area. The Ky Ahn district, where the port locates, has about 173,000 population, which is the largest among the 12 districts of the province. Among the Ky Anh district’s population, more than 90% lives in rural areas, largely engaged in agriculture.

6.4.2 Livelihood and Economy

While the whole country’s monthly average was $33 (VND636,000) in 2006, the average monthly income in the central provinces of Vietnam was US$ 24.00 (VND476,000), which is the second from the lowest of the country. This is mainly due to the poor natural resources and soil, and harsh weather that largely affects residents’ standard of living when many are engaging in agriculture. The province’s GDP accounts about only 0.7% of the national GDP. However, the standard of living in the province is improving steadily. In 2007, the Pro Poor Center (PPC), an NGO established by the local government of Ha Tinh Province to take surveys on Basic Necessities Needs of people reported that, many of the households obtains items that only a few people had between 1997-1998, when the first survey was conducted. Items included are, televisions, motorbikes, bath rooms, toilets, and access to bank loans. The changes indicated that what was thought as a luxury in the past, are now considered as basic necessities.
Table 6-1: Changes of Possessions in 1997/98 to 2006

<table>
<thead>
<tr>
<th>Items</th>
<th>1997/8</th>
<th>2006</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV</td>
<td>24.5%</td>
<td>71.6%</td>
<td>47.1%</td>
</tr>
<tr>
<td>Motorbike</td>
<td>6.7%</td>
<td>47.3%</td>
<td>40.6%</td>
</tr>
<tr>
<td>Bathroom</td>
<td>16.9%</td>
<td>56.5%</td>
<td>39.6%</td>
</tr>
<tr>
<td>Toilet - built of stone</td>
<td>34.4%</td>
<td>68.1%</td>
<td>33.7%</td>
</tr>
<tr>
<td>Livestock vaccination</td>
<td>60.7%</td>
<td>92.1%</td>
<td>31.4%</td>
</tr>
<tr>
<td>Watch</td>
<td>48.7%</td>
<td>74.2%</td>
<td>25.5%</td>
</tr>
<tr>
<td>Access to VBA loans</td>
<td>41.9%</td>
<td>65.8%</td>
<td>23.8%</td>
</tr>
<tr>
<td>Meat once a week</td>
<td>51.3%</td>
<td>74.3%</td>
<td>23.0%</td>
</tr>
<tr>
<td>Pesticide pump</td>
<td>52.3%</td>
<td>74.8%</td>
<td>22.5%</td>
</tr>
<tr>
<td>Electric fan</td>
<td>73.7%</td>
<td>96.0%</td>
<td>22.3%</td>
</tr>
<tr>
<td>Well with well head</td>
<td>72.5%</td>
<td>89.3%</td>
<td>16.8%</td>
</tr>
<tr>
<td>Thick blanket</td>
<td>78.4%</td>
<td>94.0%</td>
<td>15.6%</td>
</tr>
<tr>
<td>3 meals a day</td>
<td>83.4%</td>
<td>96.0%</td>
<td>12.6%</td>
</tr>
<tr>
<td>Two compartment wooden wardrobe</td>
<td>21.8%</td>
<td>33.9%</td>
<td>12.1%</td>
</tr>
<tr>
<td>A new set of clothes each year</td>
<td>68.3%</td>
<td>73.5%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Concrete rice drying yard</td>
<td>89.8%</td>
<td>94.8%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Table and chairs made of good wood</td>
<td>28.0%</td>
<td>32.7%</td>
<td>4.7%</td>
</tr>
<tr>
<td>Wooden rice chest</td>
<td>89.4%</td>
<td>90.4%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>92.6%</td>
<td>93.0%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Buffalo or cow</td>
<td>82.7%</td>
<td>82.4%</td>
<td>-0.3%</td>
</tr>
<tr>
<td>Radio</td>
<td>36.6%</td>
<td>26.7%</td>
<td>-9.9%</td>
</tr>
<tr>
<td>Stone built house</td>
<td>70.8%</td>
<td>58.6%</td>
<td>-12.2%</td>
</tr>
<tr>
<td>1 sao of land per person</td>
<td>91.3%</td>
<td>69.6%</td>
<td>-21.6%</td>
</tr>
</tbody>
</table>

(Source: PPC)

For economic activity of the province, while agriculture remains the largest contributor to the provincial gross output in 2007 by occupying 36% if the gross output, industry and construction sector is also growing, reaching to as much as 34%. This is a large difference compared to 43% to 26% (agriculture to industry/construction) in 2004. This may be due to the large scale construction projects at the Vung Ang and Son Duong Ports, and the construction of Road No.12.

6.4.3 Education and Health Care

In general, as the household income rises, the educational and health service level also increases in the household. The Ha Tinh province is not an exception too. Between 2004-2008, the attendance rate to the upper secondary schools, both public and private, increased from 67 million to 70 million. In the Ky Anh district, the attendance rate to the secondary schools is 8,138, which is the second most among the 12 districts in the province. This is assumed that
because of the presence of the port, more industry gathers in the district which enables household to work at the site and generate stable income than those engaged in agriculture, which yields could be influenced by seasonal differences. Another important difference in the education section is that, in 2007, the first university in the province was established. Though subjects taught at the university is still limited, this provided residents more chances to pursue higher degrees.

The number of health facilities was also increased from 299 to 434 between 2004 and 2008. As a result, the number of doctors per 10,000 residents increased from 4.71 to 5.18, and the number of bed per 10,000 residents increased from 27.40 to 30.76 between the same years. In addition, all of the communes in 12 districts are now equipped with at least one medical station, which was not accomplished in 2004. The next goal of the province is to improve the quality of medical services at each station for more stable living for the people.

6.4.4 Environment

The environment of the Ha Tinh Province is largely different between the area close the border with Lao PDR and the area along the coast. As in the map, the area near the Lao border is mountainous is covered by forests, grasslands, and scrubs. This area hosts the Vu Quan National Park, which locates in the northern Annamite mountains and identified as the national park in 2002. The national park is known as a home for new and rare species, such as deer and antelope that was discovered in 1990s but not yet scientifically described. In addition, the park is also a hole to 273 birds including 11 types of globally endangered species. The area, especially in the lower elevation area, is now under a threat of forest clearance for agriculture, hunting, timber extraction and grazing of livestock.

To the contrary, toward the coast, the land becomes largely used for agricultural purposes. In 2008, the planted area of crops in the province reached 190,227 ha, among which 100,476 ha is a planted area of paddy. The Ky Anh district where the Vung Ang Port locates is also largely a paddy field, producing 55,352 tons of paddy in 2008. The surrounding area of the Vung Ang Port is also widely resided by farmers, and a few fishermen. In the long-term, the Master Plan of the Vung Ang Economic Zone indicates that these farmers and fishermen will be relocated to the residential area in the inland, which will be prepared by the Ha Tinh People’s Committee, in the future. Paddy fields is planned to be turned into light industrial sites, and entertainment facilities.
6.5 The Environmental Impacts to the Ha Tinh Province

There are two possible environmental threats to the Ha Tinh Province, by promoting the use of the Thakek-Vung Ang Gateway for agro-forestry companies in Laos. The first is the environmental impact to the mountain area hosting variety of species. Though the Thakek-Vung Ang Gateway does not exactly go through or go near the Vu Quan National Park, the part of the Road No.12 near the Lao-Viet border is constructed through the mountain. In general, improved
road network facilitates human settlement along the road. If human settlements along the Road No.12 proceed, there is a chance that birds and mammals will be under the pressure of hunting mainly due to the wildlife trade. In addition, if a proper management would not be taken place, illegal timber extraction and firewood collection could be result in speeding up the forest clearance. Therefore, measures to reduce the impacts of the Road No.12 on biodiversity should be implemented. In particular, human settlements into the buffer zone of the national park should be strictly controlled. The enforcement of protected area management regulations, particularly controls on hunting, timber extraction and firewood collection, should be strengthened as well.

The second is the impact to the sea water. In order to export the increasing amount of woodchips through the Vung Ang Port, the number of vessels arriving to the port will surely increase every year. Based on the rough estimate, by the time woodchips export amount exceeds 900,000 tons per year, the port receives about 30 vessels per year. If other agro-forestry commodities were to export through the Vung Ang Port, the number of vessel arrivals will be even larger. Increasing vessel arrivals could result in degradation of water quality if counter measures on vessel disposals to sea, and oil leak would not be taken. To protect the sea against such threats, restrictions on the anchorage of vessels older than 20 years, which is not usually equipped with double vessel bottom to prevent oil leaking, could be a help.

6.6 The Socio-Economic Impacts to the Ha Tinh Province

6.6.1 Impacts to the Livelihood and Income

The socio-economical impact of exporting woodchips and other agricultural products from Laos through the Vung Ang Port will likely to work in the same manner as in the Khammouane Province in Laos. Increasing vessel arrivals at the Vung Ang Port could connect to employments at the port to handle loading/unloading and docking of ships. However, since vessel handling is not that labor intensive compared to harvesting of timbers for woodchips, the impact to local employment could be lower than the Khammouane Province. Still, it could be an alternative job for farmers and fishers that may need to change their specialization due to the relocation of households. Another economic impact to the local area is the money dropped by truck drivers. Since truck drivers drives in long distance, it is likely that they take meals or have accommodations in the Ha Tinh Province. Though it may be small money, it can connect to brisk economic activities in the area. Ultimately, if the woodchip export through the Vung Ang Port succeeds, it could induce economic development of the area by calling in other industries or investors to use the Port.
6.6.2 Impacts to Education and Health Care

As it is already discussed in Chapter 7.4.3, as the Vietnamese economy as a whole develops, the educational and health service quality in the Ha Tinh Province has improved in the past years. This indicates that higher income at households has contributed to children achieving higher educational level or degrees, and better access to health services. However, the economic impact of the increasing vessel handling at the Vung Ang Port, due to woodchip, to the local area could take a few years, since the volume of export will grow only gradually. Still if the woodchips were to export through the Vung Ang Port, it will lead to a periodical arrival of ships to the port, which in turn results in stable employment at vessel handling operation. Stable income at household level is always a positive contributor to attain higher education and increase access to health services.
7 ECONOMIC ANALYSIS OF THE PORT DEVELOPMENT

7.1 Basic Conditions

The woodchip production and export plan of an agro-forestry company in Laos via the Vung Ang Port as per below are set as premises to study the economic and financial impacts from conducting the proposed project. The project aims for ultimately handing 1.5 million tons of woodchip at the Vung Ang Port with an approach divided into two phases.

At the first phase, until when the trading volume of woodchips reached to 1.5 million tons, the woodchip cargo is proposed to be exported by utilizing the existing Berth No.1 and No.2. Suppose the woodchip trading volume grows up continuously and, if additional supply sources from Vietnam taken in, the demand on using the Vung Ang Port, as an export base/gateway for woodchips, would certainly increase. Thus the berth development specialized for woodchip is supposed to be necessary in due course. Consequently, with the consideration of the current status of the project, the economic and financial analysis of exporting woodchip 1) at existing Berth No.2 and, subsequently, 2) from Berth No.3 after its development shall be studied. At the outset, analysis on the conditions shall be stated, which will be followed by analysis on the financial viability.

7.1.1 Export Volume Forecast of Woodchips

The production and export volume of woodchip is, initially, projected to start at the level of 18,800 BDT/year, and ultimately increased to 1.5 million tons/year accordingly as shown below.

<table>
<thead>
<tr>
<th>Year</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
<th>7th</th>
<th>8th</th>
<th>9th</th>
<th>10th onwards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel</td>
<td>6</td>
<td>12</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>30</td>
<td>36</td>
<td>48</td>
</tr>
<tr>
<td>BDT (thousand)</td>
<td>188.0</td>
<td>377.0</td>
<td>755.0</td>
<td>755.0</td>
<td>755.0</td>
<td>755.0</td>
<td>755.0</td>
<td>944.0</td>
<td>1,132.0</td>
<td>1,510.0</td>
</tr>
<tr>
<td>GMT (thousand)</td>
<td>348.8</td>
<td>699.4</td>
<td>1,400.7</td>
<td>1,400.7</td>
<td>1,400.7</td>
<td>1,400.7</td>
<td>1,400.7</td>
<td>1,751.4</td>
<td>2,100.2</td>
<td>2,801.5</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

Note: Woodchip is normally expressed in two weights:

1. Green Metric Ton (GMT): this is actual weight of woodchip including moisture.

2. Bone Dry Ton (BDT): this is used by Paper Company for only weighing fiber only excluding moisture of woodchip.

3. The conversion ratio between GMT and BDT is: 1.86 GMT = 1.0 BDT
7.1.2 Logistic Plan

The woodchip transported from central Laos via Road No.12 is proposed to be unloaded from transportation trucks at the site of storage yard behind the proposed quay of Berth No.3. The land behind Berth No.3 is planned to be developed in accordance with the port master plan which is soon to be formulated, yet it is likely to be leased for the most prominent user of the port and it should be taken into shape in such manner.

Once the woodchip carrier calls at the Vung Ang Port to pick up woodchips from the storage yard, conveyer belts to load woodchips onto a vessel would be deployed for a transportation purpose. The handling capacity of the proposed conveyer belts is deemed to be enough to load nearly 30,000 tons of woodchips within 72 hours.

7.2 Phase One: Vung Ang Port Storage Yard Development Project

Based on the projected export volume of woodchip, the first phase of the woodchip handling shall be proposed to be carried out by utilizing the existing Berth No.1 and No.2 at the Vung Ang Port. Beside it, a woodchip storage yard is required to be located at the nearest site of the berth. Studying the suitable area for such a purpose, an ideal location was identified in the area behind the prospective development site of Berth No.3. The required size of the storage area is proposed to be 50,000 m² (=5 ha).

While the storage yard development is carried out by the port facility developer, the ship loading facility is purchased and operated by each company. Hence, in the first phase of the port area development project, the project cost is defined as a storage yard development cost, which includes EIA study preparation, any civil and engineering services and land preparation/construction costs. The operation cost is deemed to be only incurred from the interest rate for the loan amount.

7.2.1 Construction Cost and Engineering/Civil Costs
(1) Preparation Cost
(i) EIA

Cost of EIA study preparation for the storage yard development is estimated as shown in the Table 7-2.

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Unit cost (USD)</th>
<th>Amount (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Survey: Environmental Impact Study</td>
<td>1</td>
<td>10,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)
(ii) Detail design, civil and engineering service costs

In order to develop 5 ha storage yard and necessary utilities, a detail engineering design work and tender documents preparation will be needed as soon as the land lease was approved by Vietnamese responsible authorities. The estimated cost for civil/engineering services and supervision is shown in Table 7-3.

Table 7-3: Estimated Cost for Civil Engineering Services and Supervision

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Unit cost (USD)</th>
<th>Amount (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Survey: Civil</td>
<td>1</td>
<td>25,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Professional Survey: Engineering</td>
<td>1</td>
<td>25,000</td>
<td>25,000</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

(2) Construction cost

The estimated cost of the woodchip storage yard development project is:

Table 7-4: Construction Cost for the Woodchip Storage Yard

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Unit Price (USD)</th>
<th>Amount (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>1</td>
<td>2,000,000</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Civil: Storage Area</td>
<td>50,000 (m²)</td>
<td>5,000,000</td>
<td>5,000,000</td>
</tr>
<tr>
<td>Civil: Weigh Bridge</td>
<td>1</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Civil: Warehouse</td>
<td>1</td>
<td>35,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Civil: Office</td>
<td>1</td>
<td>20,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Civil: Paving and Roads</td>
<td>300 (m)</td>
<td>360</td>
<td>108,000</td>
</tr>
<tr>
<td>Electrical Distribution</td>
<td>300 (m)</td>
<td>240</td>
<td>72,000</td>
</tr>
<tr>
<td>Contingency</td>
<td>10% of total above</td>
<td>724,000</td>
<td>724,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>7,964,000</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

Note: The figure is based on the preliminary assumption thus subject to change when further study was carried out.

Land needs to be procured. The reclamation and grading of the land, using 30 cm of laterite on top, and firming the land with roller is proposed to be applied. For deploying loading facilities (belt conveyers: 300-400m) onto the vessels, the ground is likely to require concrete floor. Put fence around the land, build an office (70m²), and also a weigh bridge (16m²) and access road may be required. The estimated total cost is $7.96 million as shown in the above table.
(3) Total investment cost

The total investment cost is consisting of (1) EIA, (2) civil/engineering service and (3) storage yard construction. The total investment cost is estimated as USD 5.56 million as shown in below.

Table 7-5: Total Investment Cost of the Woodchip Storage Yard Development

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Preparation cost</td>
<td>60,000</td>
</tr>
<tr>
<td>2. Construction cost</td>
<td>7,964,000</td>
</tr>
<tr>
<td>Total Investment Cost</td>
<td>8,024,000</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

7.2.2 Operational Costs

Operation cost will be divided into two items: (1) Operation and Maintenance (O&M) of storage yard and (2) Interest Rate for Loan.

(1) Administration cost and operation and management cost (O&M cost) of this project are estimated 1% and 2% of the investment cost respectively as shown in Table 7-6 below:

Table 7-6: Operation Cost of the Woodchip Project Per Year

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost per year (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>80,240</td>
</tr>
<tr>
<td>O&amp;M cost</td>
<td>160,480</td>
</tr>
<tr>
<td>Total Cost</td>
<td>240,720</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

(2) Bank loan and interest

Equity and bank loan share is assumed to be 30% and 70% respectively and exact amount for equity and loan is as shown in the following.

Table 7-7: Equity and Loan for the Project (in USD)

<table>
<thead>
<tr>
<th>Item</th>
<th>1st year</th>
<th>Total</th>
<th>(Share)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity</td>
<td>2,407,200</td>
<td>2,407,200</td>
<td>(30%)</td>
</tr>
<tr>
<td>Loan</td>
<td>5,616,800</td>
<td>5,616,800</td>
<td>(70%)</td>
</tr>
<tr>
<td>Total</td>
<td>8,024,000</td>
<td>8,024,000</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)
The loan for this project is planned to use JBIC or any other bank loans with the following conditions:

<table>
<thead>
<tr>
<th>Table 7-8: Loan Conditions for Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest rate</td>
</tr>
<tr>
<td>Grace Period</td>
</tr>
<tr>
<td>Reimbursement Period</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

7.2.3 Expected Revenue Projection from Woodchip Storage Yard Lease and Handling at the Port

The expected revenue for the woodchip storage yard operation, which includes income received by stock yard lease, royalty and stevedore charges, would go up to around $7.73 million when the woodchip handling is done at the full operation of 1.5 million tons per year, whereas the port operation revenue from woodchip handling is expected to increase and would reach $1.61 million in full operation as shown in Table 7-9.

<table>
<thead>
<tr>
<th>Table 7-9: Expected Revenue from Stock Yard Lease and Woodchip Handling at Vung Ang Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>BDT (thousand)</td>
</tr>
<tr>
<td>Stock yard (thousand)</td>
</tr>
<tr>
<td>Port handling</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

7.2.4 Financial Internal Rate of Return (FIRR)

1) Condition of financial analysis

The condition of financial analysis of this project is as follows:

(i) Schedule of preparation and construction
The preparation works of the project are proposed to start from August 2010 to December 2010 (5 months).
Construction period is estimated 12 months from January 2011 to December 2011.

(ii) Schedule of operation
Construction is assumed to be completed by December 2011 then operation is estimated to start from January 2012.
(iii) Project life
Due to the nature of forestry products handling project, although the project is likely to continue for a longer term (at least 50 years), in order to assess the financial return from investment in reasonable period, it is set that only 10 years was used as the project life: 2011 to 2021.

(iv) Depreciation
Depreciation of machinery and equipments are considered 7 years. Depreciation shall not be applied onto land.

(v) Tax
There is no discrepancy of corporate tax rates between domestic and foreign companies in Vietnam. Hence corporate tax of 25% was applied for the project.

(vi) Dividends and Re-investment
For this study, dividend will not be paid during the 20 years period and profit shall be re-invested into the project and additional profit shall be kept as accumulated retained earning.

2) Financial Internal Rate of Return
FIRR calculated under the aforesaid conditions comes to 26.02% as shown below. The result indicates that the FIRR of this value is commercially viable. Furthermore even adopting the discount rate of 12%, which is presumably a standard value in Vietnam market, Net Present Value (NPV) could indicate a positive $21.4 million, which becomes the accumulated income surplus against the accumulated cost in the project period. The benefit cost ratio (B/C ratio) also comes to 1.95.

To sum up, even though the scope of the project was confined to the development of a woodchip storage yard and its operation and maintenance, FIRR came to a positive result of 20.25%, NPV of $16.9 million and B/C of 1.80.

Table 7-10: The Results of Financial Analysis for Each Project Components

<table>
<thead>
<tr>
<th>Project</th>
<th>Financial evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NPV (mil. USD)</td>
</tr>
<tr>
<td>Integrate woodchip loading</td>
<td>21.40</td>
</tr>
<tr>
<td>(Storage+Port handling)</td>
<td></td>
</tr>
<tr>
<td>Storage yards</td>
<td>16.91</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)
### 3) Cash flow

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash In Flow</th>
<th>Storage Yard Subtotal</th>
<th>Port Handling Subtotal</th>
<th>Out Flow Total</th>
<th>Cash Balance Cash Accumulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>8,024,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9,163,408</td>
</tr>
<tr>
<td>2012</td>
<td>1,203,720</td>
<td>201,552</td>
<td>1,405,272</td>
<td>0</td>
<td>646,092</td>
</tr>
<tr>
<td>2013</td>
<td>2,137,380</td>
<td>403,104</td>
<td>2,540,484</td>
<td>0</td>
<td>1,351,741</td>
</tr>
<tr>
<td>2014</td>
<td>4,004,700</td>
<td>806,208</td>
<td>4,810,908</td>
<td>0</td>
<td>1,694,628</td>
</tr>
<tr>
<td>2015</td>
<td>4,004,700</td>
<td>806,208</td>
<td>4,810,908</td>
<td>0</td>
<td>1,660,847</td>
</tr>
<tr>
<td>2016</td>
<td>4,004,700</td>
<td>806,208</td>
<td>4,810,908</td>
<td>0</td>
<td>1,627,066</td>
</tr>
<tr>
<td>2017</td>
<td>4,004,700</td>
<td>806,208</td>
<td>4,810,908</td>
<td>0</td>
<td>1,593,285</td>
</tr>
<tr>
<td>2018</td>
<td>4,004,700</td>
<td>806,208</td>
<td>4,810,908</td>
<td>0</td>
<td>1,559,504</td>
</tr>
<tr>
<td>2019</td>
<td>4,938,360</td>
<td>1,007,760</td>
<td>5,946,120</td>
<td>0</td>
<td>2,892,651</td>
</tr>
<tr>
<td>2020</td>
<td>5,867,080</td>
<td>1,209,312</td>
<td>7,076,392</td>
<td>0</td>
<td>3,622,972</td>
</tr>
<tr>
<td>2021</td>
<td>7,734,400</td>
<td>1,612,416</td>
<td>9,346,816</td>
<td>0</td>
<td>5,057,243</td>
</tr>
<tr>
<td>Total</td>
<td>8,024,000</td>
<td>41,904,440</td>
<td>84,651,184</td>
<td>0</td>
<td>26,263,547</td>
</tr>
</tbody>
</table>
7.2.5 Sensitivity Analysis

According to the analysis, the major influence factors are accrued from the changes in both investment cost and revenue from the project. The lease, the cost change in O&M and administration, has the least impact because its value is relatively small, and its fluctuations are estimated to be relatively stable against other price fluctuations. Moreover remarkable fluctuations of gap between the highest FIRR and the lowest are found in the positive change of the total investment and the negative change in revenue, which are 29.51% and 22.60% respectively. Consequently it can be concluded that the project profitability would be most directly impacted by changes in investment cost and revenue than other parameters. In other words, it is indicated that these two elements are the critical factors for this project.

<table>
<thead>
<tr>
<th>Table 7-11: Sensitivity Analysis on Phase 2 Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10%</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Investment total</td>
</tr>
<tr>
<td>Revenue total</td>
</tr>
<tr>
<td>O&amp;M and administration cost total</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

7.2.6 Implications

Thakek-Vung Ang woodchip transportation project is very important for both Lao PDR and Vietnam benefiting both countries by means of developing socio-economic status along the corridor. Moreover, in order to explore establishing a globally competitive woodchip industry in the region, an efficient and modern woodchip supply chain with
economical processing/handling system and optimal transportation system should be in place between Laos and Vietnam, especially in road and port. This objective will be achieved only when proper coordination and cooperation measures was placed between the private sector’s initiative and the government’s commitment to work together towards the main goal of developing a globally competitive woodchip industry in the corridor. For instance, as we have stressed from times to times, the allocation of stock yard at the backyard of the proposed Berth No.3 would be the part of the important element, which would bring about the corridor’s potential for woodchip industry in the corridor to be globally competitive. Yet the port development at Berth No.3 should wait until enough volume of woodchip cargo can be attained so that the revenue from the port operation could correspond to the investment cost.

7.3 Phase Two: Development Project of Berth No. 3

According to the projected export volume of woodchips from the Vung Ang Port, by the time the volume reaches to 1.5 million ton per year, 48 vessels are supposed to approach the port, which means 4 vessels would come per month. The estimated loading duration required for woodchips onto the vessel is deemed to be 3 days. Hence, when such situation becomes visible, a designated port for woodchip handing will be required.

The designated port development project is, thus, to be designed in the optimal area within the distance where the cheapest transportation cost can be attained in that woodchip can be directly loaded onto vessels by conveyer belts. Therefore, Berth No.3 next to the storage yard should be considered as the best designated site for the port development project which can accommodate frequently coming vessels for loading woodchip.

The land behind the sea front at Berth No.3 is already cleared and supposed to have been reclaimed by the time Berth No.3 will be developed. The port will function as designated port especially for woodchip handling and loading. The necessary facilities, project cost and operation income from port operation as well as the FIRR from the project are to be studied in the following part.

7.3.1 Financial Internal Rate of Return (FIRR)

1) Condition of financial analysis
The condition of financial analysis of this project is as follow:

i) Schedule of preparation and construction
This second phase project is supposed to start in accordance with the volume expansion situation of woodchip handing at the existing Berth No.1 and No.2, and tries to diversify and, ultimately, concentrate the woodchip handing
function in that the woodchip handling operation of Berth No.1 and No.2 will be handed over to the Berth No.3. Accordingly, initiation of the project may take certain period of time.

ii) Schedule of operation
Operation is deemed to start immediately after enough volume of woodchip, namely 1.5 million tones, started being handled by Vung Ang Port, and the completion of the port development works in two years time.

iii) Project life
Due to the nature of forestry products handling project, although the project is likely to continue for a long term (at least 50 years), in order to assess the financial return from investment in reasonable period, it is set that only 20 years was used as the project life of port operation.

iv) Depreciation
Depreciation of machinery and equipments are considered 10 years. Depreciation shall not be applied onto land.

v) Tax
There is no discrepancy of corporate tax rates between domestic and foreign companies in Vietnam. Hence corporate tax of 25% was applied for the project.

vi) Dividends and Re-investment
For this study, dividend will not be paid during the 20 years period and profit shall be re-invested into the project and additional profit shall be kept as accumulated retained earning.

vii) Bank loan and interest
Conditions of bank loan and interest are set as the same as the above phase one project.

viii) Revenue
Source of revenue and the amount is set as the same as the above phase one project.

2) Financial Internal Rate of Return
FIRR calculated under the aforesaid conditions comes to 16.33% as shown below. The result could indicate that the FIRR of this value is commercially viable in Vietnam market. Net Present Value (NPV) could indicate a positive $59.0 million, which is accumulated income surplus against the accumulated cost in the project period. Benefit cost ratio (B/C ratio) also comes to 1.83.
7.3.2 Sensitivity Analysis

To evaluate the project in more comprehensive way, we conducted a sensitivity analysis with fluctuating parameters on investment cost, O&M, and revenue at the rate of 10% from the base case in order to assess the possible risks of the project. The results of calculations are as follows.

The results of sensitivity analysis indicate that investment cost have the greatest impact on FIRR. O&M cost has the least impact because its value is relatively minor. Moreover, the gaps between the lower FIRR and the higher FIRR of the project resulting from fluctuations in investment cost and O&M costs are 4.41% and 3.44% respectively. Consequently it can be concluded that project profitability will be most directly impacted by changes in investment cost rather than other parameters. In other words, this element is the critical factors for this project.

Table 7-13: Sensitivity Analysis on Phase 2 Project

<table>
<thead>
<tr>
<th></th>
<th>-10%</th>
<th>Base</th>
<th>+10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment total</td>
<td>18.73%</td>
<td>16.33%</td>
<td>14.32%</td>
</tr>
<tr>
<td>Revenue total</td>
<td>14.65%</td>
<td>16.33%</td>
<td>18.09%</td>
</tr>
<tr>
<td>O&amp;M and administration cost total</td>
<td>16.42%</td>
<td>16.33%</td>
<td>16.25%</td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)
7.3.3 Cash Flow Analysis

As for the financial source of loan portion, provided the financial loan arrangement was made from Vietnamese commercial banks, the project feasibility would turn dubious. On the other hand, when JBIC yen loan was applied as the project financial scheme, the project could be financially sound in order to attract private investor for port development and operation. Hence in the cash flow analysis, yen loan arrangement could be claimed the most crucial premising measure for the project to sustainable control by private sector throughout the project life.

![Graph showing cash flow analysis with interest rates comparison](image)

**Figure. 7-1: Comparison between Interest Rates**
(Source: JDI Study Team)

7.3.4 Implications

According to the analysis below, the phase two port development project can only attained financial viability (supposed to be equal to the discount rate in Vietnam: 12%) only after the volume of the handing cargo, which base line in this case of woodchip, reached 1.2 million BDT per year. Consequently it can be stated that attaining financially meaningful outcome, at lease 1.5 million of woodchip handling should need to be presented before investment on phase two project is actually taken place. So as to attract such a large volume of cargo to the port, comparative advantage surely need to be attained as its usability in port function. Vung Ang Port should have potentials for handling Laotian agro forestry goods/products as their gateway.
There are several issues to be cleared for implementing the actual project, however, a sound financial outcome from the project development could be sighted when the government and private sector jointly had a stake for the successful operation of stock yard in the closest distance to the vessel to transport woodchip overseas.
8 STAKEHOLDERS ANALYSIS

In order to process the development of woodchip storage yard at the backland of Berth No.3 and No.4 on time of the start of woodchip export in 2012, and the development of Berth No.3 when the woodchip export volume exceeds the capacity of Berth No.1 and No.2 in the future, a proper analysis on the stakeholders of seaport development in Vietnam should be done to identify the key players.

8.1.1 Stakeholder Analysis on National Level

In terms of the development of seaports in Vietnam, there are mainly three key stakeholders that need to be addressed. The first is the Ministry of Transport (MOT) which is the organization that decides the details speck of a seaport, and recommends to the Prime Minister for the approval of development. The second is the Ministry of Planning and Investment (MPI), which verifies the seaport investment plan after the Master Plan of the seaport was approved by the Prime Minister through MOT. However, the final decision on the investment will also ultimately come from the Prime Minister, based on the suggestions from the Department of Infrastructure and Urban Development of MPI.

The third key stakeholder is the Ministry of Finance. The Ministry of Finance approves on the budget of the investment project if public money is to be used for the development. In case of the development of Berth No.3 at the Vung Ang Port, it is likely that the development will be processed in Public Private Partnership (PPP) manner, since based on the government’s conclusion No.25/TB-VPCP issued on January 29, 2010, the Vung Ang Port Viet-Lao Joint Stock Company owns the right of developing new berths at the Vung Ang Port. On this moment, the exact share between private and public sectors has not yet decided.
8.1.2 Stakeholder Analysis on Local Level

In the local level, there are three key stakeholders as well. The first is the Ha Tinh Provincial People’s Committee, where the Vung Ang Economic Zone Authority has an office. The second is the Maritime Administration of Ha Tinh, which is an organization under the Vietnam Maritime Administration (Vinamarine) in the organizational chart above. This organization will be the supervisor of the development work of the woodchip storage yard and Berth No.3. The third key stakeholder is the Vung Ang Port Viet-Lao Joint Stock Company. As stated above, this joint venture company between Vietnam and Laos holds the right to develop Berth No.3 to No.6. Therefore, upon developing Berth No.3 in the future, an investor would better form a joint venture company with them.

The Master Plan of Berth No.3 to No.6 was planned and designed by the Economic Zone Authority and the Maritime Administration of Ha Tinh, and currently waiting for the approval from the Chair of the Ha Tinh Province People’s Committee, which is planned to be made between April and May of 2010. Once this Master Plan becomes effective, the study team will verify whether the proposed development plan of the woodchip storage yard and Berth No.3 complies with. If it does, the study team will request to conduct a Feasibility Study to draw a detailed plan of the seaport to be submitted to MOT for the approval of the development.
9 FUTURE ACTION PLAN

In July, 2006, the Vietnamese government enforced “Decree No.71/2006/ND-CP” which rules apply to the management of seaports and maritime channels, and allows foreign investors to develop and operate a port in Vietnam. Based on this decree, the study team proposes to develop the woodchip stock yard by private investment, and Berth No.3 at the Vung Ang Port by PPP with the Vung Ang Port Viet-Lao Joint Stock Company. The flow-chart below shows the step on how seaport investment and development will be approved and processed.

![Flow-Chart of Seaport Investment and Development Approval](source)

Figure 9-1: The Flow-Chart of Seaport Investment and Development Approval

(Source: JDI Study Team)
Based on the above flow-chart, the action plan for the development of the woodchip storage yard and Berth No.3 was divided into three phases: the first is the “Preparation Study Phase”, the second is “Phase 1 Development Plan: 2010-2015”, and the third is “Phase 2 Development Plan: 2020 or after”. Each phase will be explained below.

9.1 Preparation Study Phase: 2010

This phase indicates the preparation period before the actual development of the yard and the berth starts. First, after the approval of the Master Plan on the development of Berth No.3-No.6 at the Vung Ang Port by the Chief Commissioner of the Ha Tinh Provincial People’s Committee, the study team should work immediately to confirm whether the proposed development of yard and Berth No.3 is in accordance with the Master Plan. Though, during the field study conducted in December 2009, and March 2010, the JDI study team received approval from Maritime Administration of Ha Tinh, and Ha Tinh Joint Stock Company on assisting JDI to receive approval on starting feasibility research of the yard and Berth No.3 soon.

Secondly, the study team should conduct a feasibility study on the development of a woodchip stock yard and Berth No.3 in order to arrange a detailed development plan to be submitted to MOT for the governmental approval on conducting the development. The feasibility study should not take more than six months, or at least should be finished within 2014, so that the construction of the storage yard will be in time for the start of woodchips export from central Laos in 2012.

9.2 Phase 1 Development Plan: 2011-2012

Phase 1 should be dedicated to ensure a smooth start of woodchips export through the Thakek-Vung Ang Gateway. Thus, Phase 1 is mainly divided into two objectives: the first is the development of the Agro-Forestry Processing SEZ at Thakek, and the second is the development of a Woodchip Storage Yard at the Vung Ang Port.

9.2.1 Agro-Forestry Processing SEZ in Thakek, Lao PDR

With the support from ADB and UNIDO, Laos is planning to start a nation-wide SEZ Development Program within a few years. Considering the fact that 1) harvesting of Eucalyptus and processing to woodchips is due to start from 2012, 2) the request from Lao Government to process into woodchips at least a part of the harvest within Laos, and 3) the presence of rubber and other agro-forestry production plantations in central Laos, the development plan of an Agro-Forestry Processing SEZ is a pressing need, as well as a chance of profitable business for Laos. Based on the discussions between JDI study team, and the governor of Khammouane
province, it was basically agreed to develop the SEZ in Thakek near the cross section of Road No.12 and No.13. The project area is planned to have about 100ha, of which 50 ha will be occupied by the woodchip company to process harvested timbers into woodchips. In order for the company to start its operation from the early 2012, the SEZ must be constructed by the end of 2011. Thus, a rough development schedule was planned as below.

<table>
<thead>
<tr>
<th>Schedule</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Planning and designing of the SEZ</td>
<td>Construction of the SEZ</td>
<td>Start of the operation of the woodchip processing factory.</td>
<td></td>
</tr>
<tr>
<td>2) Approval on the development from the Lao Government</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Engineering Study</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: JDI Study Team)

9.2.2 Woodchip Storage Yard at the Vung Ang Port

In Phase 1, because the woodchip export volume is still low, it is more reasonable and cost-effectively to use Berth No.1 and No.2 as the export port, rather than start constructing a new Berth and woodchip storage yard together. In order for the woodchip company in central Laos to provide paper in a competitive price in the international market, it is necessary to make up the extra transport cost it incurred by transporting woodchips by trucks all the way from Laos to Vietnam. Therefore, constructing a woodchip storage yard in the vicinity of operating berths is crucial to enable woodchips loaded onto vessels through automated conveyer belt directly from the storage yard. During the field study at the Vung Ang Port, the backland of the project area of Berth No.3 and No.4 was identified as the ideal location of the storage yard.

Once the Prime Minister approval on the development of woodchip storage yard and Berth No.3 is issued, the construction of the woodchip yard should start immediately by using a local construction company. Since no woodchip processing will be taking place at this woodchip storage yard, the design of the space should be fairly simple. However, since the project area of the yard is currently just open water, reclamation needs to be taken place. In order to speed up the process and lower the cost, it is planned to use the same local engineering company which designed Berth No.1 and No.2, and already has the knowledge of the appropriate method of reclamation.

9.3 Phase 2 Development Plan: 2020 or after

At Phase 2, the development of Berth No.3 should take place to meet the increasing woodchips and other agro-forestry products’ export demand. As per the timing, Phase 2 is projected to be started when the handling volume at Berth No.1 and No.2 nears the full capacity,
or when the woodchip export volume reaches to 1,500,000 tons per year. At the volume of 1,500,000 tons per year, it is assumed that Berth No.3 can be operated as a specialized Berth for woodchips and agro-forestry products, but still remain profitable. The actual construction should be processed according to the development plan approved by the Prime Minister at the beginning, unless special modification is necessary.

As stated earlier, the speck of the berth should be designed to accommodate 51,000DWT WMV, which should have about 13m depth of water, and 275m length of the berth. In addition, if the Berth becomes a specialized port for agro-forestry products and woodchips, it is possible to construct a permanent conveyer belt. Permanent conveyer belt will be more economical in this case rather than the mobile conveyer belt, since vessels are expected to arrive at least three times a month at the volume of 1,500,000 tons per year.

9.4 Possible Funding Scheme

In terms of the funding of processing the development of woodchip storage yard and Berth No.3 at the Vung Ang Port, the following scheme is tentatively considered.

9.4.1 Funding for the Woodchip Storage Yard

Though a closer study needs to be taken in the future, the cost of developing a woodchip storage yard at the backland of Berth No.3 and No.4 is roughly estimated to be about US$ 8 million, including the reclamation of the coast. Since the cost is relatively low, it should be incurred by a private sector. This will speed up the development process as well.

9.4.2 Funding for Berth No.3 at the Vung Ang Port

There are three possible methods of funding for the construction of Berth No.3 at the Vung Ang Port as below.

1) **Public Fund:** This method is same as the construction of Berth No.1 and No.2. However, in the Government’s conclusion No.25/TB-VPCP issued in January, 2010, it is stated that in case of constructing additional berths at the Vung Ang Port, the Vung Ang Port Viet-Lao Joint Stock Company is to ensure fund by itself.

2) **Private Fund:** The New Investment Law enforced in 2006 (Decree No.71/2006/ND-CP of the Government) allows the private sector to develop own ports. However, in case of the investment from foreign companies, it needs to form a joint venture with a local company with no more than 49% share.

3) **Public Private Partnership (PPP) Scheme:** According to the Government’s conclusion No.25/TB-VPCP, the operation of the Vung Ang Port was formally given to a joint stock
company called the Vung Ang Port Viet-Lao Joint Stock Company which is consisting of seven Vietnamese and three Laotian partners. Since this joint company owns the right to develop berth No.3-6, it is wiser for a private investor to form a joint venture with the Vung Ang Port Viet-Lao Joint Stock Company, which has a connection with both Vietnamese and Laotian government to lure partial funding from a public source. The JDI study team considers option 3 to be the most advantageous and realistic.

9.5 Recommendation to the Vietnamese Government

Though the Vung Ang Port was started operating in 2001, and Berth No.2 is scheduled to start operating in March, 2010, the port itself has not yet been widely used. Part of the reason is that there is no large size industry in the central Vietnam that could be a potential user of the Vung Ang Port. As a result, currently, the most frequent customers are the woodchip companies based in Vietnam. Because of the natural advantage of the Son Duong Port, a lot of private investors are turning their attentions to the Vung Ang area recently. However, the actual investment is likely to take another few years as most companies are experiencing world wide economic recessions from the end of 2008. Therefore, until industries potentially use the Vung Ang Port for export/import purposes are developed, the agro-forestry companies in central Laos, especially the woodchip company becomes the most tangible customer for the Vung Ang Port. In addition to the size of the export volume, which is expected to reach more than a million tons per year, the export of woodchips usually turns into a long-term relationship considering the time frame of forestry products to grow. Therefore, the Vietnamese government should treat them as the first priority.

In order for woodchip companies in central Laos to use the Vung Ang Port in long-term, cost efficiency should be attained. One of the crucial components to reach cost-efficiency is the location of the woodchip storage yard. If the storage yard is located in a distance that requires loading and unloading by trucks, rather than using a conveyer belt, the cost will be too high that the company cannot provide papers in internationally competitive price. This will eventually lead to the suspension of the woodchip export from Laos. Losing a customer who potentially exports in a volume exceeding 1 million tons per year will be a large loss for Vietnamese economy, especially for the central regions which remains relatively poorer than regions in south and north of the country. Therefore, a warm and continuous support for should be provided by the Vietnamese government on following projects for the benefit of the country.

1) Immediate construction of a woodchip storage yard at the backland of Berth No.3 and No.4
2) Construction of Berth No.3 as a specialized port for agro-forestry industries in the future
3) Improvement of the existing road and development of a new lane for Road No.12 in the future

9.6 Recommendation to the Lao Government

Considering the volume to be handled, the success of the export of woodchips from central Laos using the Thakek-Vung Ang Port Gateway has a potential to influence the development of the agro-forestry industry in Laos. If a successful export model is established, other companies in the agro-forestry industry as well as investors who have been unsure about investing in the land-locked country Laos would be encouraged and convinced to follow the same model. In order for Laos to reach this state, the cost-efficiency of exporting woodchips from Laos should be attained.

The Lao government can assist this process by first, assisting the development of an Agro-Forestry Processing Zone in Thakek, Khammouane Province. It is important to improve the industrial environment for the woodchip industry to start exporting in the scheduled timeframe. In other words, in order to start exporting from 2012, the processing factory should be completed at least by early months of 2012. If a processing factory is opened on time, it would contribute to the smooth export of woodchips as well as the creation of new employments for local households having an annual income below the national poverty line.

The second area the Lao government could provide assistance, to ensure a favorable export environment for a woodchip industry, is to improve the custom process at the border in Na Phao. Currently, the custom process at Na Phao is manually conducted by only a few officers, and the office hour is limited to day time. Considering the low volume of traffic currently crossing the border, this situation is understandable. However, the current system is certainly not efficient when a large number of 20 tons trucks are passing by in the future to transport woodchips. Thus, an electronic custom system in international standard should be implemented at the border. As explained in Chapter 4 above, the Lao government is now on the process of implementing the ASYCUDA custom system supported by UN. The government should make sure that Cha Lao at Na Phao is included as the border section the ASYCUDA system is implemented.
10 CONCLUSION

The Thakek-Vung Ang Gateway has been receiving keen interests by Thailand, and Laos as the shortest export gateway to the Pacific Ocean. By taking Road No.12, it is less than 300 km from the Thai/Lao border, and less than 150 km from the Lao/Viet border. Seeing a potentiality in this gateway, three countries—Thailand, Laos, and Vietnam—has been working closely to develop the Thakek-Vung Ang Gateway since the late 1990s to increase economic interactions among them. Under the current plan, Thailand will complete the construction of the Third Friendship Bridge between Nakhon Phanom in Thailand and Thakek in Laos. The Khammouane Province in central Laos started the development plan of Agro-Forestry Processing SEZ, and Vietnam is about to confirm the Master Plan of the expansion of the Vung Ang Port to accommodate variety of industries in the future.

Though the trans-shipment through a port in central Vietnam has not yet widely known among private investors, this effort among three countries has attracted agro-forestry companies in central Laos which are looking for an economical transport route. Among them, the most prospective actor is the woodchip companies which have completed about 30,000 ha plantation by the end of 2009 to export woodchips to Japan, China, and Korea. This plantation size is so large that within 10 years, the volume of woodchips produced in central Laos is expected to reach near 1 million tons per year. For Laos, the woodchip production will be the promoter of economic development to catch up with neighboring countries. For Vietnam, it will be the first large size export through the Vung Ang Port, and if successful, a trigger to attract other agro-forestry companies. For Japan, the main receiver of woodchips exported through Vietnam, it will help to meet the domestic and international paper demand which is expected to grow again together with the economic recovery. In order to ensure economic benefits of woodchip exports, the following projects are identified as urgent needs.

1) Agro-Forestry Processing SEZ in Thakek, Laos:
A 100 ha industrial zone at the SEZ should receive approval from the national government within 2010, and start construction in 2011, to be on time for the operation of woodchip processing in 2012. This project should be processed under the Master Plan of the Thakek SEZ (350 ha), which also includes residential and recreational zones.

2) Development of Woodchip Stock Yard:
A basic agreement among all stakeholders on the development of 5 ha storage yard at the backland of Berth No.3 and No.4 at the Vung Ang Port should receive as soon as possible. The storage yard should be located at the closest available land, so that woodchips can be loaded to vessels directly by using a conveyer belt. Following that, a feasibility study and a
Detail engineering design should be conducted within 2010. The construction of the 5 ha storage yard should start in 2011, and should be completed within 2011 or early 2012.

In the later phases of the development, once Berth No.1 and No.2 reaches the full capacity in the future (projected to be within 5-7 years), Berth No.3 should be constructed by PPP scheme as specialized Berth for woodchips and other agro-forestry industries. The profitability of operating a specialized berth is also assumed to be reached since the woodchip exporting volume is likely to reach 1.5 million to 2.0 million tons by 2020.

Regarding to the financing scheme of above development projects, PPP scheme should be taken utilizing the scheme allowed under the Governmental Decree No.71/2006/ND-CP. Since the profitability of developing the woodchip storage yard and Berth No.3 is very realistic due to the high demands from agro-forestry industries, it is assumed to be an attractive project for private investors as well.

In addition to the development projects at the Vung Ang Port, in medium to long run, additional public projects such as widening of Road No.12 will be required as the volume of cargos passing the Thakek-Vung Ang Gateway increases. Because of the on-going investment projects in the Son Duong Port, a further expansion of the Vung Ang Port and surrounding special economic zone, and improvement on power, water and local access roads should also taken place by either PPP or public funding to handle expanded economic activities in the region.

In the next stage, the study team will further work to conduct following actions:

1) Detail Feasibility Study and Engineering Design work of Agro-Forestry Processing SEZ
2) Detail Feasibility Study and Engineering Design work of 5 ha woodchip storage yard and Berth No.3 at the Vung Ang Port
Appendix Index

1. Road Design Standard
## Appendix 1: Road Design Standard

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>I</strong></td>
<td>Road Design Class</td>
<td>&gt;8000</td>
<td>3000-8000</td>
<td>1000-3000</td>
<td>300-1000</td>
<td>100-300</td>
<td>50-100</td>
</tr>
<tr>
<td><strong>II</strong></td>
<td>Traffic</td>
<td>F</td>
<td>R</td>
<td>M</td>
<td>F</td>
<td>R</td>
<td>M</td>
</tr>
<tr>
<td><strong>III</strong></td>
<td>Terrain</td>
<td>F</td>
<td>R</td>
<td>M</td>
<td>F</td>
<td>R</td>
<td>M</td>
</tr>
<tr>
<td><strong>IV</strong></td>
<td>Design Speed</td>
<td>100</td>
<td>80</td>
<td>60</td>
<td>100</td>
<td>80</td>
<td>60</td>
</tr>
<tr>
<td><strong>V</strong></td>
<td>Formation Width</td>
<td>32</td>
<td>32</td>
<td>20</td>
<td>21.5</td>
<td>21.5</td>
<td>11</td>
</tr>
<tr>
<td><strong>VI</strong></td>
<td>Number of Lane</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>VII</strong></td>
<td>Land Width (m)</td>
<td>3.75</td>
<td>3.75</td>
<td>3.5</td>
<td>3.75</td>
<td>3.75</td>
<td>3.5</td>
</tr>
<tr>
<td><strong>VIII</strong></td>
<td>Carriageway (m)</td>
<td>15</td>
<td>15</td>
<td>14</td>
<td>7.5</td>
<td>7.5</td>
<td>7</td>
</tr>
<tr>
<td><strong>IX</strong></td>
<td>Island Width at road centre (m)</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>X</strong></td>
<td>Island divided between paved shoulder and low traffic</td>
<td>2x3</td>
<td>2x3</td>
<td>-</td>
<td>2x3</td>
<td>2x3</td>
<td>-</td>
</tr>
<tr>
<td><strong>XI</strong></td>
<td>Paved shoulder (m)</td>
<td>2x0.5</td>
<td>2x0.5</td>
<td>2x2</td>
<td>2x0.5</td>
<td>2x0.5</td>
<td>2x2</td>
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<tr>
<td><strong>XII</strong></td>
<td>Lane for low traffic (m)</td>
<td>2x3</td>
<td>2x3</td>
<td>-</td>
<td>2x3</td>
<td>2x3</td>
<td>-</td>
</tr>
<tr>
<td><strong>XIII</strong></td>
<td>Unpaved shoulder (m)</td>
<td>2x0.5</td>
<td>2x0.5</td>
<td>-</td>
<td>2x0.5</td>
<td>2x0.5</td>
<td>-</td>
</tr>
<tr>
<td><strong>XIV</strong></td>
<td>Max. Gradient (%)</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td><strong>XV</strong></td>
<td>Min. Horiz. Curve (m)</td>
<td>400</td>
<td>250</td>
<td>130</td>
<td>400</td>
<td>250</td>
<td>130</td>
</tr>
<tr>
<td><strong>XVI</strong></td>
<td>Min. Vert. Curve (m)</td>
<td>100</td>
<td>50</td>
<td>25</td>
<td>100</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td><strong>XVII</strong></td>
<td>Crest (km)</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>XVIII</strong></td>
<td>Sag (km)</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>XIX</strong></td>
<td>Superelevation (m)</td>
<td>3</td>
<td>2</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td><strong>XX</strong></td>
<td>Crossfall:</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td><strong>XXI</strong></td>
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<td>-</td>
<td>4</td>
<td>3</td>
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<tr>
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<td>-</td>
<td>4</td>
<td>&gt;3</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td><strong>XXIV</strong></td>
<td>Unpaved Shoulder (%)</td>
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<td>-</td>
<td>5</td>
<td>&gt;4</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td><strong>XXV</strong></td>
<td>Roads Reserve (m)</td>
<td>60</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td><strong>XXVI</strong></td>
<td>Bridge Design Live Load</td>
<td>HS - 25 - 44</td>
<td>HS - 25 - 44</td>
<td>30</td>
<td>20 - 44</td>
<td>30</td>
<td>20 - 44</td>
</tr>
</tbody>
</table>
ラオス・ベトナム間（Thakek-Vung Ang 港）ゲートウェイ開発準備調査
（タイ北東部、ラオス、ベトナムをつなぐ新東西回廊開発）

和文要約
1. 案件実施背景

東南アジア諸国の中にあって、ラオスは周辺国と比べて経済的に遅れを取ってきたが、アジア開発銀行（ADB）主導で進められてきた「大メコン河地域経済協力プログラム」によって、周辺国とのロジスティック・ネットワークが道路・鉄道開発により整備されてきたこともあり、同国の経済発展にとってボトルネックとなっていた輸出経路の確保が進み、その状況は大きく変わろうとしている。また、自国が持つ豊かな森林資源を活用した産業が近年順調に成長を続けており、今後の更なる経済発展の牽引役として期待されている。ただ、四方を他国に囲まれたラオスは物資/製品の輸出入玄関口となる港湾までの輸送コストがかさむことから、ラオスに生産拠点を持つ企業にとって物資/製品輸送コスト・時間の両面で有利な輸送経路の洗い出しが必要になってきている。本件にて提案されている太平洋へと抜ける「タケーク（Thakek）-ブンアン（Vung Ang）港間のゲートウェイ」もこの観点から、ラオス中部にて成長が見込まれる農林産業の製品輸出経路としての役割を担うべく開発提案がされたものである。

2. 回廊の概要

「タケーク-ブンアン港間のゲートウェイ」は、下記「図 1」に示されている通り、ラオス中部のカンムアン県の中心都市であるタケークを起点に 12 号線を通り、ナファオ（Na Phao）にてラオス/ベトナムの国境を越え、一時的に 15 号線（ホーチミン・ハイウェイ）を経由した後、またベトナム側の 12 号線を通り、ベトナム北中部のハティン省（Ha Tinh）のブンアン港へと抜ける輸出経路である。12 号線は2009年6月に完成したばかりであり、この完成をもってブンアン港は中部ラオスから最短距離にある港となった。他国の港まで物資/製品を運び出すことを余儀なくされるラオスにとって、距離的な優位性は輸送経路の選定にあたって重要となる。また、ラオスのカンムアン県と隣接するタイの北東 6 州もこのゲートウェイの優位性に注目し、2011年完成を目標に現在タケークとタイの Nakhon Phanom をつなぐ第 3 の友好橋の建設がタイ政府の資金によって進められている。この橋が完成すれば、「タケーク-ブンアン港間ゲートウェイ」はタイ、ラオス、ベトナムの 3 国を結ぶこととなり、ADB の「大メコン河地域経済協力プログラム」下で進められているベトナムのダナン（Da Nang）港を輸出港としたゲートウェイに続く、新しい東西回廊として、東南アジアの経済発展に大きく寄与する可能性を秘めている。
図1：タケーキ～ブンアン港間ゲートウェイ

輸出港となるブンアン港は1996年にラオスとベトナム政府との間で、港を持たないラオスの輸出港として開発されることで合意され、2001年に開港した。開港された際は35,000DWTまでの船舶の入港が可能であったが、その後2004年に第1バースの拡張が行われ45,000DWTまでの船舶の受け入れが可能となった。さらに2010年3月より、50,000DWTまでの船舶が入港可能な第2バースの運営が、ラオスとベトナムの企業10社の合弁会社によって始まる予定である。

3. ラオスの農林産業

2005年時点においてラオスの森林は全国土のおよそ70%に当たる16,142,000haに
で広がっており、内 1.4%が植林によるものである。植林面積はまだ大きくないものの、その面積は 1990 年～2005 年の間に年率 5,500%の速度で広がっている。ラオス中央部においては、中国、ベトナム、日本の民間企業が木材、ゴム、紙の原料となるウッドチップの生産のために植林事業を行っている。本調査で焦点を当たったウッドチップの生産・輸出に関しては、ウッドチップ用の植林がラオスでは 2005 年から始まっており、そうした森林は通常 7 年周期で収穫されるため、最初のウッドチップの輸出が 2012 年にも行われる予定であり、輸出玄関口となる港湾までのロジスティックを早急に進める必要が出てきている。また、ウッドチップ用の森林を植林している企業へのヒアリングを行ったところ、将来的な輸出量は年間約百万トンにも及ぶ見通しであり、ラオスにとっても、ベトナムにとっても大きな経済効果を生むと予想されている。

よって、現状「タケーク-ブンアン港間ゲートウェイ」を輸出経路として使用した場合を想定すると、ラオス国内におけるウッドチップ加工場所の確保とブンアン港におけるウッドチップ保管ヤードの建設が急務となっており、また将来的に年間約百万トンにも及ぶ輸出を支える道路・港の設備が輸出計画に合わせて順次実施されるようラオスとベトナム政府機関との調整を図っていくことも重要となる。

4. タケーク-ブンアン港間ゲートウェイの利点

ブンアン港をゲートウェイ港とした輸出経路の利点はラオス中部からの距離的な近さだけでなく、ブンアン港の東南アジアにおけるハブ港にもなりうる自然条件の良さにあもある。ブンアン港周辺の海底は元々深く、浚渫の必要がほぼない。また、港の南に位置するロン・ケープ半島が自然の防波堤となり、波や風の影響も少ない。また、港自体が 2001年に開港したばかりであり、またベトナム中部にはまだ大規模に輸出を行う産業が育っていなかったため、港の利用頻度は高くなく、ラオスの輸出農林製品の一時保管ヤード建設のために周辺の土地がまだ空いているという利点もある。

よって、本調査は「タケーク-ブンアン港間ゲートウェイ」におけるこれらの利点を踏まえて、ラオス中部の農林産業企業がこの回廊を使用した場合必要とされるインフラ設備の確認とその開発計画への提言を行うと共に、ベトナム側からの協力を得て、ラオス・ベトナム両国が裨益するような「タケーク-ブンアン港間ゲートウェイ」の開発を進めていくための施策への提言も試みたものである。

5. 短期開発計画

2012 年からのウッドチップの輸出を予定通りに行うためには、2011 年までに 2 件の開発案件を実施していかなければならない。まず最初に、植林が進められているカンムアン県のタケークにおいてウッドチップ加工を行うための農林加工 SEZ（Agro-Forestry Processing SEZ）を建設することである。この農林加工 SEZ は、現在 ADB と国際連合
工業開発機関（UNIDO）により実施されているラオスでの全国 SEZ 開発計画策定調査において、今後ラオスの経済を牽引していく 12 の重要な SEZ 群が提案されている中の 1 つとして提案されているものである。本農林加工 SEZ は現在カンムアン県政府より中央政府に提案が行われている工業団地/ホテル/レクリエーション施設を含む 350ha の SEZ の 1 部として開発を進める計画であり、土地については 12 号線と 13 号線が交わる地点で既に確保されている。農林加工 SEZ が完成すれば、およそ 50ha をウッドチップ加工用の工場が使用し、残りをゴムや木材加工企業が使用する計画である。

実施スケジュールとしては 2010 年までにラオス中央政府より SEZ 開発の正式な許可を得て、フィージビリティ（FS）調査とエンジニアリング・デザインの実施を行う予定である。また、2011 年までにウッドチップの加工工場の建設を終え、2012 年に工場操業を始める計画である。

図 2：Thakek における農林加工 SEZ の位置

次に開発が急がれるのは、ブンアン港におけるウッドチップの一時保管用のヤードの建設である。ラオス国内にてウッドチップに加工された製品は輸出船が到着するまで
ここに一時的に集められる。ウッドチップの輸送コストを考えると、この保管ヤードの建設地は、ウッドチップ搬出に使用される港湾バースに近接していないならばならず、ヤードから輸出船までチップを運ぶコストがかさむようなことがあれば、最終的に国際市場での競争力を削ぐ結果となる。そのため、本件では現在運営されているバース No.2 の隣に開発予定であるバース No.3 と No.4 の後背地にウッドチップ保管ヤードを開発していくことを提案し、ハティン省政府、ブンアン港の開発権を持つ Ha Tinh Port Joint Stock Company と、ハティン省海事局へ説明を重ね、最終的に基本合意を得たものである。この位置にヤードが建設されれば、ヤードから船舶へとベルトコンベアーやを使用して直接の積み出しが可能となり、ウッドチップの船舶への搬入に際してトラックを使用した積み降しを行う場合よりも大幅なコストカットが見込まれる。

なお、ヤード開発を実施に移すためには、まずベトナム政府運輸省（MOT）より許可を得て FS 調査とエンジニアリング・デザインを 2010 年内に行い、その結果を受けて正式に開発申請を MOT を通して首相に提出し、2011 年内に許可を得て、開発を進めていく必要がある。最終的に 2012 年からの輸出に間に合うためには、ヤード開発は遅くとも 2012 年初頭に終わらせていなければならない。

図 3：ウッドチップヤード建設予定地
上記2件のインフラ開発計画を限られた期間で確実に実行していくためには、ラオス・ベトナム両政府からの協力が欠かせない。一方、このウッドチップの大規模輸出案件が順調に実施されれば、ラオスにとっては経済開発を牽引役として地域産業の柱となり、またベトナムにとっては港の利用が進み、雇用の創出が生み出され、国内でも生活水準が比較的低水準となっている中西部開発に大きく寄与する事業となる。今後はこうした事業実施に係るメリットを強調しながら、両国にとって経済効果を最大限に普及できるよう調整を図っていく必要がある。

5. 長期開発計画

上記の短期開発計画は、まず2012年のウッドチップの輸出開始に焦点を当てた場合の提案となる。しかし、ウッドチップ用の植林面積は現在も順調にラオス中部にて拡張が進んでいることから、短期計画と合わせて長期の開発計画準備を進めていくことも重要である。長期開発計画としては、以下の2点があげられる。

1) ブンアン港におけるバースNo.3の開発

現在計画されている具体的な積み出しスケジュールでは、ウッドチップが輸出される最初の数年はバースNo.1とNo.2を利用し、ウッドチップの輸出量が年間1~1.5百万トンを超えた2つのバースでは処理しきれなくなると予想される2020年以降にウッドチップ輸出専用埠頭となるバースNo.3の建設を行う予定である。バースNo.3の開発予定地は現在ハティン省の正式な承認を待っている「ブンアン港マスタープラン」内でその位置がバースNo.2の横に既に定められており、今後はこのマスタープランに沿った開発計画を提案していくことが必要である。バースNo.3の開発権は半官半民のHa Tinh Port Joint Stock Companyに委ねられていることから、開発計画は官民連携（PPP）にて行っていくことが適当である。また、資金源としては国際協力銀行（JBIC）のローンを利用し、取扱量が年間1.5百万トンを超えた場合十分な採算性を得られることが見込まれる。

2) 12号線の整備・拡幅

ウッドチップのラオスからベトナムへの輸送は20トントラックを使用することが計画されており、2012年から輸出が開始されれば現時点では往来が少ない12号線においても大型トラックの往来が急激に増えることが予測されている。そのため、定期的に道路表面の舗装を行うことが必要となってくる。また、将来的にウッドチップの輸出量が増えるにつれて、現在片側1車線となっている12号線も片側2車線となるよう拡幅することが必要になってくる。この対応によって、12号線上での渋滞や事故を防ぎ、輸出計画に大幅な遅れを出すことを回避できる。開発資金源としては、道路の拡幅が必要になるまでにまだ数年であることから、JICA技術協力資金を利用して進めていくことも視野に入れる。
このように、「タケークープンアン港間ゲートウェイ」がラオス中部の農林企業の輸出経路として長期的に利用されていくためには、輸出量の予測に合わせてインフラ整備を進めていくよう配慮していくことが必要になる。結果的に、経済発展が遅れているラオス中部、ベトナム中部双方に経済的効果が波及され、また最終的な紙の利用市場である日本やその他の国々にとっても恩恵が広がるよう、まずウッドチップの輸出の初期段階を支える港湾設備開発を短期開発計画に沿って実行していけるようにすることが直近の最重要課題である。