VIETNAM
DATA COLLECTION SURVEY ON COLLABORATION WITH ASIAN DEVELOPMENT BANK IN INFRASTRUCTURE SECTOR

FINAL REPORT

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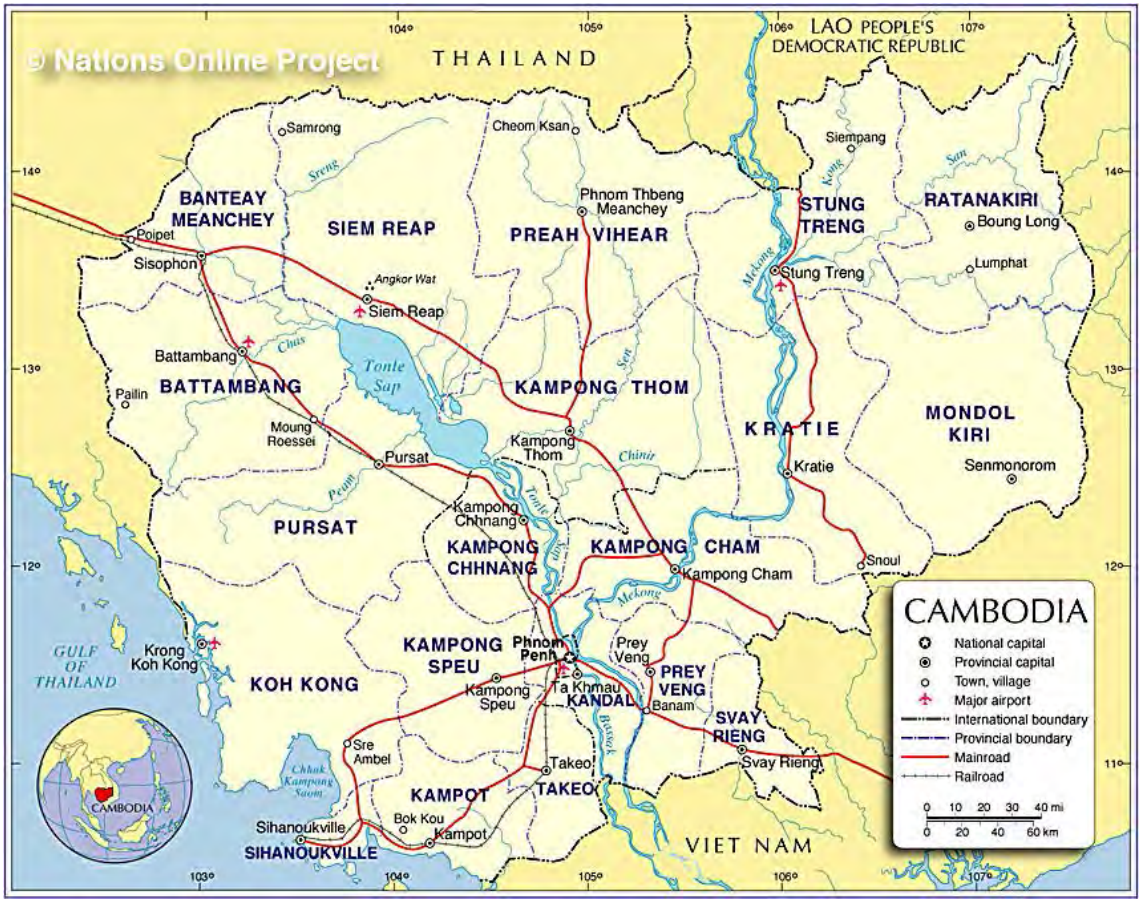
Indochina Region Map

Source：Google Map

Kingdom of Thailand Map

Source : Nations Online Project

Kingdom of Cambodia Map

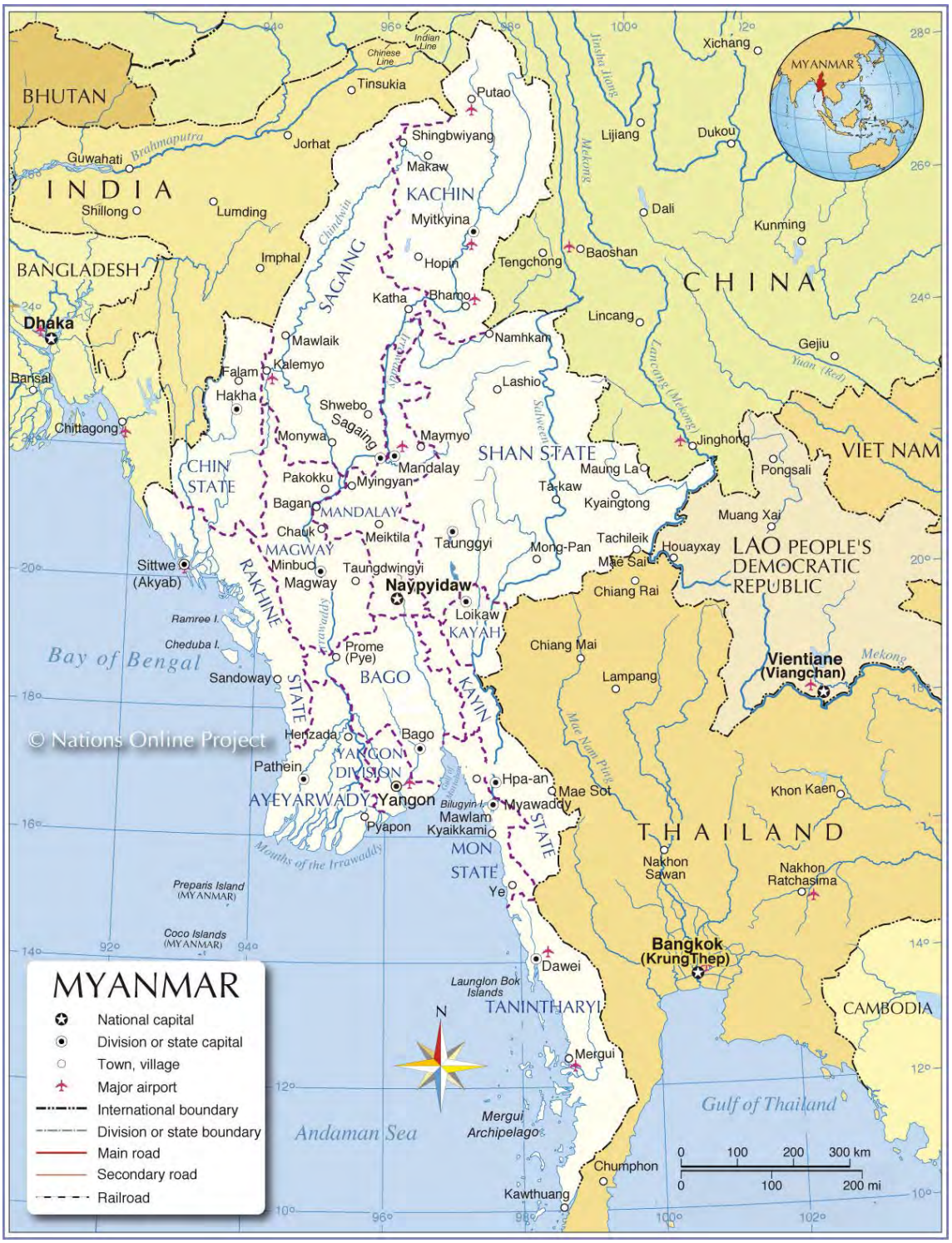


Source : Nations Online Project

Lao People’s Democratic Republic Map

Source : Nations Online Project

Republic of the Union of Myanmar Map



Source : Nations Online Project

Socialist Republic of Vietnam Map (1/2)

Source：Google Map

Socialist Republic of Vietnam Map (1/2)

Source : Nations Online Project

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*Borders shown in maps in this report don't have any intention to show JICA's official opinion for legal relationship about countries, territories, cities and regions

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List of abbreviations

Abbreviation	Definition
ACV	Aviation Airport Corporation of Vietnam
ADB	Asian Development Bank
ADF	Asian Development Fund
AEC	Asian Economic Community
AFD	Agence France Development
AH	Asian Highway
BEZ	Border Economic Zone
BIDV	Bank for Investment and Development of Vietnam
BOI	Board of Investment (Thailand)
BOT	Build operate transfer
BRVT	Ba Ria Vung Tau (Vietnam)
BSEZ	Border Special Economic Zone
BT	Build transfer
CEZ	Coast Economic Zone
CIPM	Cuu Long CIPM (Vietnam)
CIT	Corporate Income Tax
CMTV	Cai Mep Thi Vai (Vietnam)
EDCF	Economic Development Cooperation Fund
EE	Electronics & Electrical appliances
EIB	European Investment Bank
F/S	Feasibility study
FDI	Foreign Direct Investment
FMCG	Fast-moving consumer goods
GDP	Gross Domestic Product
GEF	Global Environment Facility
GMS	Greater Mekong Subregion
GSVC	General statistics of Vietnam Custom
GTFW	Garment, Textile and Footware
HCMC	Ho Chi Minh City (Vietnam)
ITC	International Trade Center
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
JV	Joint Venture
KDB	Korean Development Bank
KFW	German Development Bank
KOICA	Korea International Cooperation Agency
LCB	Laem Chabang (Thailand)
MOT	Ministry of Transport (Thailand, Myanmar, Vietnam)
MOU	Memorandum of Understanding

MPI	Ministry of Planning and Investment (Vietnam)
MPWT	Ministry of Public Works and Transport (Cambodia, Laos)
NEDA	Neighboring Countries Economic Development Cooperation Agency (Thailand)
NH	National Highway
NR	National Road
NSEDP	National socio-economic development plan (Laos)
OCR	Ordinary Capital Resources
ODA	Official Development Assistance
OPEC	Organization of the Petroleum Exporting Countries
PIT	Personal Income Tax
PPC	People's Committee (Vietnam)
PPP	Public Private Partnerships
SEZ	Special Economic Zone
SME	Small Medium-Size Enterprise
TEDI	Technical Engineering Design Inc. (Vietnam)
TPP	Trans-Pacific Strategic Economic Partnership Agreement
VAT	Value Added Tax
VCB	Vietcombank
VDB	Vietnam Development Bank
WB	World Bank

Summary

1. Background and purpose

In this survey project, Indochina is defined as the region which comprises five countries: Vietnam, Thailand, Cambodia, Laos, and Myanmar, and this region is prominently known as a rising star of Southeast Asia. With close geographical proximity, five countries share borders with one another and conduct many trading transaction. Trade among these countries show impressive and surging figures in the recent years, where some transactions represented industrial linkage emerging from labor-intensive outsourcing demand. This growing trade spearhead by the development of transport infrastructure. However, the infrastructure development is imbalance among five countries and infrastructure quality in some countries is still under the Asian ASEAN standard, which hardly transform the region to an integrated zone with sustainable growth. The insufficient modern infrastructure lead to high logistics cost incurred for freight transport through this region.

Under current condition, there are massive demands for infrastructure development and financial resources. In this context, Japanese Government announced “Partnership for Quality Infrastructure” for investment in Asian region in May 2015. Part of the announcement was the collaboration between Japan and Asian Development Bank (“ADB”) to provide approximately USD 110 billion for “quality infrastructure investment” in Asia over the next five years. Meanwhile, JICA and ADB have willingness to seek the expansion of project scale as well as the improvement of project quality through the alliance.

In response to the preceding circumstances, this survey report aims to provide comprehensive landscape of infrastructure in Indochina Countries, consider necessary infrastructure to strengthen this region and propose potential project for JICA and ADB collaboration

2. Analysis of each country in Indochina region

2-1. Thailand

With a remarkable economic performance in the last decade, Thailand is classified as a newly industrialized country. Export is the main driver for its development when the figure reached more than two thirds of total GDP in 2014. Its key exported products reside on electronics and automotive sector. Regarding to industrial production, several foreign companies in Thailand have shifted the labor-intensive part to neighboring countries for cost saving under “Thailand Plus One” strategy. Phnom Penh, Sihanoukville, and Koh Kong in Cambodia and Savannakhet in Laos have captured the outsourced production (labor intensive process) from Yazaki, Denso and Nikon. To stop the efflux of FDI, Thailand

Government planned to construct border special economic zone (“BSEZ”). However, this strategic movement is struggling to attract investors and has high possibility to be abandoned. Henceforward, the country will switch their prioritization to strongly promote high-tech sector in Central region where Bangkok, Ayuthaya, Chonburi, Rayong settle under “Super cluster” strategy.

As supporting for the national growth, infrastructure investment is one of critical demands. Of which, Thailand expects to allocate most of budget on rail construction to resolve high logistic cost problem. At this moment, road freight is still the dominant type of transport which contributes to increase transportation costs. The average cost for road is usually 80% higher than that for rail. Constructing new high-speed line, doubling existing track and expanding mass transit line in Bangkok metropolitan are three focused projects. While the expansion of mass transit line could implement in short term to undertake heavy congestion issue in Bangkok, new high-speed line will only be accomplished in long run due to the complication from land acquisition and limited technical support. Meanwhile, majority of Thailand’s existing road is in good condition with 4-lanes and excellent pavement caused less concentration to road projects. However, the plan still point out some projects for road improvement such as widening small section in primary economic corridors and road connecting to key borders with Myanmar and Laos. Additionally, understand the important role of Laem Cha bang to Thailand and the neighboring countries, the capacity expansion is also planned for this biggest port.

2-2. Cambodia

Cambodia is still an under-developed country with limited industrial production. Its national development goal is to reach middle-income status after the next decade. Currently, service, thanks to tourism, is the most important sector in Cambodia which contributed 40% of total GDP in 2014. On the other hand, agriculture remains the significant proportion in total GDP (around 30% in the last 5 years) while manufacturing is overwhelmingly dominated by garment production. Specifically, apparel and footwear accounted for 80% of total export in 2014 and the majority of them has been transshipped via Vietnam’s Southern ports. As regards to industrial development, Cambodia, advantages the cheap labor cost and nearest location to Thailand’s industrial hub, is the most proper destination to perceive “Thailand Plus One” strategy. Presently, several companies (namely Yazaki, Minebea, Denso, etc) have followed the trend and established an industrial connection between two countries in electronics sector. In the future, the linkage will be broaden to automotive industry when Cambodia aim to turn Poipet as car’s outsourced production hub for Thailand.

To fulfill the objective of “middle-income country” in 2025, Cambodia targets infrastructure investment as one of the key measures. At the moment, various bottlenecks still exist including poor road condition in Cambodia. For that reason, road improvement is highly prioritized of which three routes connecting with Thailand, Vietnam and Sihanoukville plan to undergo a complete transformation. Under JICA investment, NR5 (bordered with Thailand) will be widen to 4-lane highway while NR1 (bordered with Vietnam) have been gradually rehabilitated. Besides, expressway from Phnom Penh to Bavet is under feasibility study by JICA. On the other hand, Chinese company is planning expressway construction from Phnom Penh to Sihanoukville along NR4. According to the plan, Cambodia appears to be fully prepared for the thorough evolution. Apart from roadway, rail line is another key target but in medium to long term. Currently, the existing railway in Cambodia is in poor condition of which Northern line (Phnom Penh – Poipet) almost being abandoned since 2008, while Southern line (Phnom Penh – Bavet) operating at low utilization rate. The Government intended to rehabilitate these two lines to share the traffic with roadway. Meanwhile, China announced their interest in constructing a new line connecting Phnom Penh with Vietnam via Loc Ninh for trade facilitation.

2-3. Laos

Economic growth is a priority goal for Laos’s development in order to increase the income per capita for this least-developed country. Hydroelectricity, mining and agriculture are still the three focuses in the country development plan, in particular, Laos aims to be a battery for Southeast Asian region by increasing the electricity penetration to 90% by 2020 and export to Vietnam and Singapore as well as maintains well the operation of current mine sites and the implementation of prospective agriculture plantations. Additionally, newly proposed SEZs in nationwide are prepared as part of this expansion, but focus industry for each SEZ has yet to identify. In another context, the initiative of “Thailand Plus One” model has drawn Lao’s opportunity to adopt production of hi-valued electronic related products. In fact, few Japanese companies namely Nikon switched its labor-intensive part to Savannakhet.

Given the fact that there is always a tight connection between infrastructure and economy, especially under the vision of moving Laos from landlocked to land-linked country as well as optimizing industrial allocation, primary routes enhancement has been defined as a critical need. Roadway and railway should be more prioritized than other transportations at current stage. In particular, NR13 is listed as the most urgent improvement in the checklist of mandatory infrastructure projects, serving domestic transportation between North – South route as well as connecting all secondary primary routes: NR9, NR12, NR16, etc. China, Thailand and Worldbank have been supporting Laos to upgrade and study feasibility for this

road. Followed by NR13, NR9, NR12, NR8 are indicated as key connection with Vietnam and serving transshipment via Vung Ang, Da Nang port or NR16 shall be a shortcut links Laos with Thailand and Vietnam, handling product movement from Pakse SEZ through Laem Chabang and Da Nang port. Kunming railway is also a big part of infrastructure development in Laos, which was postponed countless times. However, Laos and China have come to a final decision of starting construction from Boten (border with China) to Vientiane in December 2015, while the remains are still under planning phrase. These infrastructures aim to strengthen the connection of Laos with neighboring countries to push more trade and accelerate the industrial switching from Thailand.

2-4. Myanmar

Myanmar has the third largest population in Indochina region; however, the country's GDP per capita is the lowest compared to neighboring countries. This is mostly because of the long military ruling governance, which subsequently led to the broad sanctions imposed by the US in 1997. Even after the historic reforms in 2012, its economy is still heavily dependent on its natural resources. Most of its exports were to China and Thailand meanwhile imports were for domestic consumption due to limited industrial manufacturing.

The Ministry of Industry in Myanmar is developing a new Industrial Master plan with the vision until 2030. In its master plan, Myanmar sets a target to become a modern industrial nation by 2030 aiming at boosting main industries (Manufacturing, Electricity, Energy, Construction and service) contribution to total GDP to 37%. The key measures are to leverage industrial zones, border industrial zones and special economic zones (SEZ) established across the country in order to promote private investments in local market, attract investment from neighbors as well as FDI from other countries for export purposes.

In the master plan for infrastructure development, the Government has set a significant budget about USD 20.6 billion for infrastructure until 2030. In the plan, the first priority is North South Corridor (part of AH1) of which the Yangon - Mandalay expressway is they key backbone connecting key cities Mandalay, Nay Pyi Taw and Yangon. However, this road has many shortcomings which is regarded as a death road by many travelers. In addition to that, trucks are not allowed on this road. Also along the AH1, from Yangon to Myawaddy is also important because this is a strategic commercial route from Yangon to Thailand. Most of the exports from Thailand enter into Myanmar through this route. However, some sections such as Eindu – Kawkareik is still underdeveloped and far from meeting Asian standards. The Northern Corridor is vital for trade facilitation with China. This road goes from Mandalay through Muse finally connects with Yunan, China (AH14).

In addition to roadway, high priority necessity infrastructures also include railways, ports

and industrial zone infrastructures. Regarding railway, most of its infrastructure (tracks, signals, bridges, tunnels, locomotives etc.) are in urgent need of rehabilitation. About ports, Dawei Deep seaport will be necessary in the future as gateway of Indochina west end of Dawei-Bangkok-Da Nang Economic Corridor. In order to realize its full economic potentials, the Government of Myanmar is eyeing both technical and financial supports from both public and private donors including ADB, Japan, Korea and neighboring countries (China, Thailand, India) for infrastructure developments.

2-5. Vietnam

Even Vietnam ranks a second largest economy in Indochina, the country development is quite isolated with others in the region. For years, Vietnam is widely known with its assembling dominance in manufacturing sector. Two notable product groups are electronics (mainly mobile phone, computer parts) and garment, textile, footwear ("GTFW") accounted nearly 50% of total export. Materials and parts related to these groups also dominated the import value. China is the vital trade partner with Vietnam where supply most aforementioned materials. Whereas, trading with other two neighboring countries namely Lao and Cambodia stay modestly due to low value products trade in exchange. Notwithstanding, the ports advantage allow Vietnam to play important role to these countries for their transshipment demand.

As regards to situation of Vietnam industry, private sector is the key driver to the industrial allocation with electronics related manufacturing center in the North, heavy industry concentrates in Central and light industry is prominent in the South with exception of heavy industry in BRVT . Follow this initiative and ambition to strengthen prevailing key industry, the Government identified four industry groups namely 1) Electronics, IT; 2) GTFW; 3) Metallurgy, chemical and 4) Agriculture to focus for development toward 2025.

To facilitate the economic and industrial development, the Government estimated USD 48 billion required budget for period 2016 – 2020. The desired budget would cover investment in building ring road and urban railway in main cities, express highway nationwide, constructing international gateway port in the North as well as improving current railway and airport. Some budgets will be allocated to develop prioritized economic zones and hi-tech zones. In parallel, minimizing the existing infrastructure bottlenecks is also indispensable work. Most prominent issues are the congestion on the road, at the border, ports, through the inland waterway to the inefficient operation of current BSEZ and hi-tech zone.

Fortunately, Vietnam has attracted sponsorship from most prestigious international organizations of which JICA and ADB are the most active donors. Many high-prioritized projects by the Government such as urban railway and ring road in Ha Noi and HCM, Lach

Huyen international deep-sea port and some sections in North-South express highway are partially supported by JICA and ADB. Meanwhile, other key projects include the express roadway from Ha Noi to Hai Phong port clusters and Da Nang ports denoted to private investment. In the future, connecting capital of Vietnam and Lao, namely Ha Noi-Vientiane route, is also important which highly considered by two Government.

3. Direction of future development in Indochina region

Indochina region is a promising area to be expected economic growth and industrial development in the future on the basis of abundant working population reaching peak time and realization of ASEAN Economic Community (AEC). Actually, many manufacturers are considering to shift production base from China to Indochina region, so this area has possibility to take the important position as future "The Workshop of the World" instead of China. In order to realize previous direction, mainly three conditions need to be satisfied.

1) Realize active transaction in/between main cities in Indochina region

Currently, chronic traffic congestion in urban areas and missing link between key cities are actualized issues. In short term, these issues need to be solved by constructing urban transportation and inter-urban transportation. Besides, high logistics cost is common critical issues in Indochina region, so modal shift from road to railway is expected in middle term. In long term, upgrading existing infrastructure such as high-speed railways, express highways and flight accesses also need to be considered to improve access between key cities.

2) Establish gateway to connect with international market

In Indochina region, there are two existing international deep sea ports such as Leam Chabang port (Thailand) and Cai Mep Thi Vai port (Vietnam). But, these ports have obstacles to be utilized effectively in terms of related infrastructures. Consequently, improvement of surrounding infrastructures is required in short term. In middle term. Lach Huyen port in Hai Phong (Vietnam) will become key north gateway to international market in Indochina region. Dawei port is also future potential gateway to access with Europe and the east coast of USA in long term. In Indochina region, previous four deep sea ports should be main gateway, so infrastructures to utilize the ports effectively need to be constructed and upgraded continuously.

3) Realize appropriate industrial role division in Indochina region

The countries in Indochina region have different characteristics regarding the level of industrial clustering and labor cost, so appropriate industrial role division will contribute to enhancement of companies' competitiveness. Currently, only Bangkok can be the center of high-tech process. Therefore, cooperation between Bangkok and the border SEZs (existing

and new) in Cambodia, Laos and Myanmar will exist. In order to accelerate this trend, infrastructures connecting between Bangkok and SEZs need to be improved in short-middle term. In long term, industrial role division focused on Ha Noi area is potential, so infrastructures linking with Ha Noi are also necessary to be upgraded in the future.

4. Potential infrastructures supported by JICA-ADB collaboration

In order to define potential infrastructures supported by JICA-ADB collaboration, below three viewpoints need to be considered for screening.

1. Case to require large amount of loan due to large scale project
2. Case to need technical assistance (such as dispatch of specialists) by JICA
3. Case to contribute to improvement of connectivity among Indochina region

Especially, third viewpoint is indispensable to identify infrastructures to contribute to future industrial development in whole Indochina region. Through these viewpoints, selected infrastructures to be considered at high priority are listed below.

<Short term (- 3years)>

1. Bangkok-Sakaeo-Poipet-Phnom Penh (Thailand-Cambodia)
   - NR5 between Phnom Penh and Poipet (Cambodia) expansion
2. Bangkok-Tak-Maesot-Myawaddy- Yangon (Thailand-Myanmar)
   - NR12 between Tak and Maesot (Thailand) expansion
   - AH1 between Kawareik and Thaton (Myanmar) improvement and expansion
3. Ho Chi Minh-Bavet-Phnom Penh (Vietnam-Cambodia)
   - NR1 between Phnom Penh and Bavet (Cambodia) expansion
4. Leam Chabang port and related infrastructures (Cambodia, Laos, Thailand)
   - Bang Na-Chon Buri express highway expansion between Bangkok and Leam Chabang port
5. Cai Mep Thi Vai port and related infrastructures (Cambodia, Vietnam)
   - Expansion of Cho Gao canal between Mekong River and Soai Rap River
6. Vung Ang port and related infrastructures (Laos, Vietnam)
   - Vung Ang port expansion
   - NR8 between Viengkham and Nam Phao (Laos) upgrade
   - NR12 between Thakhek and Na Phao (Laos) upgrade
   - NR13 between Vientiane and Viengkham (Laos) upgrade
7. Bangkok-Mukdahan-Savannakhet (Thailand-Laos)
   - Road between Bangkok and Mukdahan (Thailand) upgrade

<Middle term (- 5years)>

8. Bangkok-Champasak (Thailand-Laos)
   - NR16 between Vangtao and Pakse (Laos) upgrade
9. Lach Huyen port and related infrastructures (Laos, Vietnam)
   - Lach Huyen port construction
   - NR8 between Viengkham and Nam Phao (Laos) upgrade
   - NR12 between Thakhek and Na Phao (Laos) upgrade
   - NR13 between Vientiane and Viengkham (Laos) upgrade

<Long term (- 10years)>

10. Dawei port and related infrastructures (Thailand, Myanmar)
    - NR323 between Bangkok and Kanchanaburi (Thailand) upgrade
    - Road between Sinbyudaing and Dawei (Myanmar) construction
    - AH112 between Yangon, Mawlamyine and Dawei (Myanmar) upgrade
11. Da Nang port and related infrastructures (Laos, Vietnam)
    - Da Nang port expansion
    - NR9 between Savannakhet and Densavan (Laos) upgrade
    - NR16 between Pakse, Sekong and Dakchung (Laos) upgrade

In order to realize close connectivity with neighboring countries, soft infrastructures also have important role in parallel with hard infrastructure development. Actually, inefficient custom clearance procedure, lack of border facilities and unreasonable toll (bribe) cause increase of logistics cost and long transportation time. In addition, the regulation of international truck to limit runnable areas is preventing active international logistics. These issues have conflicts of interest among countries, so the support from JICA and ADB collaboration seems to be effective from viewpoint of neutral third parties. On the other hand, volatile quality of infrastructures is another factor to prevent stable international transportation due to different limitation of weight. In order to standardize the quality of infrastructures, the technical assistance from JICA and ADB also has important role, so it needs to be applied to international roads which list up at high priority.

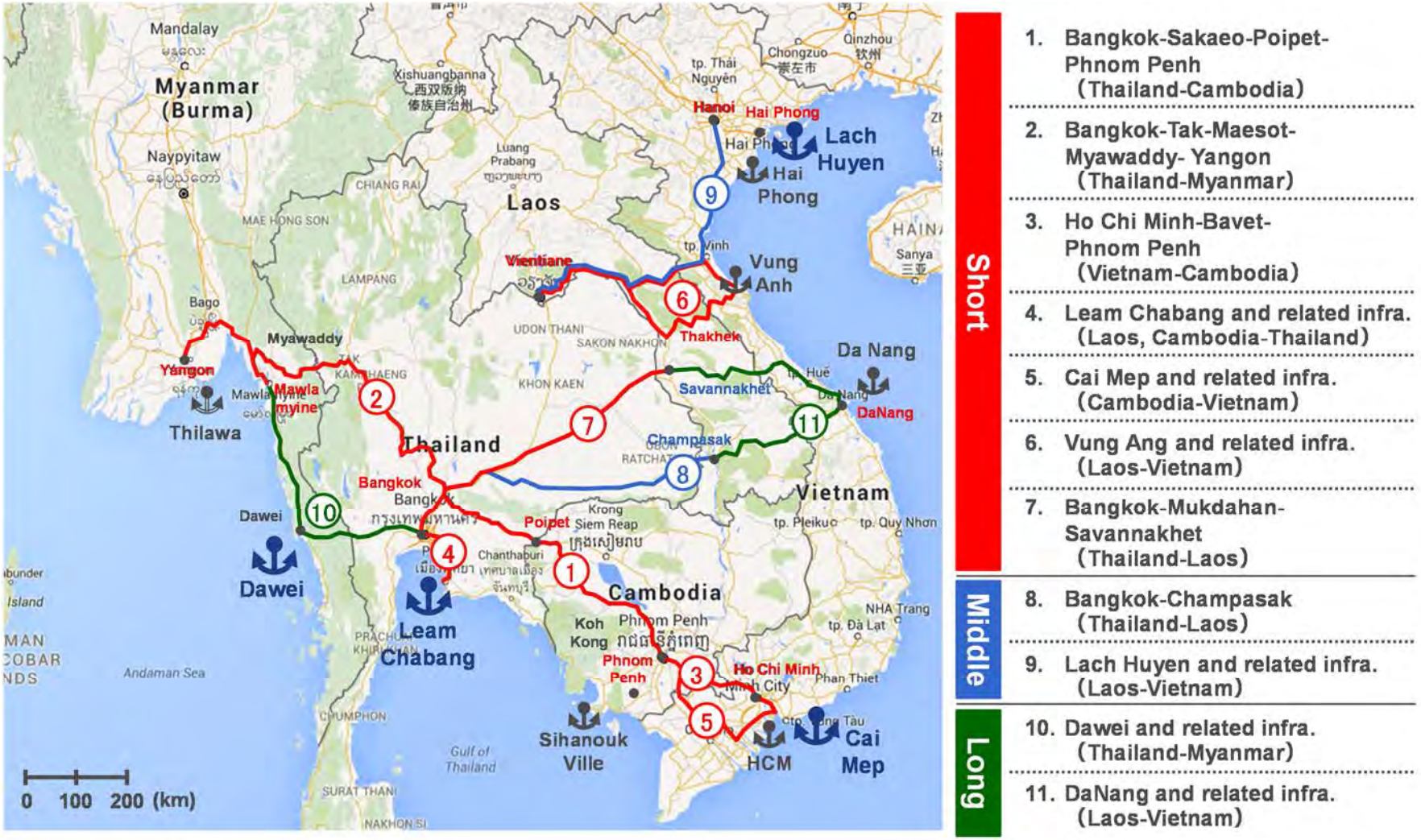

Figure: Infrastructure list to be considered at high priority

Chapter 1: Introduction

1-1. Background and purpose

Indochina is well known as a rising star of Southeast Asia, comprises five countries: Vietnam, Laos, Cambodia, Thailand and Myanmar. These countries share borders with one another, where many trading transaction have occurred with facilitation of transport infrastructure. Given that transport infrastructure plays an important role in the economy, its research and development is essential, especially in Indochina countries where the infrastructure has not yet developed. Depending on geography of each country, there are different ways to trade products and passengers among countries, but mostly by road and sea in Indochina at this moment.

Among five countries, Thailand is the liveliest country, where a large of goods has been moved mainly through road borders and seaports annually: USD 11.8 billion with Vietnam, USD 8.2 billion with Myanmar, USD 5.4 billion with Laos, USD 5.1 billion with Cambodia. Even trading among these countries show impressive figures, the limitation of infrastructure quality is current concern for the growing potential of this region. For years, many bottlenecks related to infrastructure has been identified such as chronic congestion in the metropolitan area, especially in Thailand and Vietnam; inter-urban transportation to connect Phnom Penh – Poipet, Vientianne – Champasak and Myawaddy – Yangon. Moreover, soft infrastructure is another critical factor in addition to previous hard infrastructures. Standardizing custom clearance procedure would helpfully contribute to enhance the connection between five countries.

SEZ also plays an important role, showing logical connection between it and the routes. Under “Thailand Plus One”, the linkage between SEZ in Indochina is expected to tighten with Thailand as an anchor economy and Cambodia, Laos, Myanmar as supporting satellite. Thus, road development for future connection shall be aimed attention at. Efficient infrastructure development is not only to solve out logistic issues but also to achieve a bigger goal which is economic benefits of regional countries.

Under these conditions, there are huge demands for infrastructure development and financial resources. In this context, Japanese Government announced “Partnership for Quality Infrastructure” for investment in Asian region in May 2015. In addition, it was announced that Japan, in collaboration with ADB, will provide approximately USD 110 billion for “quality infrastructure investment” in Asia over the next five years. Meanwhile, JICA and ADB have willingness to seek the expansion of project scale as well as the improvement of project quality by cooperating each other. It is important for both JICA and ADB to find potential collaboration projects in infrastructure sector to accelerate future cooperation.

In response to the mentioned-above matter, a “Data Collection Survey on Collaboration with Asian Development Bank in Infrastructure Sector” report will provide comprehensive landscape of infrastructure in Indochina Countries and propose future potential collaboration project between JICA and ADB.

1-2. Project scope

1-2.1. Target area

This project covers five Indochina countries, including Vietnam, Thailand, Myanmar, Cambodia and Laos.

1-2.2. Project period

From October, 2015 to January, 2016

1-2.3. Project scope

The objective of the Study is to propose potential collaboration projects and analyze its economic ripple effect on the region by identifying following points;

- Development strategy and investment plan for infrastructure sector in five countries in Indochina region
- Existing main infrastructure facilities, transport network, industrial parks, and cluster of industries
- Industrial allocation, role-division and economic transaction between two countries
- Main infrastructure projects supported by JICA, ADB and other donors
- Economic activities and issues of transportation among several countries from viewpoint of private companies
- Potential projects for JICA-ADB collaboration with time schedule
- Necessity of the proposed projects from the view point of economic development goals and index in each country and region
- Economic ripple effect on the region

1-2.4. Project approach

On the basis of aforementioned project scope, this survey will be conducted by process below.

First of all, current infrastructure master plan in each country will be investigated by desk-top research to identify the development strategy and investment plan for infrastructure sector in five countries in Indochina region. Besides, in order to clarify the current progress and situation of planned infrastructure in each government, the information will be updated to the latest situation by interview with the ministry related to

infrastructure (ex. Ministry of Transport). After that, additional desk top research for governmental policies and discussion with local related entities (such as logistics companies, local government, International institutes (JICA, ADB, JETRO, etc.) will be conducted to grasp the current situation of infrastructures, transportation network, industrial zone and clusters of industries. In this survey project, collaboration between countries in Indochina region (Connectivity) is one of the important criteria to realize development of whole Indochina region, therefore transaction between two countries beyond border needs to be investigated in detail to identify the industrial and economic situation. Through these investigations, the conducted or scheduled main infrastructure projects which are supported by donors are also listed. On the basis of the result of interviews with related players (Governmental officers, international institutes, private companies), the issues of infrastructures and the bottlenecks to prevent collaboration between two countries will be identified from various points of view.

In order to define potential infrastructures supported by JICA-ADB collaboration, the necessary infrastructures should be considered to realize development of Indochina region. To make it specific, three conditions; “Active transaction in/between main cities in Indochina region”, “Gateway to connect with international market” and “Appropriate industrial role division in Indochina region” are important. By considering above criteria, some potential infrastructures will be selected. After that, to define potential infrastructures supported by JICA-ADB collaboration, following three viewpoints should be considered for screening.

1. Case to require large amount of loan due to large scale project
2. Case to need technical assistance (such as dispatch of specialists) by JICA
3. Case to contribute to improvement of connectivity among Indochina region

Especially, third viewpoint is indispensable to identify infrastructures to contribute to future industrial development in whole Indochina region. After screening infrastructures through above process, timeline and the necessity of each infrastructures will be defined, and future expected ripple economic impact will be also estimated.

Chapter 2: Analysis of Thailand

2-1. Basic information

2-1.1. Overview

Thailand, officially the Kingdom of Thailand, situates at the center of the Indochina peninsula. The country is bordered to the north by Myanmar and Laos, to the east by Laos and Cambodia, to the south by Malaysia, and to the west by the Andaman Sea and the southern terminus of Myanmar.

According to World Bank, Thailand is ranked as the world's 51st-largest country, with a total area of approximately 513,120 km2. It is also the 20th-most-populous country in the world, with around 67 million people. The capital and largest city is Bangkok, which is Thailand's political, commercial, industrial, and cultural hub. Within the region, Thailand functions as an anchor economy for the neighboring developing countries of Cambodia, Laos and Myanmar. Its figure for national GDP in 2014 was recorded at around USD 405 billion.

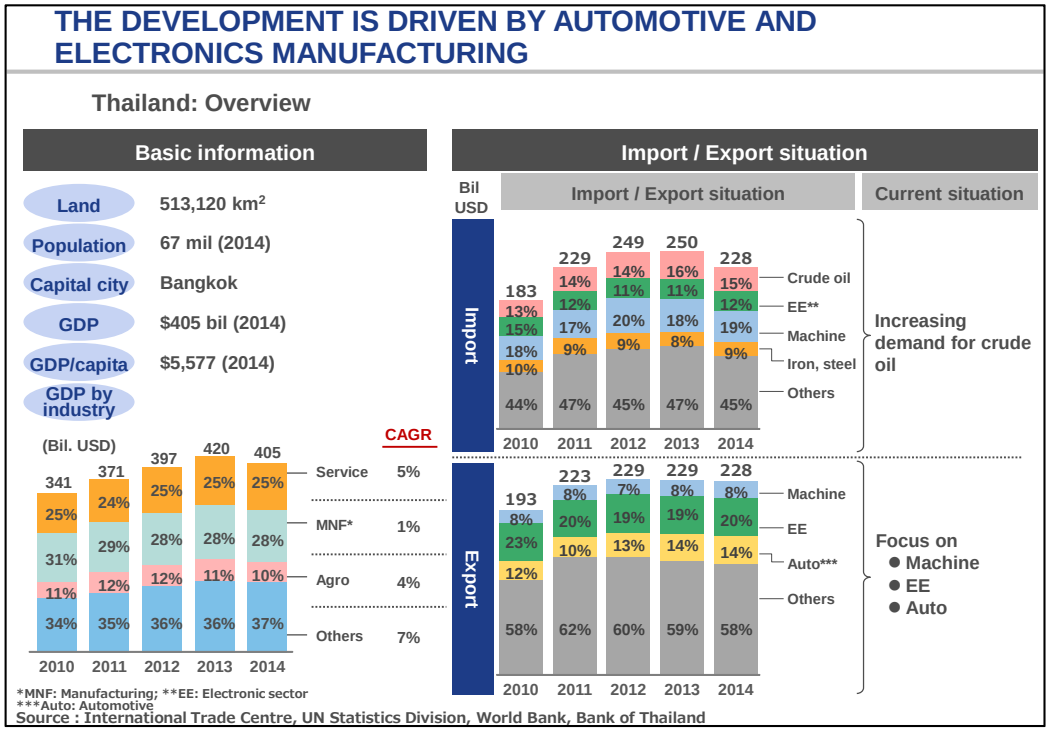

Figure 1: Overview of Thailand

Regarding GDP by industry, service and manufacturing by far has been the main sector in Thailand economic development, with the respective proportion of 25% and 28% in total GDP. Service itself is the fastest growing sector, at 5% per year in the period 2010-2014, mainly driven by transportation, wholesale & retail trade and tourism.

For trading perspective, the country relies heavily on crude oil from Middle East and natural gas from Myanmar. The percentage of these mineral fuel products has slightly increased in the last five years even when the import figures decreased due to poor economic performance.

In addition, Thailand is an export-oriented economy when we look at the GDP composition. The contribution of export to total GDP in 2014 was 61%, indicating the vulnerability to the economic condition of its key trading partners and currency fluctuation. It is reasonable as foreigners (mostly Japan) has turned Thailand into a prominent manufacturing hub for automotive and electronic products. Specifically, Thailand automotive industry was the largest in Southeast Asia and the 12th largest on the world in terms of 2014 capacity. Regarding last year trading figure, export of automotive and electronics accounted for 34% of total export with US, Japan, China are major importers.

2-1.2. Current transaction with neighboring countries

Among three neighboring countries (Cambodia, Laos, Myanmar), Thailand – Cambodia appears to be the most beneficial trading connection for the growth of Indochina while the remaining linkages mainly originate from the exploitation strategy of Thailand for natural resources. The figure below shows the current transaction between Thailand and neighboring countries in 2014 provided by International Trade Center (ITC).

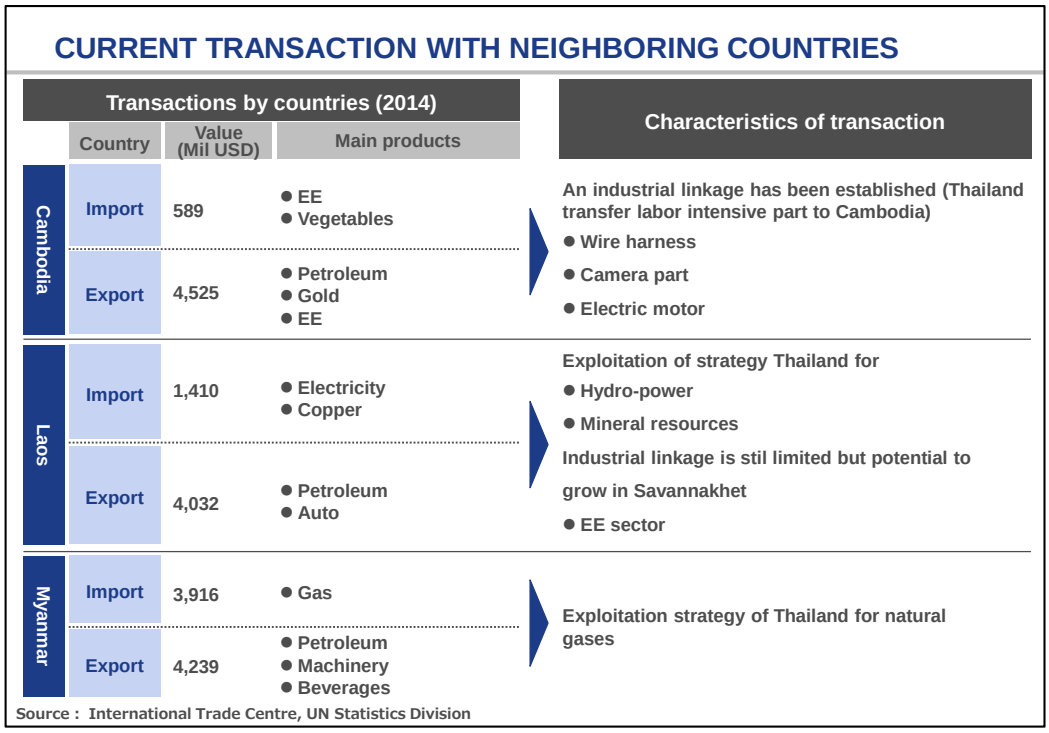

Figure 2: Current transaction with neighboring countries

- Thailand – Cambodia

  Total trading value is up to USD 5.1 billion in 2014. Electronics and vegetables are crucial products imported from Cambodia whereas petroleum, unwrought gold and electronics are primarily transported in the reverse direction.

  Various industrial linkages have been established between the two countries. Of which, Thailand-based Japanese firms transfer the labor intensive process in the value chain to Cambodia in order to cut cost. At the moment, three main sectors that receive the FDI outflow from Thailand are wire harness, camera part and electric motor with outstanding companies such as Yazaki, Denso, Minebea, etc.

- Thailand – Laos

  With sufficient resources, Laos is exploited for hydro power and cooper (USD 1.4 billion in 2014). On the other hand, it has to import petroleum and vehicles from Thailand for domestic consumption (USD 4 billion in 2014) as an under-developed industrial sector.

  The industrial connection is still limited. There are only few companies in Savannakhet (Laos) producing semi-product for manufacturing hub in Bangkok. However, the linkage will likely be strengthened in the future when Laos industrial development is realized.

- Thailand - Myanmar

  The situation is similar to Laos when Thailand capitalizes on Myanmar resources (mostly natural gas) while providing petroleum, machinery and beverages to Myanmar for consumption. The total figure was recorded at over USD 8 billion.

2-1.3. Industrial allocation in Thailand

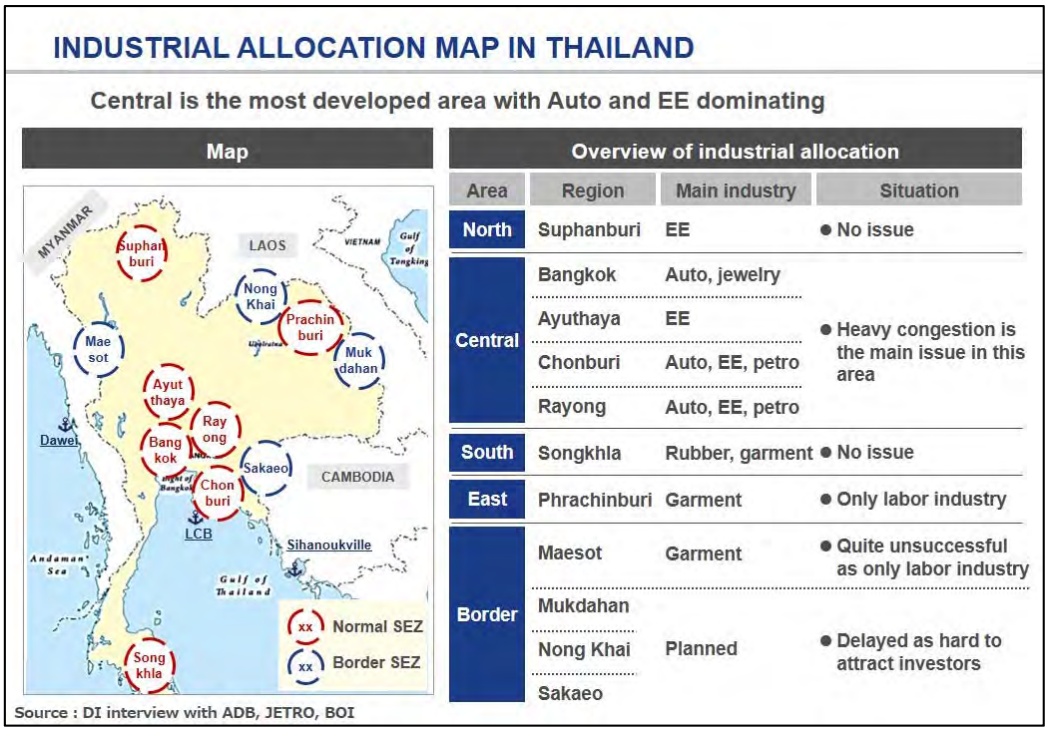

Figure 3: Industrial allocation in Thailand

A) Normal SEZ

Automotive and Electronics & Electrical Appliances are the most developed industry of Thailand. It is densely distributed in the central area where Bangkok, Ayuthaya, Rayong and Chonburi settle. Overall, the facilities and infrastructure are good with no serious issue has been found yet. However, regarding the current operation, these SEZ have performed below the par due to Thailand poor economic performance. According to international institute officer, the designed capacity for automotive production in the center cities are around 3 million units per year while only 1.8 million units were actually produced in 2014. High labor cost is another existing bottleneck which prompts foreign companies to head to neighboring countries once they have expansion demand.

Petrochemical is another spotlight in Thailand industrial development with the focal points are coastal area (Rayong, Chonburi). Recently, Thailand government designates to slow down the pace and slightly transfer the petrochemical sector to Dawei since they are afraid of the potential threat to natural environment in Chonburi and Rayong. However, according to the interviews with various Japanese governmental agencies and logistic firms in Thailand, the shifted trend to Dawei will only be realized in the long-term.

There are also few industrial cluster focusing on labor intensive sector such as garment and

textile. They often locate distant from the central developed area and next to border gate like Prachinburi and Songkhla.

B) BSEZ

According our interview with Thailand Board of Investment (BOI), it is one of Thailand strategic plan to stimulate the future industrial development and prevent the FDI outflow since more foreign companies target Cambodia and Laos as new production hub. However, the implementation progress has been slow. Among 10 newly established SEZ, only Maesot is in operation with low utilization and another 3 is under-construction but they all find difficult to attract investors

2-2. Industrial master plan

According to draft document related to industrial master plan, Thailand is now conducting two strategic plans, namely BSEZ and super cluster for future industrial development.

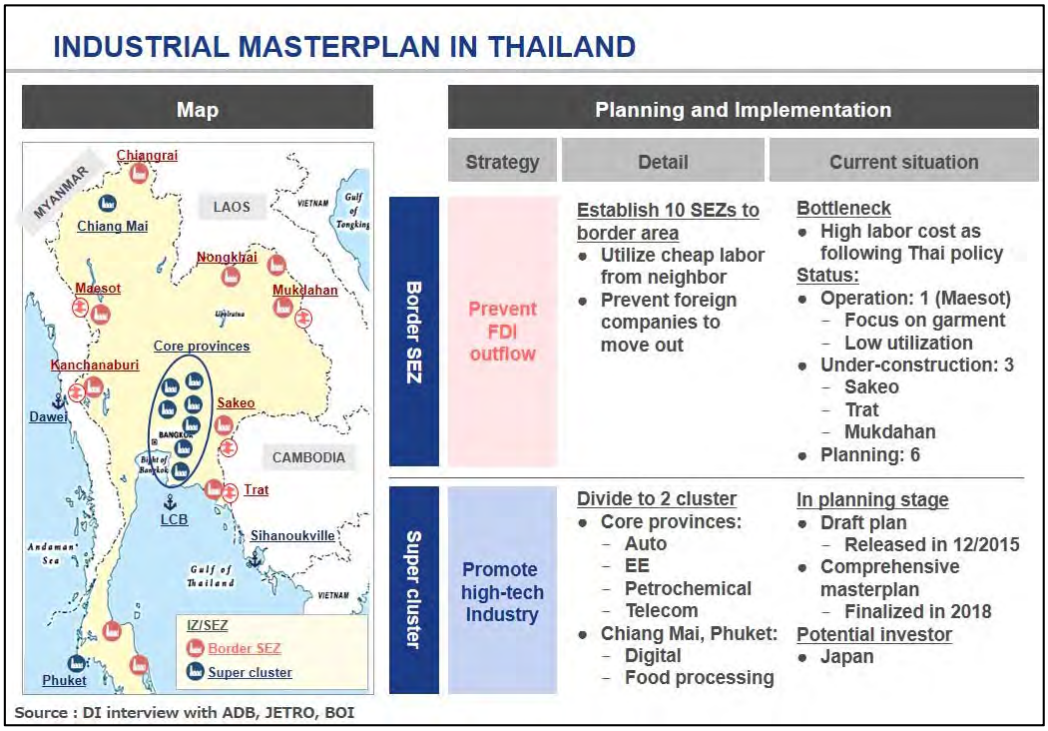

Figure 4: Industrial master plan in Thailand

A) BSEZ

Currently, numerous Japanese companies in the region have transferred the labor intensive process to less developed countries for utilizing labor cost (“Thailand Plus One”). By establishing SEZ at border area, Thailand government determines to stop this trend and

prevent the FDI outflow to other countries.

New 10 SEZ will be constructed at key border (Malaysia, Cambodia, Laos, Myanmar) to:

- Attract workforce from nearby area in less developed countries with low cost
- Maintain the investment of foreign companies in bound of Thailand

However, there are still existing bottlenecks to prevent achievement of goals, such as:

- Firms in the SEZ must follow the Thai minimum wage policy with the average labor cost is 50% higher than that of neighboring countries
- Difficult to secure labor force due to tough living condition at border area and lacking of facilities and services

B) Super cluster

As BSEZ strategy is struggling to attract investors, Thailand government is planning another strategic movement in order to change the direction of future industrial development. In the context of super cluster, high-tech industry is highly prioritized and will be the key driver for the transformation of Thailand in the forthcoming period. Thailand is currently in discussion with Japan to invest more Japanese investors in the kingdom under the super cluster policy.

The current progress is in planning stage with draft plan will be released in December of 2015. The comprehensive master plan is expected to be finalized in 2018.

2-3. Infrastructure master plan

2-3.1. Summary of Thailand national connectivity program

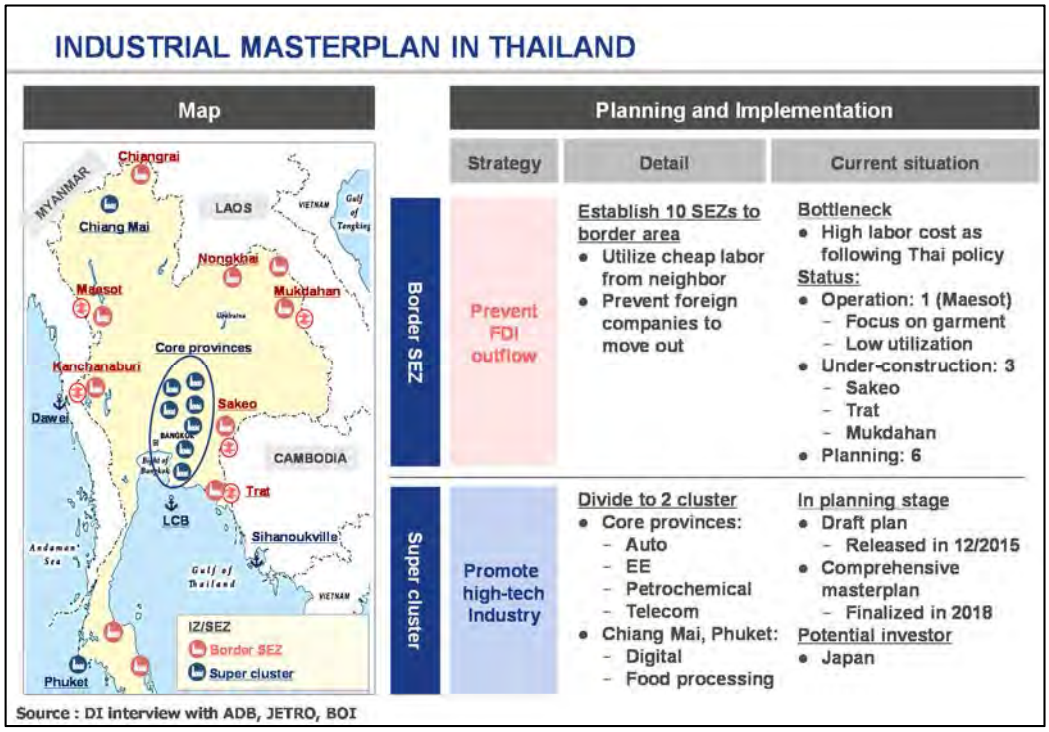

Figure 5: Summary of infrastructure master plan in Thailand

Thailand introduced the 8-year plan which aims to completely transform the national transportation infrastructure with total investment of USD 55 billion. Thailand, therefore, will be the critical connection for ASEAN Economic Community (AEC) by the time the projects are completed in 2022.

The first objective is concentrated on constructing an inter-city network for railway. This goal stems from high logistics cost in Thailand as it accounted for around 15% of GDP in 2012, compared to other countries (e.g. 13% in Malaysia and only 8% in US). At the moment, Thailand still relies heavily on road transport, which is fuel intensity and in turn put an upward pressure on logistics cost. Also, to resolve the congestion problem in urban area, especially Bangkok metropolitan, is another key goal in the master plan. For this purpose, Thailand government will enhance the highway capacity and expand mass transit line in Bangkok city.

In terms of concretizing the aforementioned objectives, Thailand earmarks approximately 80% of national budget for rail network. Of which, three focused directions are:

- Establishing high speed line to connect Bangkok with border area (49% of budget)
- Expanding mass rapid transit inside of the capital city (22% of budget)
- Double track the existing railway and increase the proportion of double-track rail to

65% in 2020 (7% of budget)

The allocation of remaining 22% will be invested in road, port and airport.

2-3.2. Detail of Thailand national connectivity program

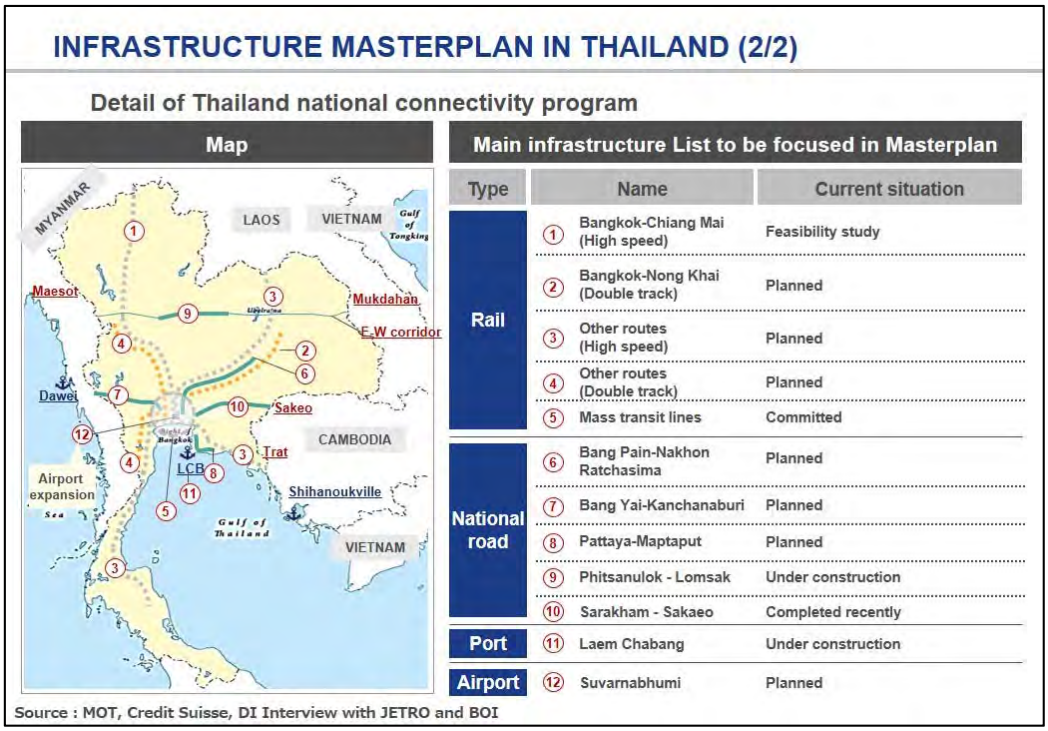

Figure 6: Infrastructure master plan in Thailand

- Rail: most projects are only in planning stage or currently committed:
  - Bangkok – Chiang Mai (high speed): in May 2015, Thailand and Japan signed a memorandum on the cooperation for high speed railway. Based on the memorandum, Thailand and Japan will jointly conduct a feasibility study.
  - Bangkok – Nong Khai (double track): after being delayed, Thailand and China have agreed to accelerate their joint railway project with construction to be commenced before year-end.
  - Other high speed and double track projects are in preparation stage in 2015.
- Road: Thailand conducted the bidding for 8-lane highway expansion which is expected to finish in this year:
  - Bang Pain – Nakhon Ratchasima
  - Pattaya – Maptaput
  - Bang Dai – Kanchanaburi

  Apart from focused projects of the master plan, we should also notice two other routes

which are now under rehabilitation by ADB:

- Phitsanulok – Lomsak: update highway 12 to 4-lane with the total length of 105km.
- Sarakham – Sakaeo: update highway 359 to 4-lane with the total length of 73km. Most logistic companies prefer highway 304 and 33 to transport from Bangkok to Phnom Penh. However, compared to route 304 and 33, route 359 has shorter distance, thus, the expansion plan can improve the efficiency for logistics on this section.

- Airport and seaport: Thailand have good facilities and infrastructure, thus the number of projects in this category are just a few. Expansion for Laem Chabang port and Suvarnabhumi airport are key programs.

2-4. Potential connection with neighboring countries

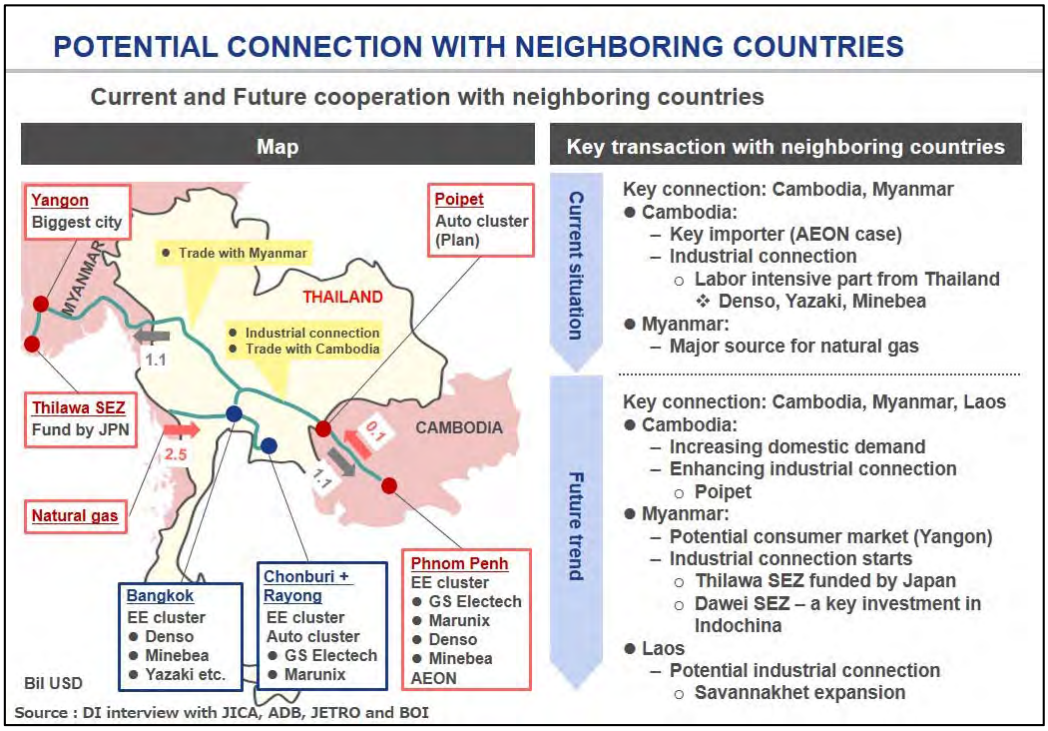

Figure 7: Potential connection with neighboring country

A) Current situation

In the current situation, Cambodia and Myanmar are key connections for Thailand. Cambodia functions as a key importer with highest trading figure. After an establishment of the Japanese giant retailer AEON in Phnom Penh, the import demand in Cambodia has even increased further. Also, since Cambodia is rising as the most potential candidate for

"Thailand Plus One", two nation's trading has been strengthened, especially for electronics sector (Denso, Yazaki, Minebea, etc). On the other hand, Myanmar has been providing sufficient mineral fuel to Thailand, specifically natural gas. According to the trading statistics, Myanmar is 2nd in mineral export to Thailand, only ranked below Middle East region.

B) Future trend

As regard to future development, invigorating industrial connection in Indochina region is the primary engine to connect countries.

- Cambodia: Poipet SEZ will be the determined factor for enhancing the connection with Bangkok. Cambodia government plans to turn this area into automotive manufacturing hub for Thailand. Poipet locates in close proximity with Thailand's key production hub and Laem Chabang international port. Moreover, with NR 5, which links Phnom Penh and Poipet, is under widening plan, Banteay meanchey province is fully prepared for future connection.
- Myanmar: Thilawa SEZ, invested by Japan, have several manufacturer committed to enter namely Suzuki, NHK and more occupants will likely follow the early adopters. Hence, trading between Thailand and Myanmar will be significantly driven by industrial linkage of Bangkok – Thilawa. In addition, there are possibilities that Dawei SEZ in long-term could be potential for producers from Thailand to enter and establish the connection.
- Laos: Savannakhet has the advantage to attract more investors in Thailand as several Japanese companies already moved in. If the trend is realized, Bangkok – Savannakhet should also be noticed.

Apart from industry point of view, trading for domestic consumption in Yangon, Phnom Penh could be a lever to trigger growth. Therefore, linking Bangkok to Yangon and Phnom Penh is also beneficial for local resident.

2-5. Current bottleneck of infrastructure

Overall, the quality of Thailand infrastructure is excellent. Most difficulties and issues are at border and railway. On the basis of interviews with related parties, approximately 7 bottlenecks are crucial to aim attention at:

- Road

1) *Sakaeo – Poipet*: frequent heavy congestion
   - Passenger is a key factor causing blockage: Sakaeo checkpoint has the highest figure for passenger, compared to other local border gates as many casinos locate

there and Cambodia itself relaxes the regulation for passenger to attract more tourists. On the other hand, there is no separate lane for freight and passenger through this border. Hence, cargo transported in the area must line up and wait for a long time before passing.

- Small and unofficial retailers contribute to slow down the procedure at border: The popular modes of transport at Sakaeo – Poipet is using small tricycle wrapped by a canvas to carry products. Security officer must inspect manually and slow down the procedure.

2) *Maesot – Myawaddy*: poor facilities

As the bypass bridge suffered from destruction in the past, there has been an imposition of 12 tons weight limit since 2006. Thus, logistic companies avoid this route by sea transport which is 3 times longer in the matter of time. In June 2015, Thailand started to construct a new bridge at this border.

- The alternative river route for bridge is small and complicated. Many illegal trading took place on the river due to lose control from Myanmar side.

3) *Tak – Maesot*: missing link to connect with Myanmar

This route is the obstacle for trading between Thailand and Myanmar. For Bangkok – Tak, the road is 4-lane and has high quality according to several logistic firms. However, Tak – Maesot is the narrow section with only 2 lanes and it should be widen to facilitate trading with neighbors.

4) *Phitsanulok – Lomsak*: barrier to develop East-West corridor

To connect five countries in Indochina, Southern corridor and East-West corridor play crucial role. However, while the former has been developed with qualified infrastructure, the latter is still poor in terms of road quality. Phitsanulok – Lomsak has narrow width and is under construction by ADB to be widen.

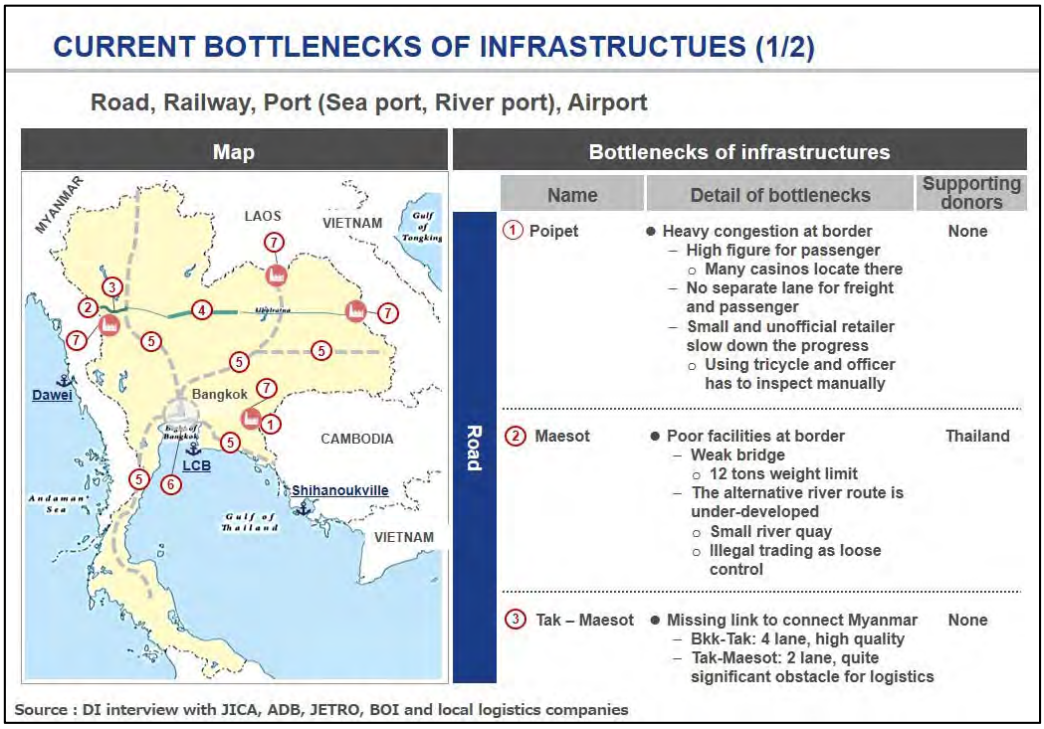

Figure 8: Current bottlenecks of road

- Rail

5) *Existing railway*: low utilization

It is very inconvenient for logistic firms as well as passenger to use railway due to limited and unstable schedule. This problem arises from low proportion of double track line. By 2014, only 7% railway in Thailand has double track.

6) *Mass transit line*: lack of capacity

In Bangkok, heavy congestion at mass rapid transit is the popular scene in rush hour as there is still limited line existing with very high utilization rate. With the same situation happens for 4-lane highway in road transport, expanding mass transit line is the only feasible approach. JICA recently has committed to finance for parts of Bangkok transit line system.

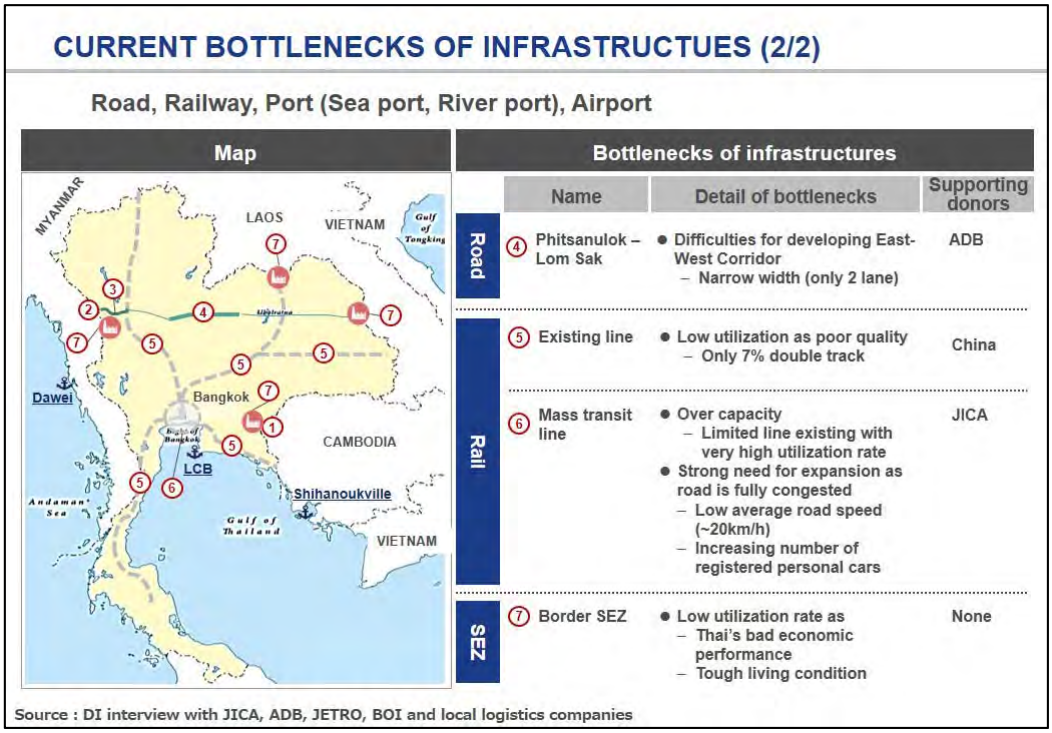

Figure 9: Current bottlenecks of road, rail, SEZ

- SEZ

7) *BSEZ*: high possibility that it will fail
   - Manufacturers hesitate to enter BSEZ. High labor cost issue still remains unsolved in Thailand SEZ as companies must follow Thailand minimum wage policy and it is around 50% higher than that of Cambodia, Laos and Myanmar.
   - "Thailand Plus One" which has stopped recently is another reason that tends to fail BSEZ strategy. Due to poor economic performance of Thailand, the demand to expand new factory has disappeared. For instance, the capacity of automotive production in 2015 is 3 million unit per year but the actual figure was only 1.8 million last year. Therefore, almost manufactures are focusing on existing facilities and allocation of labor intensive work to BSEZ is not progressing as planned schedule. Labor quality also contributes to stop the movement of producers in Thailand.

2-6. Current schedule projects by donors

There are currently around 20 focused infrastructure projects in Thailand. Railway is highly prioritized with significantly massive national budget compared to other transport types. Of which, urban mass transit will be eminently beneficial for Thailand when it is completed in

2022. Besides, roadway has 6 projects concentrating on widening to prepare for future trading connection while airport and seaport are not prioritized with only 1 project for each (Suvarnabhumi international airport and Laem Chabang port). In terms of industrial development, new 10 SEZ will be established at border area adjacent to Cambodia, Laos, Myanmar and Malaysia.

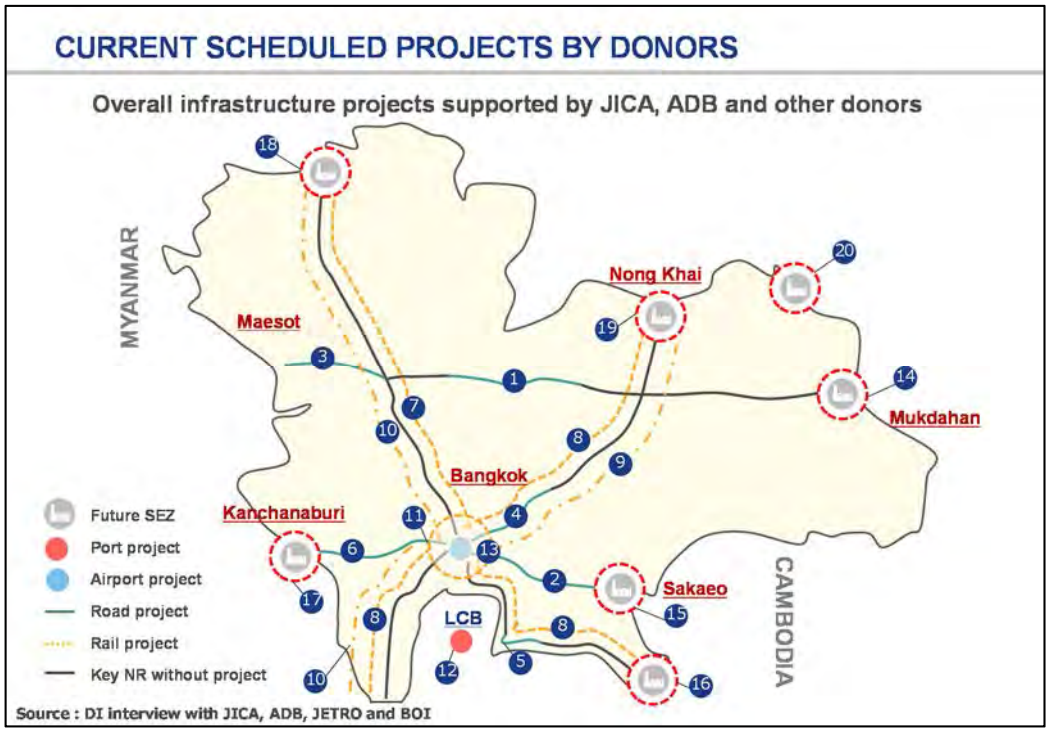

Figure 10: Current scheduled projects by donor

Further detail of key projects are listed below

Table 1: List of current projects in Thailand

Type	No	Name	Detail	Total amount (mil USD)	Donor	Completion	Status
1.Road	1	Phitsanulok - Lom sak	Road widening to 4 lane	114	ADB (46%)	2015	Ongoing
	2	Sarakham - Sakaeo		51		2015	Completed
	3	Tak - Maesot		39	TBA	2017	Planned
	4	Bang Pa-in - Nakhon Ratchasima	Road widening to 8 lane	4,500	TBA	2015	Still bidding
	5	Pattaya - Maptaput			TBA	2015	Still bidding
	6	Bang Yai - Kanchanaburi			TBA	2015	Still bidding
2.Rail	7	Bangkok - Chiang Mai	Construct new high speed rail	5,700	Japan	2027	Only FS
	8	Others		21,460	TBA	2019	Planned
	9	Bangkok - Nong Khai	Double track	3,900	China	2020	Planned
	10	Others			TBA	2020	Planned
	11	Bangkok urban planning	Expand mass transit line	12,460	JICA	2022	Planned
3.Port	12	Laem Chabang	Capacity expansion	3,728	TBA	2020	Planned
4.Air	13	Suvarnabhumi	Capacity expansion	1,736	JICA	2017	Ongoing
5.SEZ	14	Mukdahan	Establish new border SEZ	280	TBA	2019	Planned
	15	Sakaeo				2019	Planned
	16	Trad				2019	Planned
	17	Kanchanaburi		TBA		2019	Planned
	18	Chiang Rai				TBA	Planned
	19	Nong Khai				TBA	Planned
	20	Nakhon Phanom				TBA	Planned

Source: ADB, JICA, JETRO (Infrastructure Map), DI Interview (JICA, ADB)

2-7. Necessary infrastructures to be prioritized highly

To prepare for future development, there are 6 key projects that Thailand government will strongly prioritize with the construction of mass transit line is urgently critical

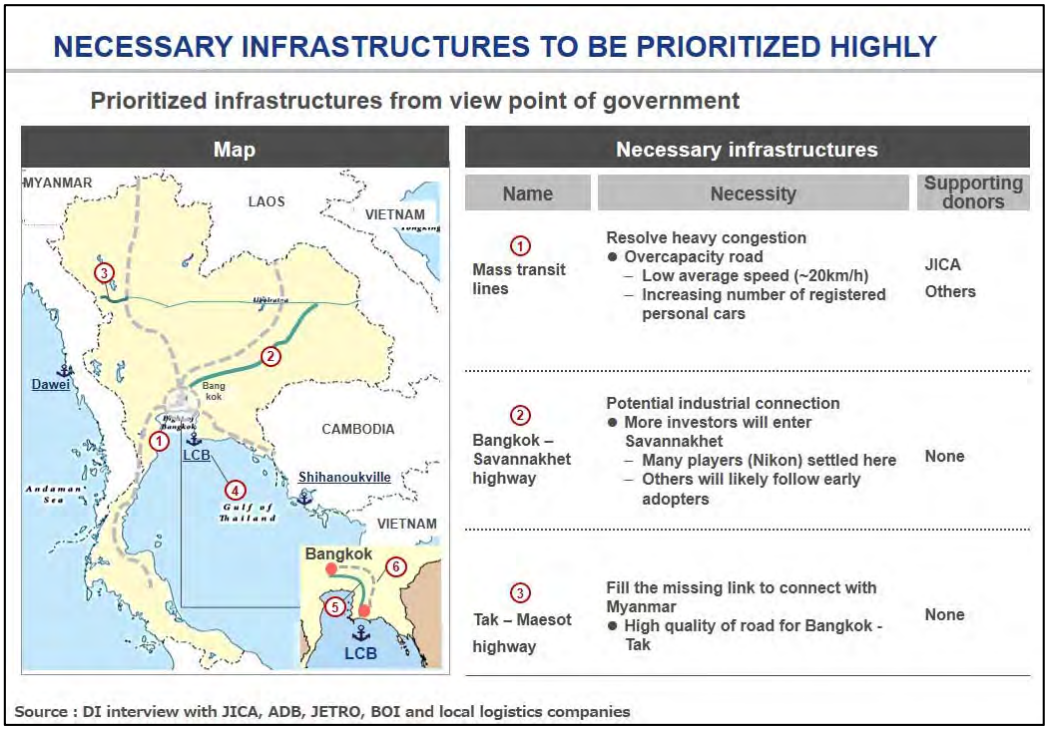

Figure 11: Necessary infrastructure to be prioritized highly (1/2)

1) Mass public transit line

According to Ministry of Transport, Bangkok has been suffering from some of the most severe road-based traffic congestion in the world. Presently, the frequent mode of transport used in Thailand is still road-based system, leading to mass traffic congestion with the rush hour average speed of approximately 20 kilometers per hour. Moreover, personal registered cars have witnessed a consistent annual growth since 2007 (35%), indicating that the worsen situation will probably happen.

2) Bangkok – Savannakhet highway

Currently, various Japanese companies have entered, especially Nikon, to Savannakhet SEZ. If Laos develop in the forthcoming period, more foreign manufacturers will follow the early movers. In that case, there would be a strong demand for freight transported on Bangkok – Savannakhet and rehabilitating this section is a vital preparation.

3) Tak – Maesot highway

This route is the obstacle for trading between Thailand and Myanmar. For Bangkok – Tak, the road is 4-lane and has high quality according to several logistic firms. However, Tak –

Maesot is the narrow section with only 2 lanes and it should be widen to facilitate trading with neighbors.

4) Laem Chabang Port

Laem Chabang Port is receiving increase traffic of cargo throughput in the last 5 years. When the regional industrial connection with neighboring countries take to the next stage, demand for Laem Chabang will substantially increase as a booming number of semi-products from Cambodia, Laos and Myanmar are transported to Bangkok for final process.

5 - 6) Linking Bangkok – Laem Chabang (Expressway & Rail)

Since being driven by the future industrial linkage, rail and road system that connect Bangkok and Laem Chabang would be worth to aim attention at. Currently, express highway from Bangkok to Laem Chabang port is terminated on the way. Therefore, extention of this highway will be one of the most important project. Besides, improvement of railway operation in this area should be considered as well.

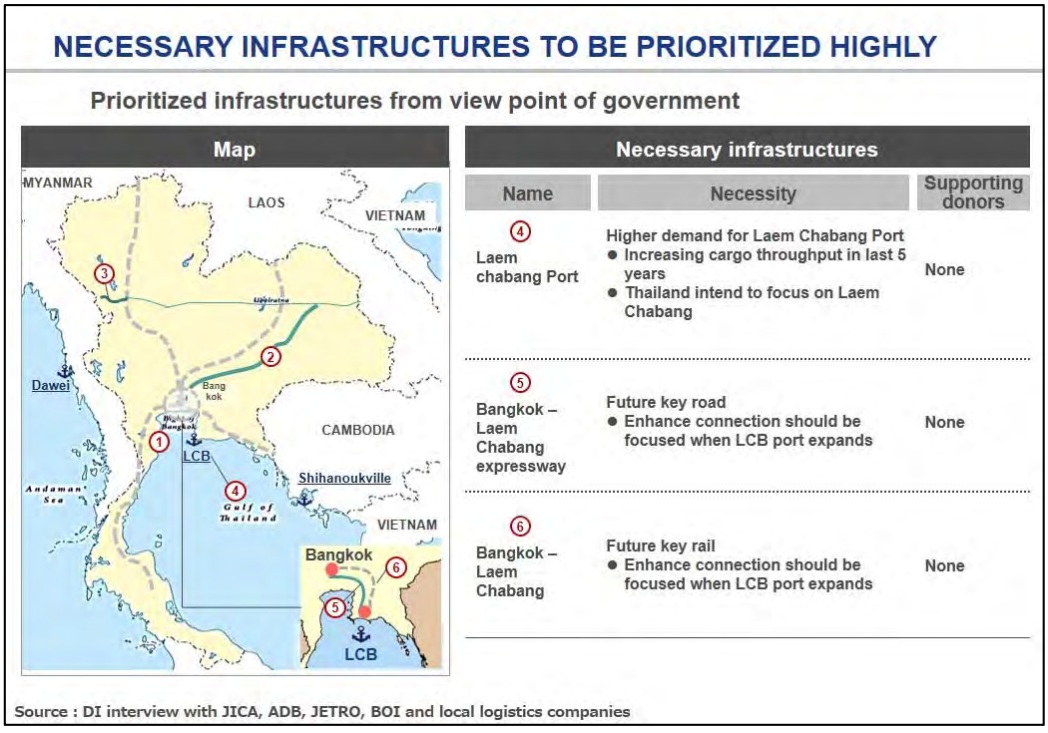

Figure 12: Necessary infrastructure to be prioritized highly (2/2)

Besides, various projects are in planning stage for medium and long term transformation. Overall, these programs require massive investment with sophisticated level of technical aspect. Projects below are necessary infrastructures in middle-long term point of view.

1) Medium-term plan

- Double track existing railway and the expansion of key national road to 8 lane are categorized to the mid-term plan. Compared to high speed project, double tracking is much less problematic and challenging. As it will be aligned to existing one, the technical aspect and land acquisition issue are unlikely to occur. In addition, for the trading development of Indochina region, the highway expansion to 8 lanes in Thailand is the critical step. In future, when the industrial connection in Indochina region becomes widespread, it is likely to be heavily congested on existing 4-lane road in the center city like Thailand.

2) Long-term plan

- From governmental viewpoint, the construction of high speed railway and any projects to directly facilitate trading with Myanmar through Dawei are vital but will only be realized in long term. Regarding high speed railway, the project has a number of unresolved technical issues. To avoid the land acquisition cost, Thailand government attempts to construct high speed line running parallel to the existing line. However, there are numerous existing railroads in mountainous area which have many bends and it would be dangerous for high speed railway locating here.
- Dawei, on the other hand, is a controversial project despite its potential. According to one Japanese logistic companies in Thailand, they are skeptical about the development progress of Dawei for several reasons. The unfavorable location of Dawei (600km from Yangon) and under-developed road quality are one argument. Moreover, the area often suffers from weather issues and it is not suitable for a location of an international deep sea port. Overall, the development of Dawei only comes to place after next 10 or 15 years.

Chapter 3: Analysis of Cambodia

3-1. Basic information

3-1.1. Overview

Cambodia, officially Kingdom of Cambodia settles in the southern side of Indochina region. With the total area of 181,035 km^2, the country is adjoined Thailand in the northwest, Laos in the northeast and Vietnam in the east. According to World Bank statistics, the figure for population is quite low, at only 15.3 million, making Cambodia the 70th populous country in the world. GDP per capita of Cambodia remains low compared to other neighboring countries as they don't have neither an ample natural resources like Vietnam and Laos nor a developed industrial base like Thailand. Agriculture, consistently, is the dominant economic sector while manufacturing has only accounted for a small proportion in total GDP. In the last 5 years, there has been no significant improvement in manufacturing sector and garment textile industry still played a vital role.

The heavy reliance on garment sector is illustrated in the export-import balance. Key imported products are fabric and petroleum. Fabric is a raw material for garment production with key exporter is China. On the other hand, most exported product from Cambodia is garment and footwear which took up 80% last year. The primary destination for garment product is US.

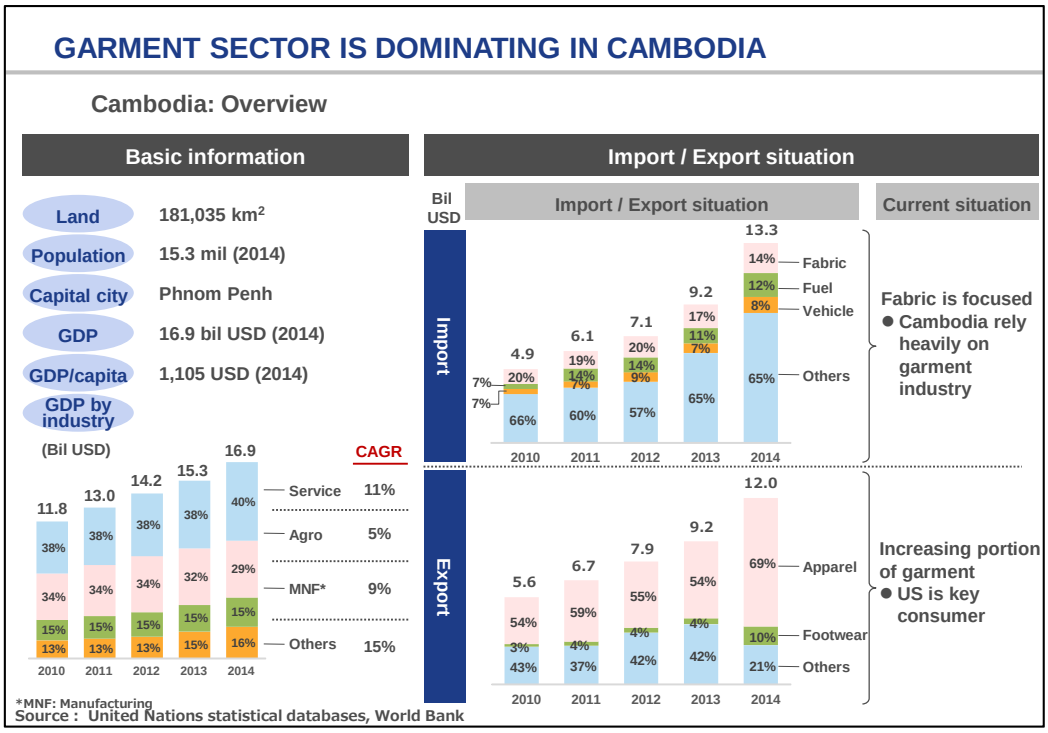

Figure 13: Overview of Cambodia

3-1.2. Current transaction with neighboring countries

In terms of trading with three neighboring countries (Cambodia, Laos, Myanmar), Thailand is the most strategic partner for the national development, Vietnam functions only as a gateway (for transshipment) for Cambodia while the connection with Laos is extremely minor. Detail transaction with neighboring countries are shown below.

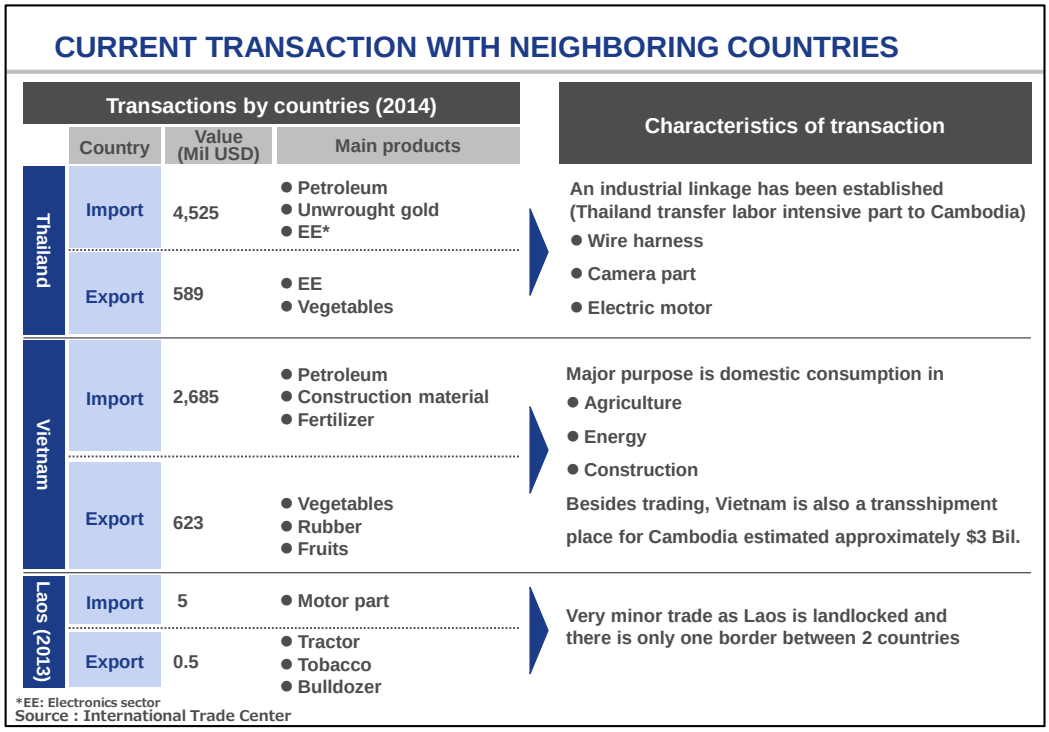

Figure 14: Current transaction with neighboring countries

- Cambodia – Thailand

  According to ITC statistics, total trading value is up to USD 5.1 billion in 2014. Electronics and vegetables are crucial products imported from Cambodia whereas petroleum, unwrought gold and electronics are primarily transported in the reverse direction. With the advantage of cheap labor cost, Cambodia has been receiving the FDI outflow related to labor intensive process from Thailand under "Thailand Plus One". Currently, Yazaki, Denso and Minebea are the precedent firms for this trend.

- Cambodia – Vietnam

  This current trading mainly serves for domestic consumption of each country with Cambodia importing petroleum, construction material and exporting vegetables and rubber (ITC statistics). However, transshipment is a key factor making the connection. Vietnam's long coastal lines and rich ports allow it to be international gateway for Cambodia due to undeveloped ports situation in Cambodia. According to interview

with local logistics players and international institutes, transshipments even weigh more than pure trade value with the estimated value of approximately USD 3 billion from Cambodia. Presently, Cambodia transit most of their import goods in Cat Lai – Ho Chi Minh City, and export via Cai Mep Thi Vai – Ba Ria Vung Tau province.

- Cambodia – Laos

  The figure for trade between Cambodia and Laos is substantially small compared to others as Laos's unfavorable location. Laos is a landlocked country and there is only one border gate for trade facilitation. Hence, there will be no significant changes for this connection in future.

3-1.3. Industrial allocation in Cambodia

Industrial cluster in Cambodia has been zoning in the Southwest area, bordered by Thailand and partly Vietnam while the Northeast area is not strongly prioritized. Overall, the most considerable issue in Cambodia production is insufficient electricity. Except Phnom Penh, all industrial hubs suffer from this shortage.

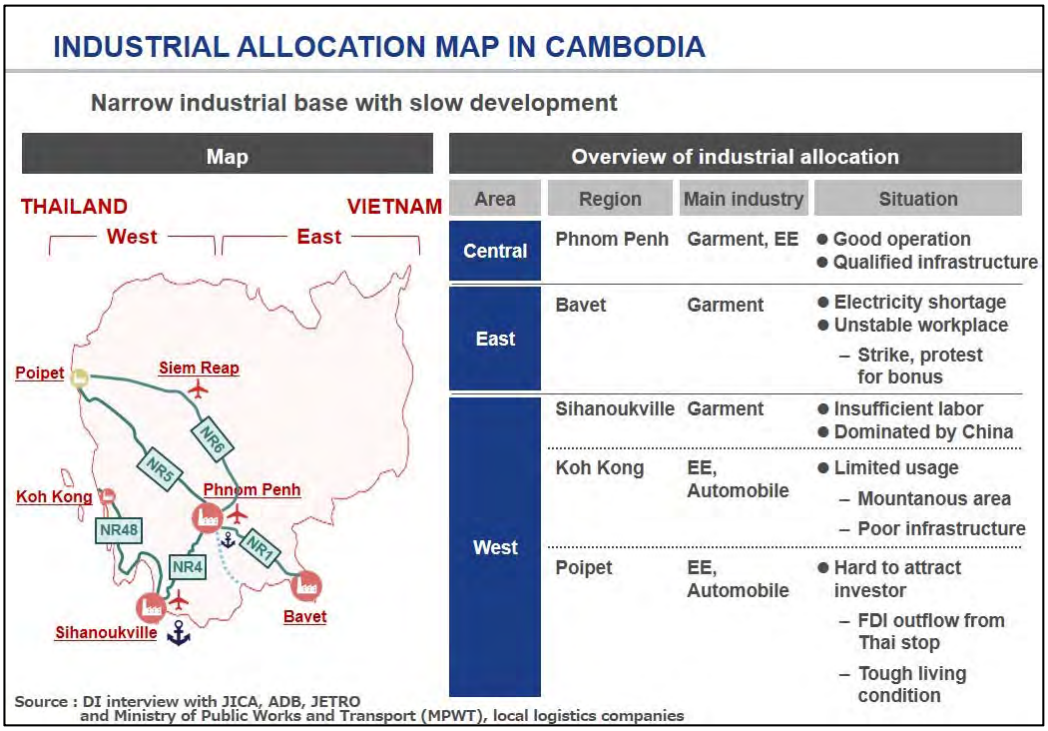

Figure 15: Industrial allocation map in Cambodia

- Central: Phnom Penh is by far the strongest industrial cluster in Cambodia in terms of number of manufacturers, investment and human resources. Main industries in the region are garment textile and electronics & electrical appliances. Under "Thailand

Plus One" phenomenon, Phnom Penh is considered as the most potential and successful area when it can attract the largest number of Japanese companies from Thailand compared to other provinces.

- East: Bavet, which is adjacent with Vietnam in the Southeast, is the production hub of garment and textile in Cambodia. However, this area has the most serious issue in power deficit. Unstable workforce is another obstacle for Bavet. Tough living condition at border area plus low wage from labor intensive work force local workers to protest and ask for a bonus or wage increase. The latest strike happened in August 2015 with two weeks of production delay for one Chinese factory.
- West: There are three focused areas in the West: Sihanoukville, Koh Kong, Poipet. Coastal Sihanoukville, locating near to the biggest deep sea port in Cambodia, is now dominated by Chinese garment manufacturers. Koh Kong aims attention at automotive and electronics sector. However, the utilization rate in this area is quite low due to poor infrastructure in mountainous area. Poipet is currently under-construction and calls for investors. Cambodia government plans to turn this area into automotive manufacturing hub for Thailand. Poipet locates in close proximity with Thailand's key production hub and Laem Chabang international port. Moreover, with NR 5, which links Phnom Penh and Poipet, is under widening plan, Banteay meanchey province is fully prepared for future connection. There are some investor shows their interest in Poipet. Unfortunately, Poipet still finds it difficult to attract investors, especially Japanese, living in Poipet may be difficult with insufficient condition in this area. Thailand poor economic performance might be another reason that hinders growth of Poipet.

3-2. Industrial master plan

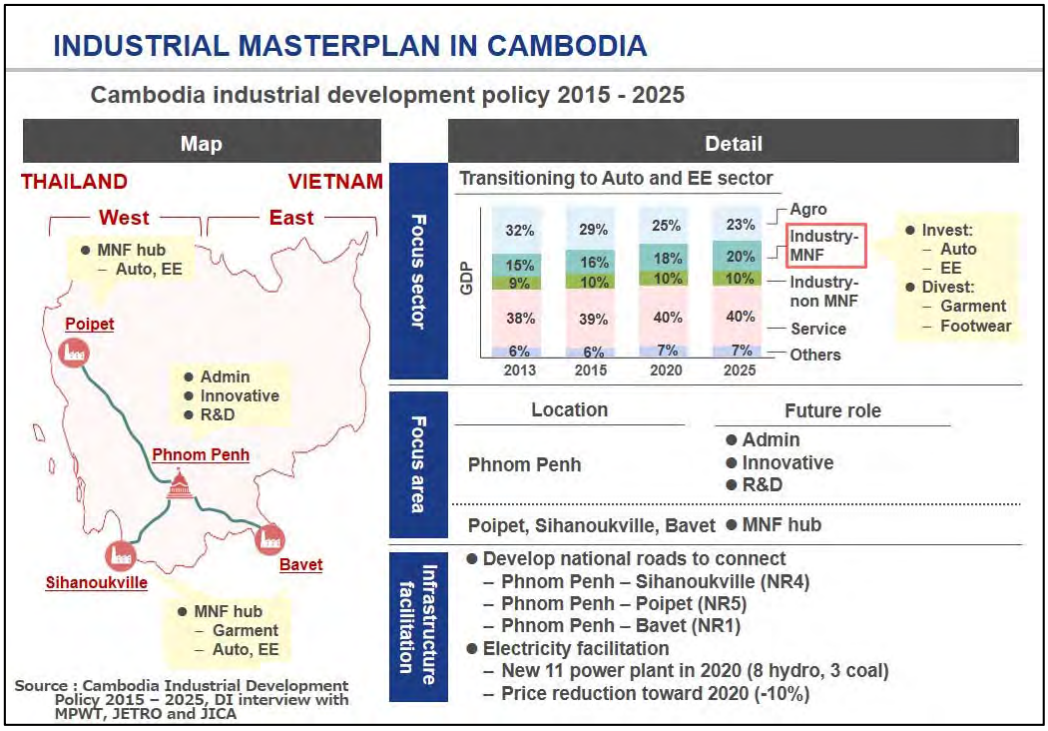

Figure 16: Industrial master plan in Cambodia

With simple structure and low level of sophistication (mostly concentrated on garment and agriculture related industries) Cambodia industry still remains weak. Thus, Cambodia government has conducted the Industrial Development Policy 2015 – 2025 which concerns the industrial sector as a key driver to reach a middle-income country status.

According to the plan, Cambodia will strengthen the industrial base by increasing GDP share of industrial sector to 30% in 2025 from 24% in 2013. Moreover, it also intends to diversify export products by investing more in automotive and electronics sector while decreasing the proportion of garment textile at the same time. Therefore, automotive and electronics will be key priority sector for Cambodia towards 2025.

Regarding area development, Phnom Penh and surrounding areas will transform into an administrative, scientific and innovative center. Additionally, Cambodia is preparing the urban development plan to transform Poipet, Koh Kong and Sihanoukville into manufacturing hubs.

Cambodia also plans to improve the quality of infrastructure to support for this industrial transitioning. In terms of transportation, they will develop and implement a master plan for developing three economic corridors, namely Phnom Penh – Sihanoukville, Phnom Penh – Bavet, Phnom Penh – Poipet. The electricity advancement is brought into discussion too with new 11 power plants and price reduction will take place in 2020.

3-3. Infrastructure master plan

3-3.1. Summary of Cambodia National Strategic Development Plan

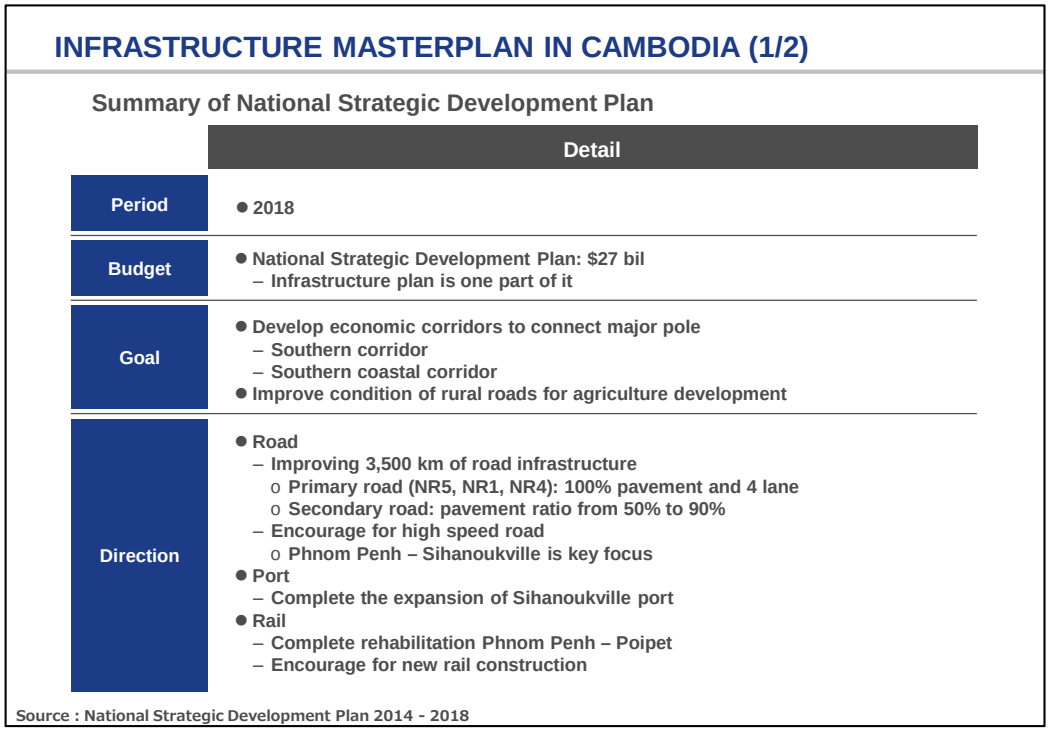

Figure 17: Summary of infrastructure master plan in Cambodia

The National Strategic Development Plan 2014 – 2018 with total capital investment of USD 27 billion is a strategic plan for Cambodia to achieve the overall development. An important part of it is infrastructure investment. According to the plan, the primary goal is to facilitate trading between major economic poles with Southern corridor and Southern coastal corridor are highly prioritized. As the country still depends on agriculture production, the national plan also focuses on rural roads development. Regarding detailed direction below, a large proportion of investment will be spent on road:

- Road
  - Improving 3,500 km of road infrastructure
    - Primary three roads (NR5, NR1, NR4): 100% pavement and 4 lane
    - Secondary road: pavement ratio from 50% to 90%
  - Encourage for high speed road
    - Phnom Penh – Sihanoukville is key focus
- Port
  - Complete the expansion of Sihanoukville port which is the largest port in Cambodia

- Rail
  - Complete rehabilitation of existing railway between Phnom Penh – Poipet
  - Encourage for new rail construction

3-3.2. Detail of Cambodia National Strategic Development Plan

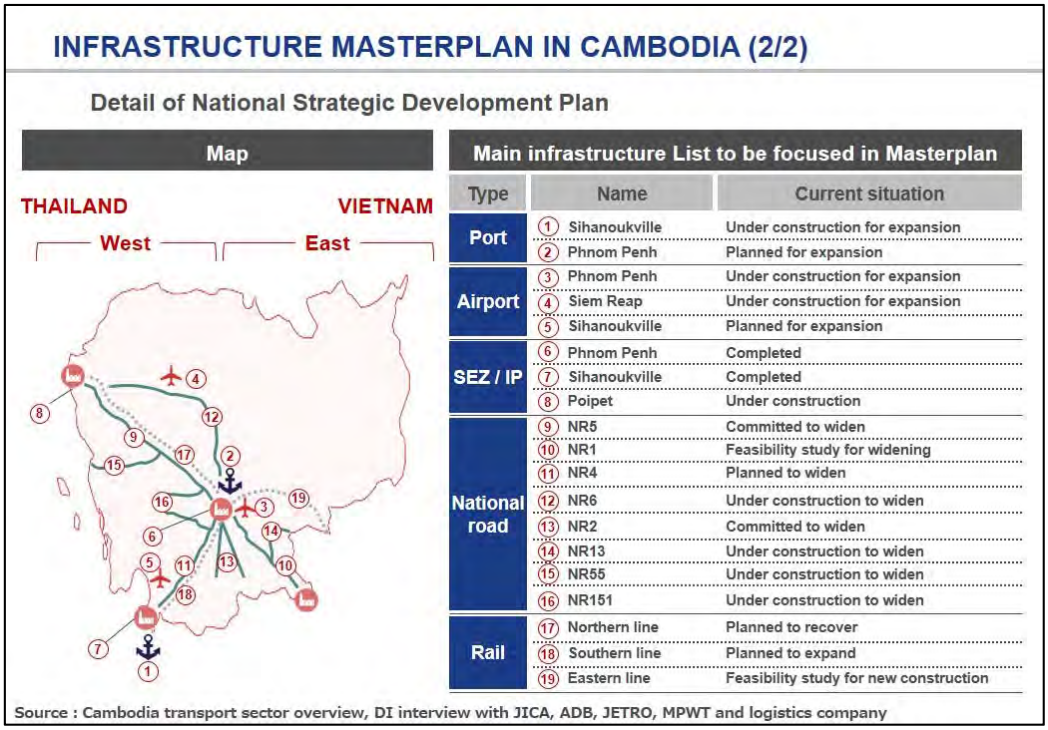

Figure 18: Infrastructure master plan in Cambodia

- Seaport and airport: will experience a significant improvement in Sihanoukville and Phnom Penh with the capacity expansion. Another airport in center of attraction is Siem Reap. The main purpose for this project is to appeal tourism. For industrial transformation, Phnom Penh and Sihanoukville again is drawing much attention.
- SEZ: SEZs were constructed and operated in previous areas (Phnom Penh and Sihanoukville) with high utilization rate. Therefore, many expansion plan were conducted for Phnom Penh and Sihanoukville port. Additionally, Cambodia government realizes the potential of Poipet thanks to favorable location and cheap labor cost. Thus, Poipet has been invested heavily in order to be a key production hub for automotive industry in Thailand.
- Road: In terms of road revolution, there are three key projects that should be aimed attention at

- NR5: trading between Thailand and Cambodia via Bangkok – Poipet – Phnom Penh has increased sharply. Especially after an establishment of AEON mall in Cambodia, the demand for freight even grows further. In the past, Chinese Government and ADB supported this road, currently JICA has committed to widen this road (from Thlea Ma'am to Battambang and from Sisophone to Poipet) into 4-lane highway.
- NR1: the development of this route is an ideal alternative for the waterway (Mekong River) to trade with Vietnam. According to one Japanese logistic companies, there has been a surging demand for transporting garment product from Phnom Penh to Ho Chi Minh. The waterway currently is the first concern but it has operated quite inefficiently and this road could likely receive a proportion of traffic from the waterway as alternative transportation way if it is fully rehabilitated and widen.
- NR4: connecting two major development centers is beneficial for Cambodia in many aspects. Firstly, trading facilitation between big cities is a clear reasoning. Moreover, garment export from Cambodia to EU (27% in 2014) has grown higher than that to US (only 6% in 2014). Most transactions with EU took place at Sihanoukville port via NR 4 so widening this road could be a good preparation for future development.

- Railway: Rail line is a long-term prospect of Cambodia. Presently, only Southern line (Phnom Penh – Sihanoukville) line is in good condition with acceptable quality. However, its usage is below the par as most logistics companies still prefer roadway. Northern line (Phnom Penh – Poipet) was stopped after the destruction by landmines since 2008 and Cambodia is planning to recover it. Another project is Eastern line (Phnom Penh – Loc Ninh) which has caught the attention from China but it is only at feasibility stage

3-4. Potential connection with neighboring countries

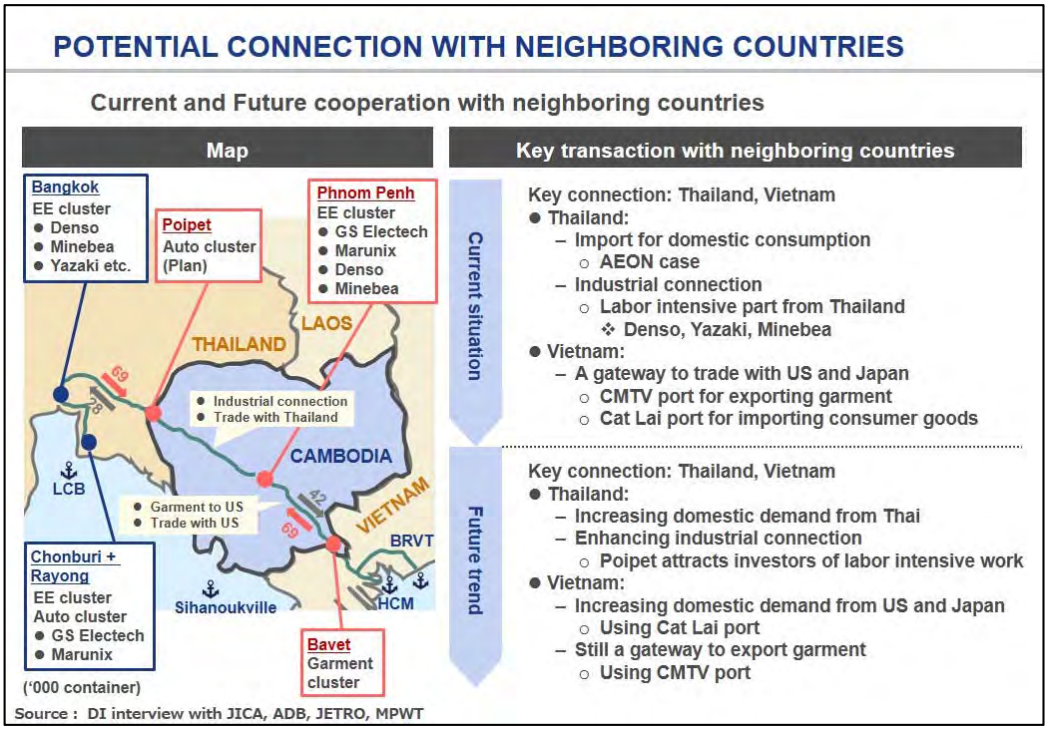

Figure 19: Potential connection with neighboring countries

A) Current situation

Thailand functions as a key exporter with highest trading figure. According to statistics date from Ministry of Economy and Finance in Cambodia, import from Thailand accounted for more than 10% of total import for Cambodia in 2014. After an establishment of the Japanese giant retailer AEON in Phnom Penh, the import demand in Cambodia has even increased further. Also, since Cambodia is rising as the most potential candidate for "Thailand Plus One", two nation's trading has been strengthened, especially for electronics sector (Denso, Yazaki, Minebea, etc). Concerning Vietnam, besides pure trade between two countries, it is strategically crucial for trading of Cambodia as transshipment hub. Most of transactions with US or Japan have been transshipped via Vietnam port with Cat Lai for importing consumer goods and Cai Mep Thi Vai for exporting garment product.

B) Future trend

In terms of future development, the figure for import and export are expected to increase as Cambodia will reach the middle-income country status. Therefore, traffic from trading with Thailand and Vietnam would be busier. Moreover, industrial linkage also plays a vital role to enhance the connection of Cambodia – Thailand. As mentioned before, the government plans to turn Poipet into automotive manufacturing hub for Thailand. Poipet

locates in close proximity with Thailand's key production hub and Laem Chabang international port. With NR 5, which links Phnom Penh and Poipet, is under widening plan, Banteay meanchey province is fully prepared for future connection.

3-5. Current bottleneck of infrastructure

Despite the potential prospect of Cambodia, there still remains several bottlenecks to be resolved for future development. According to interviews with local logistics companies and governmental institutes, around 14 bottlenecks are raised in nationwide, and they are being invested or waiting for investment.

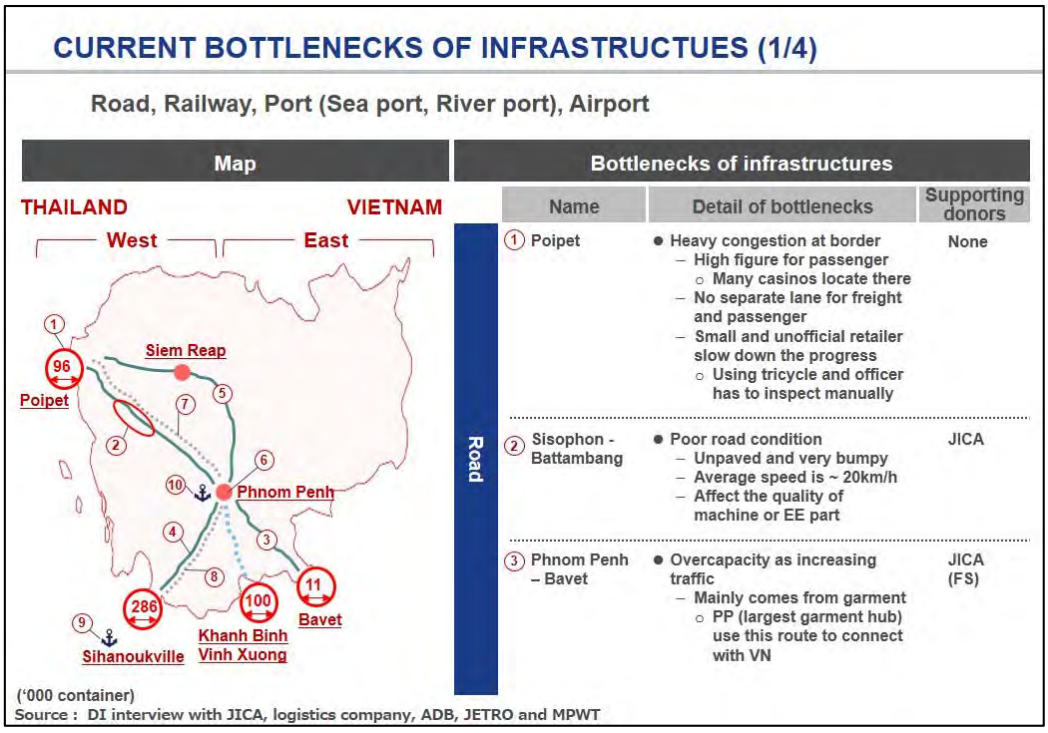

Figure 20: Current bottleneck of road (1/2)

- Road

1) *Sakaeo – Poipet:* frequent heavy congestion
   - Passenger is a key factor causing blockage
     - Sakaeo checkpoint has the highest figure for passenger, compared to other local border gates as many casinos locate there and Cambodia itself relaxes the regulation for passenger to attract more tourists. On the other hand, there is no separate lane for freight and passenger through this border. Hence, cargo transported in the area must line up and wait for a long time before passing.
   - Small and unofficial retailers contribute to slow down the procedure at border

- The popular modes of transport at Sakaeo – Poipet is using small tricycle wrapped by a canvas to carry products. Security officer must inspect manually and slow down the procedure.

2) *Sisophon – Battambang*: very low quality

This route belonging to NR5 is too narrow with extraordinarily poor condition. According to one Japanese logistics company, they actually conducted a fieldtrip to investigate the road quality in this area. The road is bumpy, narrow and poorly paved with nearly all the way between Sisophon and Battambang affected by the flood. The average speed in the area is only 22 km/h compared to more than 40 km/h on the remaining section of Phnom Penh – Poipet.

3) *Phnom Penh – Bavet:* increasing traffic

There has been a surging demand for transporting garment product from Phnom Penh to Ho Chi Minh and the inland waterway reaching to Vietnam seems to be lack of capacity. "Normally, only 30% of garment product has been transported on this road but the figure often doubled during dry season or special occasion as holidays" said by one Japanese governmental agency. Thus, the demand for an improved highway with 4-lane in this route (NR1) is quite urgently vital.

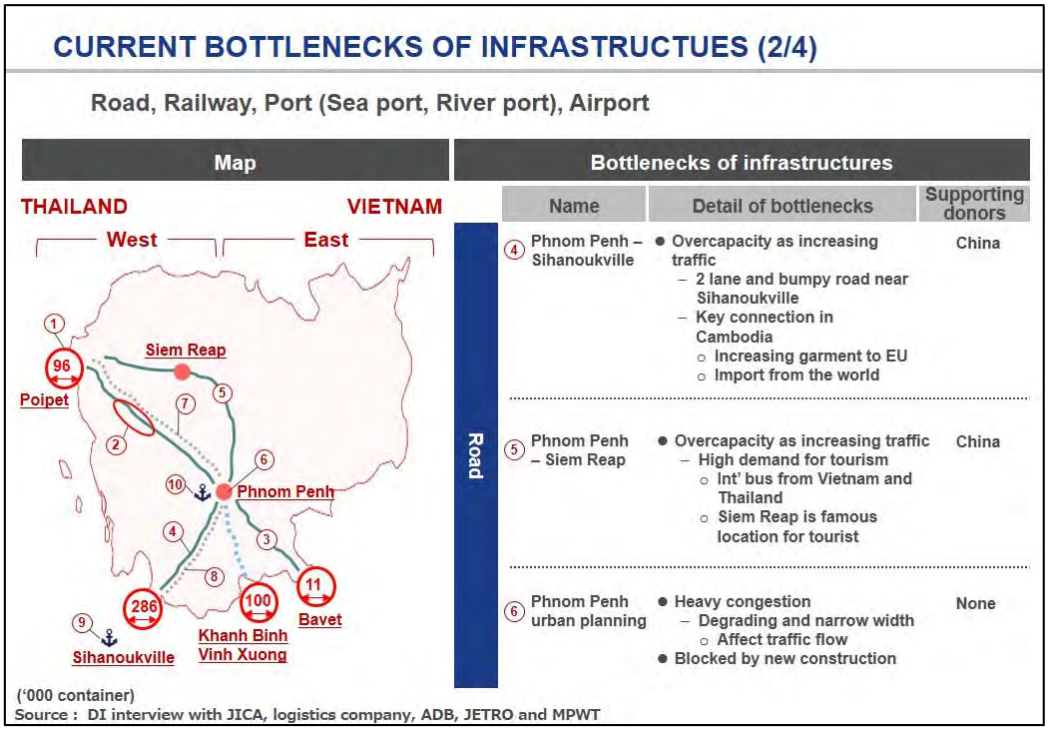

Figure 21: Current bottleneck of road (2/2)

4) *Phnom Penh – Sihanoukville*: increasing traffic

The increasing traffic has recently interfered the transportation flow on this section (NR4). This problem stems from the rising demand for garment export to EU via Sihanoukville port.

5) *Phnom Penh – Siem Reap*: poor condition

Siem Reap is the most notable place for tourism in Cambodia, hence, the traffic from this route (NR6) is driven by passenger travel. In addition, after the operation of international bus from Thailand and Vietnam, the demand for travel even rises further. However, one Japanese logistic company complaint about the quality of this road and confirmed that it should be rehabilitated for future tourism attraction.

6) *Phnom Penh urban planning*: frequent congestion

Degrading of road quality is the biggest issue in the capital city. Moreover, there are now numerous new constructions in Cambodia with inefficient operation. They are often delayed and blocked a major proportion of road with new constructions.

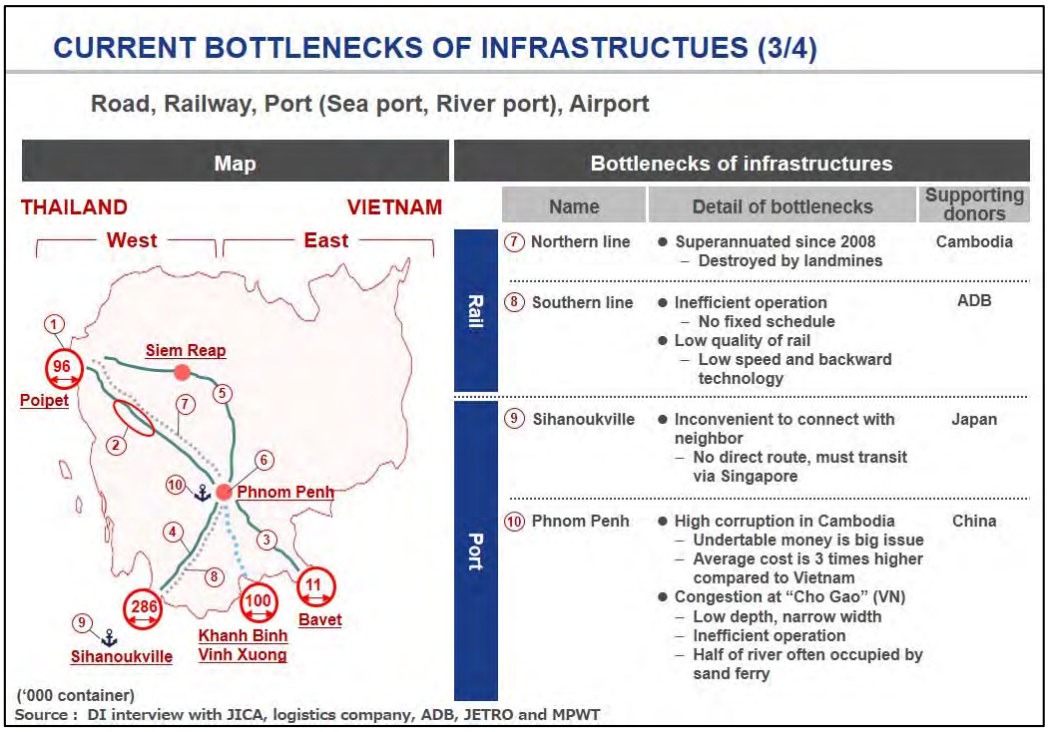

Figure 22: Current bottleneck of rail, port

- Rail

7) *Northern line*: discontinued since 2008

Due to the destruction by landmines, most of Northern line were superannuated since 2008. ADB actually planned to rehabilitate the section Poipet – Phnom Penh but it had

been abandoned for some reasons in 2013. Cambodia government is now planning to recover this line for low speed operation.

8) *Southern line*: inefficient operation

The current operation is under-performed as the operator cannot arrange fixed schedule for freight transport. They only start delivering until a container is full but it causes inconvenience for customers and hinder growth for this line. Additionally, according to MPWT, there is a need to upgrade the technology to wider line for future development.

- Port

9) *Sihanoukville:* difficulties come from small scale

Using this port to connect with neighboring countries such as Thailand or Vietnam is problematic as there is no direct route from Sihanoukville port. It means cargo must transit via Singapore port before heading to the final destination. Thus, most companies prefer road transport for conducting transaction with Thailand and Vietnam to save time.

10) *Phnom Penh:* high transport cost for using waterway

Under-table money is the most serious obstacles for this route. From the perspective of one Vietnamese logistic companies, the section from Phnom Penh to Vietnam border is annoying but they have no choice. There has been many inspection stations or police officers to stop the ferry for investigation fee. They complaint that the average opaque cost in Cambodia is three times higher than in Vietnam. Another bottleneck for the river route is the congestion of “Cho Gao” canal in Vietnam territory. It has narrow width, low depth and is often occupied by sand ferry. Currently, Vietnamese government is supporting expansion project of this canal, and considering additional dredging as next phase project.

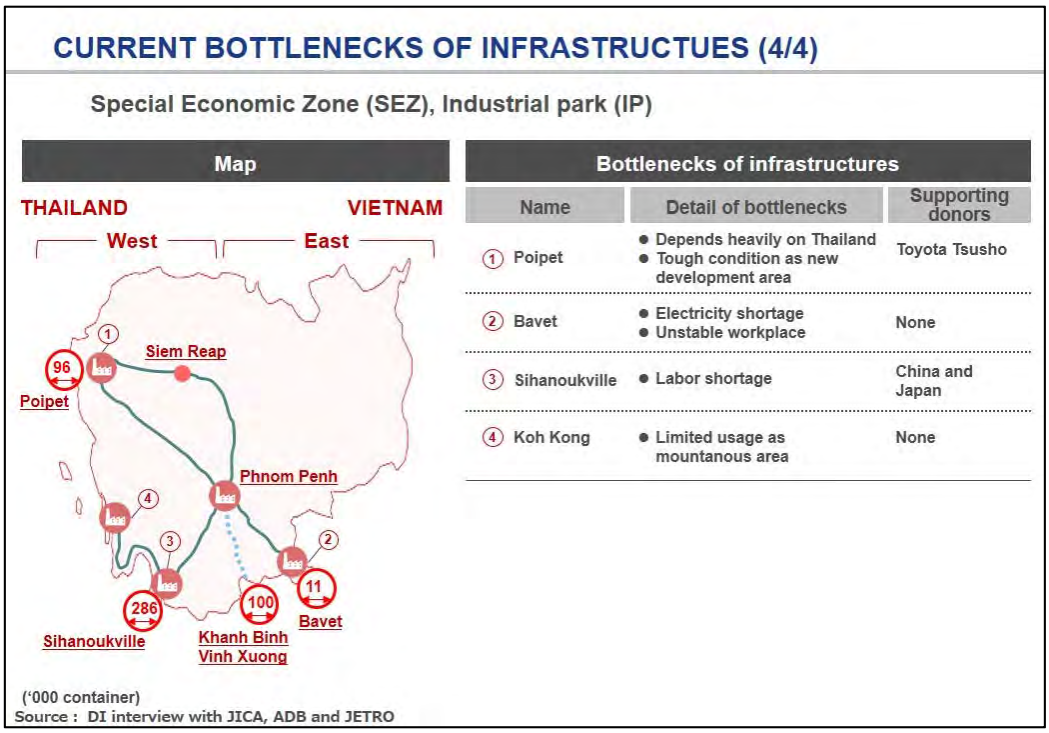

Figure 23: Current bottleneck of SEZ

- <u>SEZ</u>

11) *Poipet*: vulnerable to Thailand and struggle to find investors

One key issue for the development of this SEZ is the vulnerability to Thailand. This border area is intentionally planned to be a production hub for Thailand automotive industry. Hence, if the neighbor's economic performance witnesses a downturn, Poipet will be significantly affected. Another reason is that investors are hesitating to enter as tough living condition in the border area (lack of facilities and services).

12) *Bavet*: problematic labor and power

This area has a most serious in power deficit. Unstable workforce is another obstacle for Bavet. Tough living condition at border area plus low wage from labor intensive work force local workers to protest and ask for a bonus or wage increase. The latest strike happened in August 2015 with two weeks of production delay for one Chinese factory.

13) *Sihanoukville:* labor shortage

As not owning a dense population, manufacturer in Sihanoukville often hires workers from another nearby provinces. Battambang functions as the primary labor supply for Sihanoukville as it is the populated region and closest to Sihanoukville. However, there has been a trend that people in Battambang would rather plant agriculture

product at home or work in Phnom Penh than going to Sihanoukville as the location matter.

14) *Koh Kong*: limited usage

Koh Kong aims attention at automotive and electronics sector. However, the utilization rate in this area is quite low due to poor infrastructure in mountainous area

3-6. Current schedule projects by donors

Overall, there are 16 key projects supporting the future development of Cambodia. Road is obviously heavily invested, especially the connection between the capital city of Phnom Penh and Thailand and Vietnam. To ameliorate domestic linkage, the section Phnom Penh - Sihanoukville port and Phnom Penh ring road are also focused. Regarding railway, the projects to construct rail line running parallel to support key national road is highly prioritized as alternative transportation method. For industrial transformation, Poipet by far has been a key investment in order to receive the FDI outflow from Thailand.

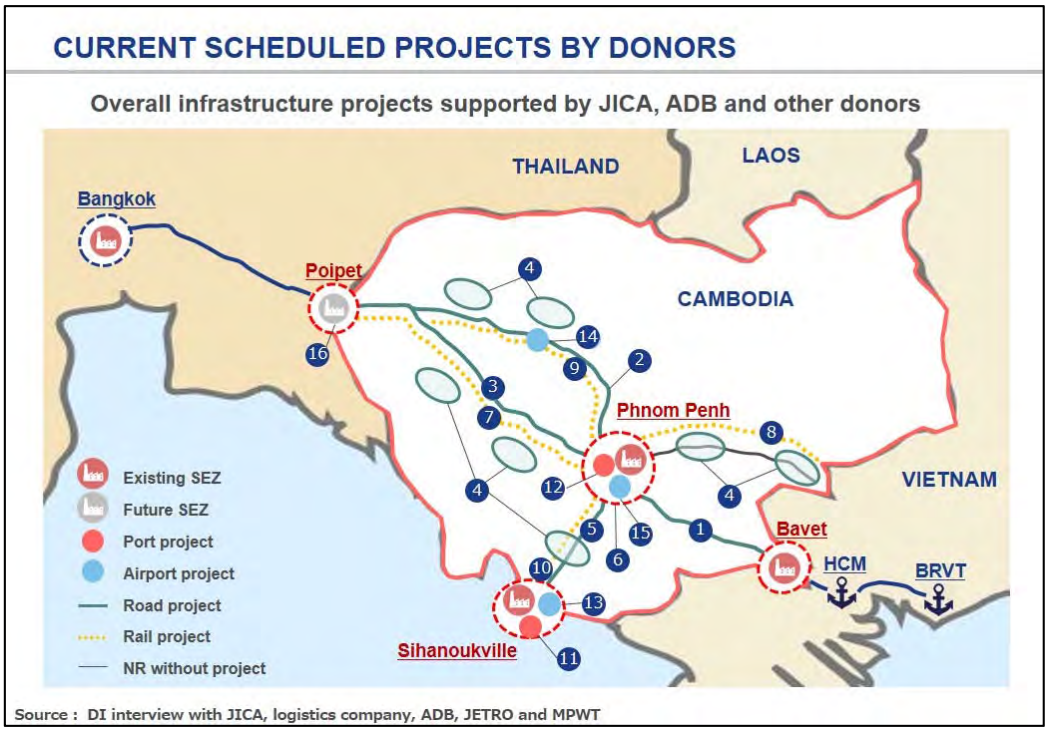

Figure 24: Current scheduled projects by donors

Further detail of key projects are listed below

Table 2: List of current projects of Cambodia

Type	No	Name	Detail	Total amount (mil USD)	Donor	Completion	Status
1.Road	1	Phnom Penh - Bavet (NR1)	FS for Expressway construction		JICA		FS
	2	Phnom Penh - Siem Reap (NR6)	Expressway construction	133	China	2016	Ongoing
	3	Phnom Penh - Poipet (NR5)	Widen to 4-lane	239	JICA (67%)	2020	Committed
	4	Rural road in remote area	Pavement	118	ADB (90%)	2020	Ongoing
	5	Phnom Penh - Sihanoukville (NR4)	Widen to 4-lane / Expressway		China	2021	Planned
	6	Phnom Penh Ring Road	Construction of new road	337	China		Planned
2. Rail	7	Poipet - Phnom Penh	Recover after destruction	142	Cambodia (86%)	2020	Ongoing
	8	Phnom Penh - Snuol	New line to connect with VN		China	2020	FS
	9	Sisophon - Phnom Penh	New line construction		TBA	2030	Planned
	10	Phnom Penh - Sihanoukville	Rehabilitation		ADB	2030	Planned
3.Port	11	Sihanoukville	Construction of 2 new terminal	72	Japan	2017	Ongoing
	12	Phnom Penh	Construction of new terminal		China	2017	Planned
4.Air	13	Sihanoukville	New terminal	200	France (100%)	2016	Planned
	14	Siem Reap	New terminal to attract tourist	100	TBA	2020	Ongoing
	15	Phnom Penh	New terminal		TBA	2020	Ongoing
5.SEZ	16	Poipet	New construction of auto hub		Toyota Tsusho	2015	Ongoing

Source: ADB, JICA, Infrastructure and Regional Integration Technical Wirking Group, DI interview with ADB, JICA, JETRO and MPWT

3-7. Necessary infrastructures to be prioritized highly

According to MPWT, road rehabilitation is the first priority for Cambodia because of its importance for trading facilitation by connecting with neighboring countries.

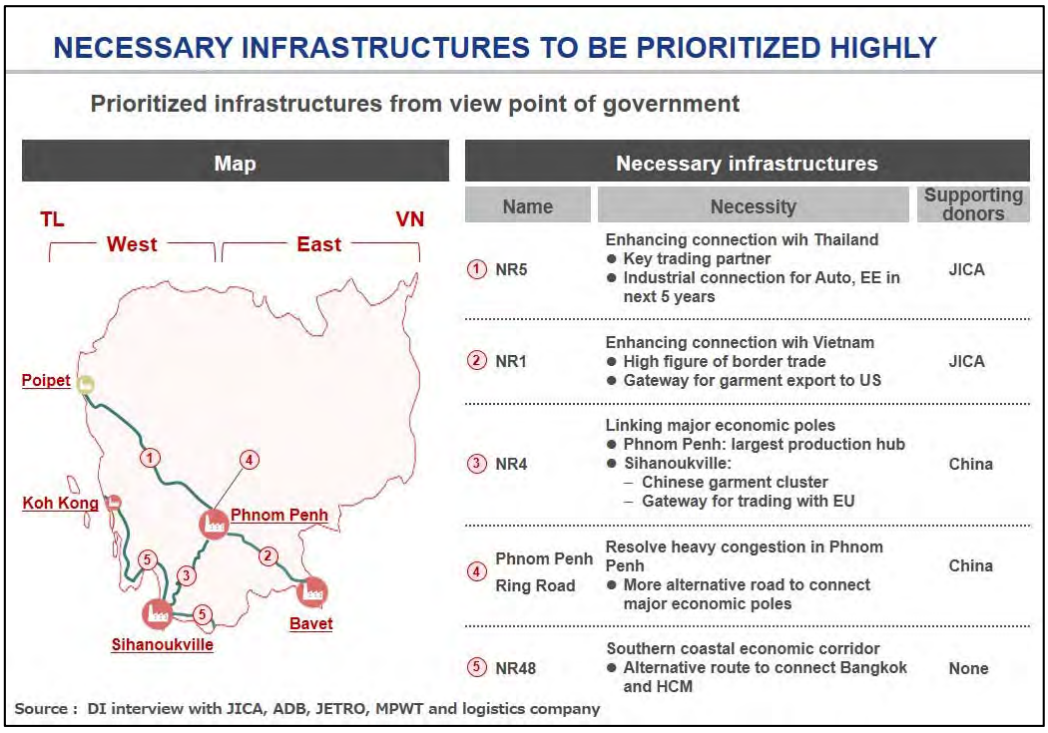

Figure 25: Necessary infrastructure to be prioritized highly

1) NR5

Thailand is a key trading partner for Cambodia, contributing over 30% of total import. In the future, when Cambodia realized the target of middle-income country, the demand for domestic consumption will necessarily increase. Hence, rejuvenating this section would be helpful for the country. Moreover, Cambodia government believe that the industrial connection with Thailand for automobile and electronics sectors will be strengthened in the next 5 years despite presently relying on garment and textile sector. JICA has committed to expand NR5 (from Thlea Ma'am to Battambang and from Sisophone to Poipet) from 2 lanes to 4-lanes.

2) NR1

NR1 connecting between Phom Penh and the border with Vietnam is one of the most important infrastructures as well as inland water way in Mekong River. But, the current infrastructure including road and river seems to be lack of capacity for garment transport. Moreover, the bottleneck of river route in Cambodia resides on soft infrastructure and it will be undoubtedly time-consuming. Thus, widening this road would be a strategic movement. JICA is conducting the feasibility study for expressway.

3) NR4

The development of this section can boost domestic as well as international trading. For domestic connection, Phnom Penh – Sihanoukville would be enhanced. On the other hand, garment export from Cambodia to EU (27% in 2014) has grown higher than that to US (only 6% in 2014). Most transactions with EU took place at Sihanoukville port via NR 4 so widening this road could be a good preparation for future development. Currently, Chinese government has intention to support this road.

4) Phnom Penh ring road

Similar to other big cities such as Bangkok or Ho Chi Minh, heavy congestion remains the biggest issue of infrastructure. Hence, the government planned to construct the ring road network inside of the capital city. The project was brought into discussion with China in 2011, and Korea was also considering the possibility of support. Currently, this road construction is supported by Chinese government.

5) NR 48

Despite mountainous area, this portion provides an alternative route of NR1 and NR5 to connect with Bangkok and Ho Chi Minh. Especially, manufacturers located in Koh Kong (e.g. Yazaki) will be favorable if this road is rehabilitated. However, this road should be less prioritized compared to the others.

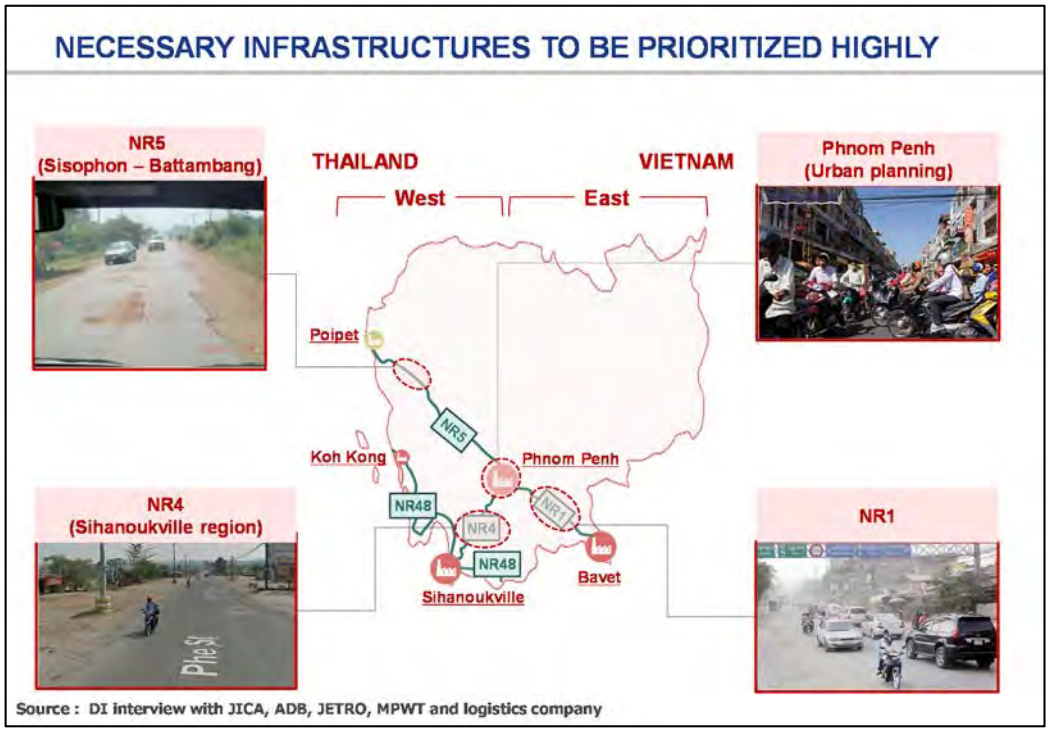

Figure 26: Current situation of prioritized projects

Chapter 4: Analysis of Laos

4-1. Basic information

4-1.1. Overview

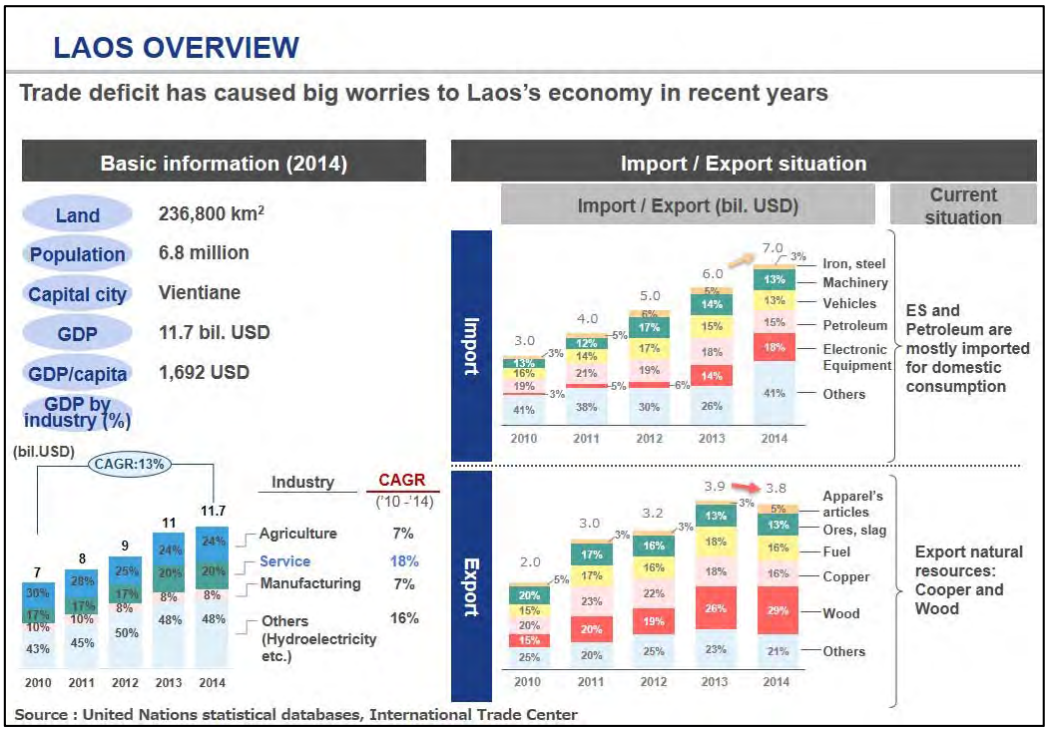

Figure 27: Overview of Laos

Being known as a landlocked and one of the poorest countries in the World, but Laos is owning plentiful natural resources and huge potential for industrial linkage that not everyone might know. Laos has such a modest amount of population at 6.8 million people, living in a large area of 235,800 km2 and the capital is Vientiane. According to ITC statistics, GDP was recorded as USD 11.7 billion by 2014, contributed mainly by agriculture (24%) among three key industries, followed by service (20%) with the highest growth rate at 18% in 5 years and manufacturing (8%). The rest as 48% was recognized for others (hydroelectricity, construction, etc). Most of natural resources have been exploited for export purpose, such as: wood and copper, while electronic equipment and petroleum are mainly imported for domestic consumption. An annual high growth rate is well captured for import sector, whereas export tends to slow down, which causes a threat to Laos's economy due to trade deficit.

Among Indochina countries, Laos is the only one border by all four remaining countries: Vietnam to the East, Cambodia to the South, Thailand to the West and Myanmar to the North West. Its strategic location opens abundant opportunities for Laos to links and trades with the

World, transforming Laos from landlocked to land-linked country which is defined as the most enormous goal by the Government of Laos.

4-1.2. Transaction with neighboring countries

According to ITC statistics, nearly USD 10 billion value of goods crossed borders with neighboring countries in 2014 proves that Laos has the possibility to connect the world. Each transaction has contributed a different role to the economy development of Laos, in short, Laos exploits its natural resources for export while equipment and vehicles are imported from Indochina countries for domestic consumption.

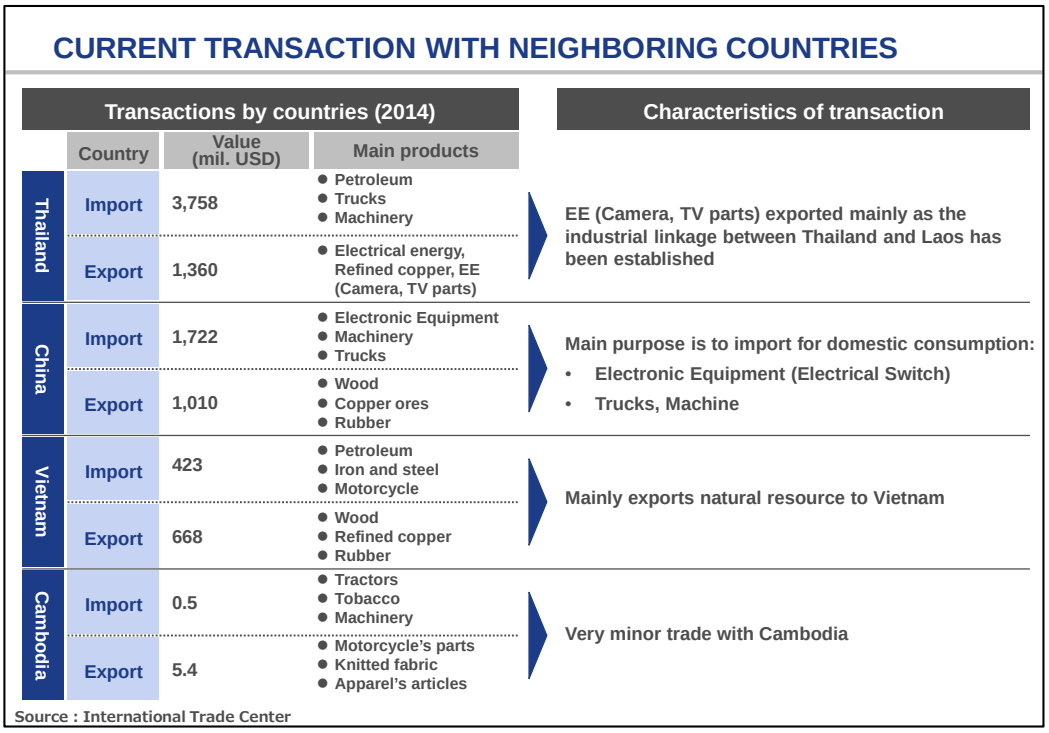

Figure 28: Current transaction with neighboring countries

- Laos - Thailand

  Half of the goods came from and to Thailand, such as: machinery, trucks or petroleum for domestic consumption and electronic equipment (camera, TV parts) or electrical energy as the industrial linkage has been established between Thailand and Laos through electronics parts.

- Laos - China

  More than sixty percent of the remains traded with China, mainly vehicles or electronic switch for domestic consumption and natural resources (wood, copper ores and rubber).

- Laos - Vietnam

  Vietnam is placed as the third largest trader among Indochina countries, which provides Laos petroleum, motorcycle and in return, it exports rubber and other natural resources from Laos.

- Laos – Cambodia

  A minor trade is recorded as the transaction between Laos and Cambodia, as Laos is bounded by Cambodia to the South with a short borderline

Figure 28 is showing overall trade landscape of promising future linkage, but it also shows a different characteristic of every single connection: Industrial linkage with Thailand, Domestic consumption with China, Exporting natural resource with Vietnam and other products for consumption with Cambodia and Myanmar.

4-1.3. Industrial allocation

Laos is always recognized as a rich country of agriculture and mining, but the Government has also invested in dams for exploiting hydroelectricity along Mekong River recently. These three industries allocate in over the country and are mentioned as key focus sectors for Laos at this point of time and in the future.

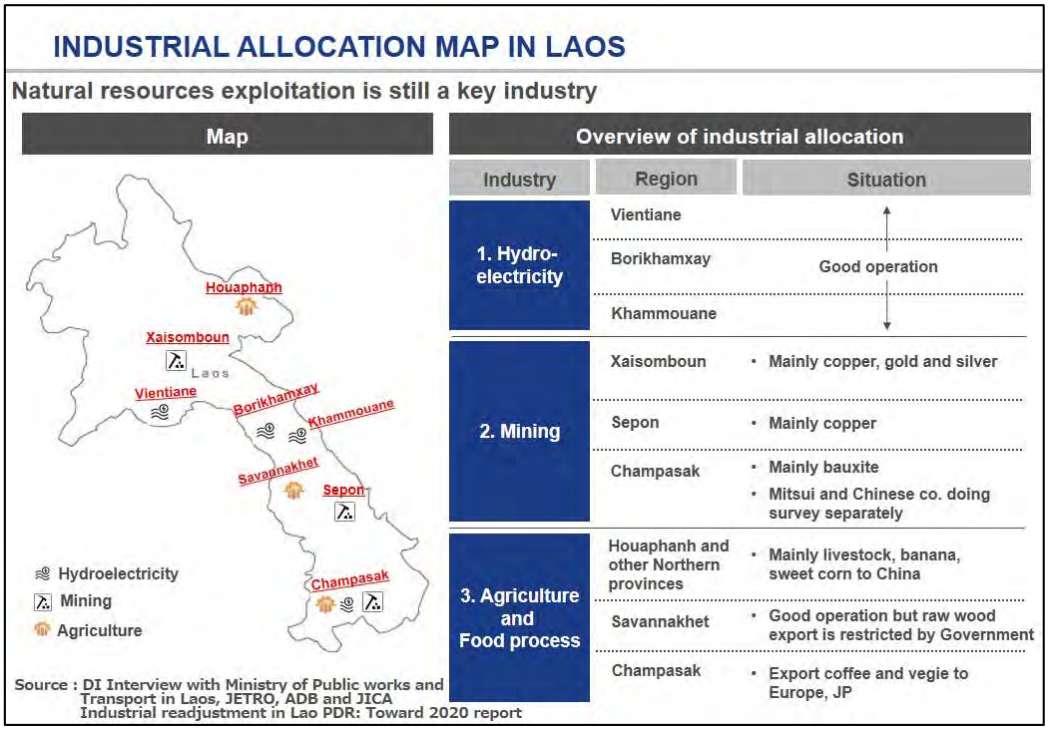

Figure 29: Industrial allocation map in Laos

1) Hydroelectricity

Laos government is focusing on new construction of hydroelectricity. Especially, in Vientiane, Borikhamxay, Khammouane and Xayaboury, large-scale hydroelectricity plant are under operation or construction. Therefore, Laos could achieve over 80% penetration ratio for electricity. In addition, most of dam projects in other areas are on-going for the purpose of export primarily rather than domestic consumption. In which, 70% is currently exported to Thailand. Given the rising importance of hydroelectricity export, ADB puts a lot of funding to transmission line facilities for export to Thailand, Vietnam, Cambodia as well as domestic line in Northern region.

2) Mining

The second prioritized industry has been indicated for Mining, which Laos has totally 170 projects implemented nationwide by most of Chinese private companies and the three biggest mine sites locate at Xaisomboun (copper, gold and silver), Sepone (mainly copper) and Champasak (mainly bauxite), where Mitsui and another Chinese firm are doing survey about this area.

3) Agriculture and Food process

Last but not least, agriculture and food process also allocate nationwide with different sector focuses, such as:

- Houaphanh and other Northern provinces: livestock, banana and sweet corn export to China
- Savannakhet: exports raw woods to Vietnam and China despite of being restricted by the Government of Laos. Instead, the Government encourages forestry plantation
- Champasak has similar geography characteristics with Lam Dong province in Vietnam, which brings a great potential for planting coffee and vegetable. On condition that, Vinacafe signs agreement with Laos to develop coffee production in an area of 1,000 ha after a project to grow around 3,000 – 5,000 ha of coffee was conducted in 2007. Besides, Tsumura in medicines industry or other Japanese vegetables firms have invested in Champasak.

4-2. Industrial master plan

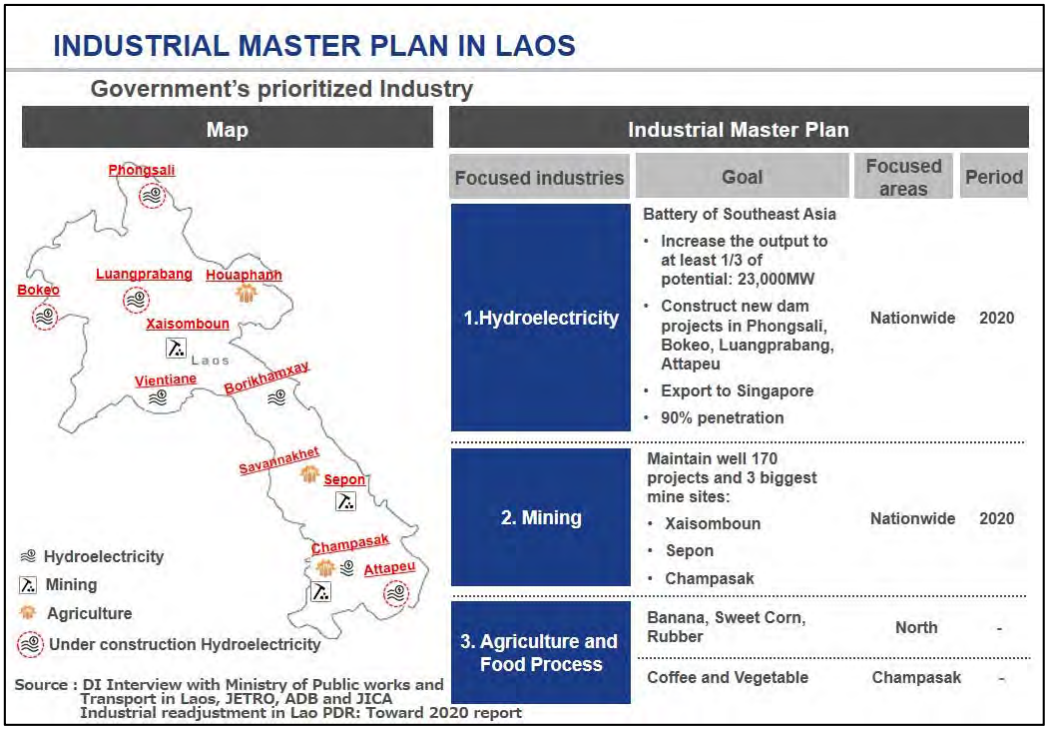

Figure 30: Industrial master plan in Laos

Hydroelectricity, Mining and Agriculture are still prioritized as the three key industries by the Government, in the next five years.

1) Hydroelectricity: In order to become a battery of Southeast Asia by 2020, Laos aims
   - Increase the output to at least one-third of potential: 23,000 MW
   - Construct new dam projects in Phongsali, Bokeo, Luangprabang and Attapeu
   - Export electricity to Singapore (currently export to Thailand and Vietnam mostly)
   - Achieve 90% penetration (as the current accessibility is 88%)
2) Mining: Maintain well 170 on-going projects and 3 biggest mine sites in Xaisomboun, Sepon and Chamapsak
3) Agriculture and food processing: Focus on producing and exporting Banana, Sweet Corn and Rubber to China in the Northern region, meanwhile, Champasak in the South is still confirmed as the area of coffee and vegetable plantation thanks to its highland geography.

Given the fact that infrastructure plays a momentous impact to industry development, the Government has shown a fundamental need of improving crucial transportation infrastructures (roadway and railway) and major SEZ.

4-3. Infrastructure master plan

4-3.1. Summary of infrastructure master plan

Approximately USD 15 billion has confirmed for the need of infrastructure development through the 7th National socio-economic development plan (NSEDP). In which, 10% - 20% come from the Government, 25% - 30% from ODA and 50% - 55% by private sector. In which, the Government has decided principal infrastructures as follow:

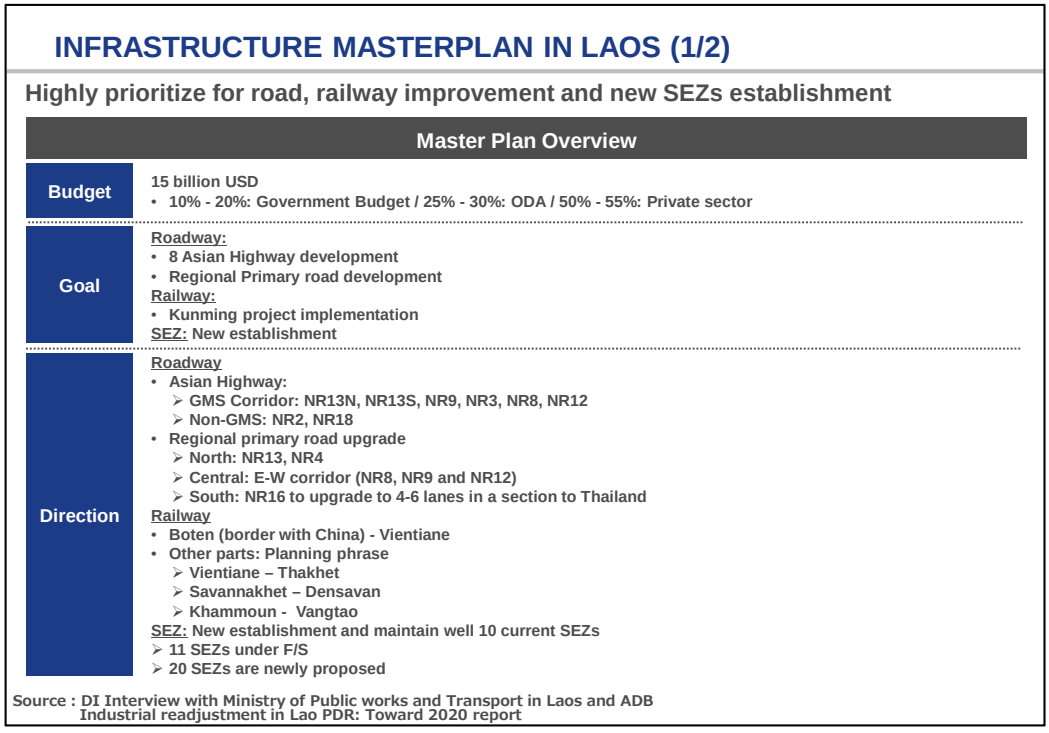

Figure 31: Summary of infrastructure master plan in Laos

- Road:
  - Develop 8 Asian Highway, including: GMS corridor (NR13N, NR13S, NR9, NR8 and NR12) and Non-GMS corridor (NR2 and NR18)
  - Follow by Asian Highway, Regional Primary Road is the second focus in each region: North (NR13, NR4), Central (NR8, NR9 and NR12) and South (upgrade to 4-6 lanes in a section to Thailand for NR16)
- Railway: Accelerate the Kunming project's implementation
  - The part from Boten (border with China) to Vientiane
  - Other parts at planning phrase:
    - Vientiane – Thakhet – Mugia: F/S by Korean government
    - Savannakhet – Densavan: F/S by Malaysian company
    - Khammoun – Vangtao

- SEZ: Manage 11 current SEZs and build up more SEZs nationwide, in which, 11 SEZs are under feasibility study and 20 SEZs are newly proposed.

4-3.2. Details of infrastructure master plan in Laos

The above plan for each infrastructure is presented in more details as below:

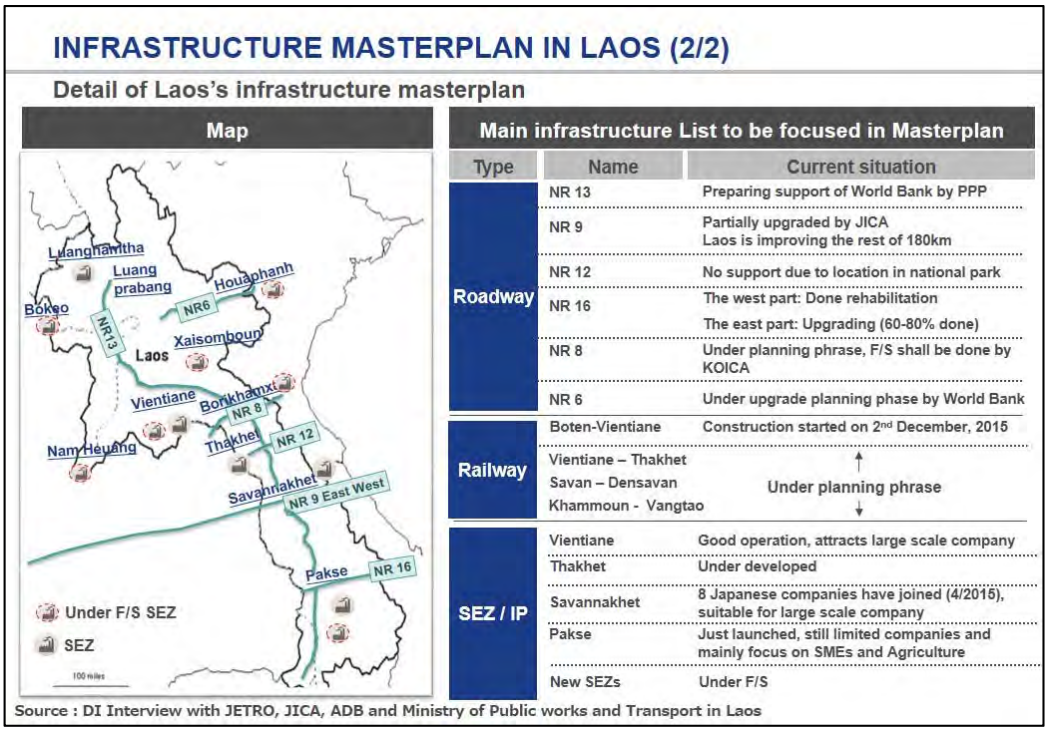

Figure 32: Infrastructure master plan in Laos

- Road:
  - NR13 is the most important highway in the country of Laos, it begins at Boten in the North of Laos, connects the city of Vientiane to Luangprabang in the North and roughly follows the line of Mekong River down to the border with Cambodia. It includes 2 main parts: NR13N (North) and NR13S (South), in order to serve domestic consumption purpose. Currently, World Bank is preparing the bidding process to support upgrading NR13 including total 100km of north and south by PPP pilot scheme.
  - NR9 belongs to the East-West Economic Corridor, an economic development program initiated in order to promote development and integration of four Indochina countries: Myanmar, Thailand, Laos and Vietnam. Therefore, JICA completed some upgrade of NR9; 3.1km (Strengthening Road Maintenance Capability Project) by technical assistance and 58.1km by grant project.

Regarding the remaining 180km, JICA is sending just technician and Laos government is upgrading by governmental budget.

- NR12 is defined as an additional part of the East-West Economic Corridor, passing Thakhet to Vung Ang port – the most critical port for transshipping products from Laos to the World and vice versa. In addition, the Government has indicated that their rising demand of using Vung Ang port could be foreseen in the future. This road has so many sharp curves and steep slopes that trucks cannot keep speed due to location in mountainous area. Under this condition, improvement demand of this road is existing, but JICA cannot support by regulation of Guidelines for Environmental and Social Considerations because 15km of this road from border with Vietnam locates in national park.
- NR16 locates down further to the South of Laos, serving transportation mostly in the Southern region which connects Thailand and Vietnam through Laos. Its western part is already rehabilitated and 60%-80% of the eastern part is upgrading. Besides, JICA is supporting to construct Sekong Bridge.
- NR8: The Government of Laos also seeks for a support from KOICA to take charge of feasibility study, in order to upgrade this route from its bumpy situation.
- NR6 connects Houaphanh (Laos) and the Northern Vietnam is now under upgrade planning phrase by Worldbank.

- Railway: Kunming project
  - Boten – Vientiane: A new railway was just decided to start the construction in early December 2015 and expected to complete by 2020. The line will start in border city Boten and travel past Luang Prabang and Vang Vieng before arriving in Vientiane with the average speed set at 160Kph.
  - The remains of Kunming project combines 3 parts is under planning phase.
    - Vientiane – Thakhet – Mugia: F/S by Korean government
    - Savannakhet – Densavan: F/S by Malaysian company
    - Khammoun – Vangtao

- SEZ: The Government of Laos plans to build up more SEZs nationwide beside 11 on-going SEZs allocate in Vientiane, Thakhet, Savannakhet and Pakse.
  - Vientiane: currently has 5 SEZs located here, having good operation in variety of projects: textile, retail, hospital, hotel, etc. It attracts most of large scale companies because of its strategic location.

- Thakhet (Khammoune): comprises 2 SEZs focus on services, such as: hotel, education, sport, etc.
- Savannakhet: has attracted 8 Japanese companies in automobile, food processing, etc in April 2015 and suitable for large scale companies.
- As Pakse SEZ was launched in September, 2015, it has limited company to join which attracts mostly small and medium entrepreneurships.

In addition, 11 SEZs under feasibility study and 20 SEZs are newly proposed nationwide in order to facilitate Laos's economy development plan.

4-4. Potential connection with neighboring countries

By all crucial infrastructures and industries that MPWT as well as other organizations: JICA, JETRO, ADB have emphasized above, the connection of Laos with Thailand, China and Vietnam should be highly prioritized. Laos shows a particular characteristic in its relationship with neighboring countries.

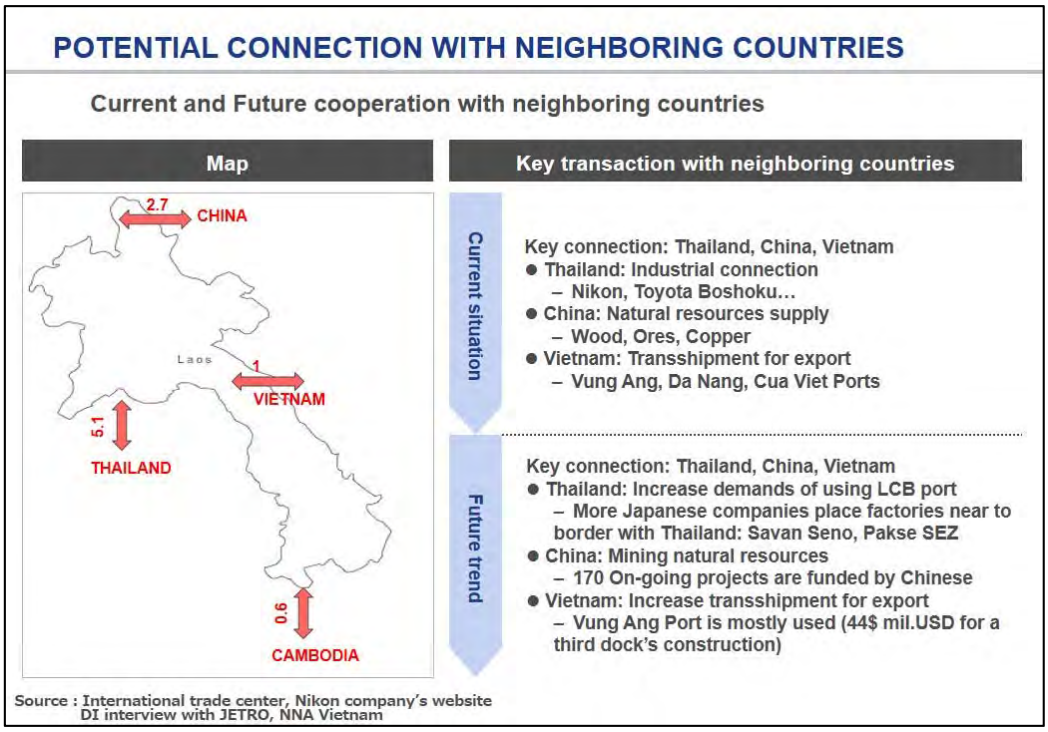

Figure 33: Potential connection with neighboring countries

A) Current situation

An infant industrial linkage has been established between Thailand and Laos, by Nikon (camera lens, others parts, etc) and Toyota Boshoku (automobile seat covers), supplying to the Thai production base. Meanwhile, Laos connects China because of providing natural

resources and Vietnam for using its ports to export products to the world

B) Future trend

- Thailand: the trend of industrial linkage between two countries might be booming in the future, since there are few of Japanese companies industry just joined Pakse in late of 2015. SEZ recently and Thailand is getting more crowded by factories, industrial zones, etc. Additionally, it is losing some points in investors' eyes due to the economic downturn and rising labor wage in recent years.
- China has been the biggest natural resources importer, accounts for nearly half of the annual resources that Laos export to the World, such as: Wood, Ores, Copper… China will not stop exploiting natural property as they are implementing to build up and strengthen 170 mining projects in total Laos country.
- Vietnam plays as a key gateway for Laos to communicate with the World. Thanks to Vung Ang, Da Nang, Cua Viet and other ports, Laos can have one step closer to other countries. Knowing its influence to the future, the Government of Laos has involved in the construction of a third dock with Vietnam (approximately 44$ million USD for the total investment).

4-5. Current bottlenecks of Infrastructure

In order to maintain well these connections with neighboring countries, key infrastructure must meet standards. However, they are having quite many bottlenecks according to our research and analysis.

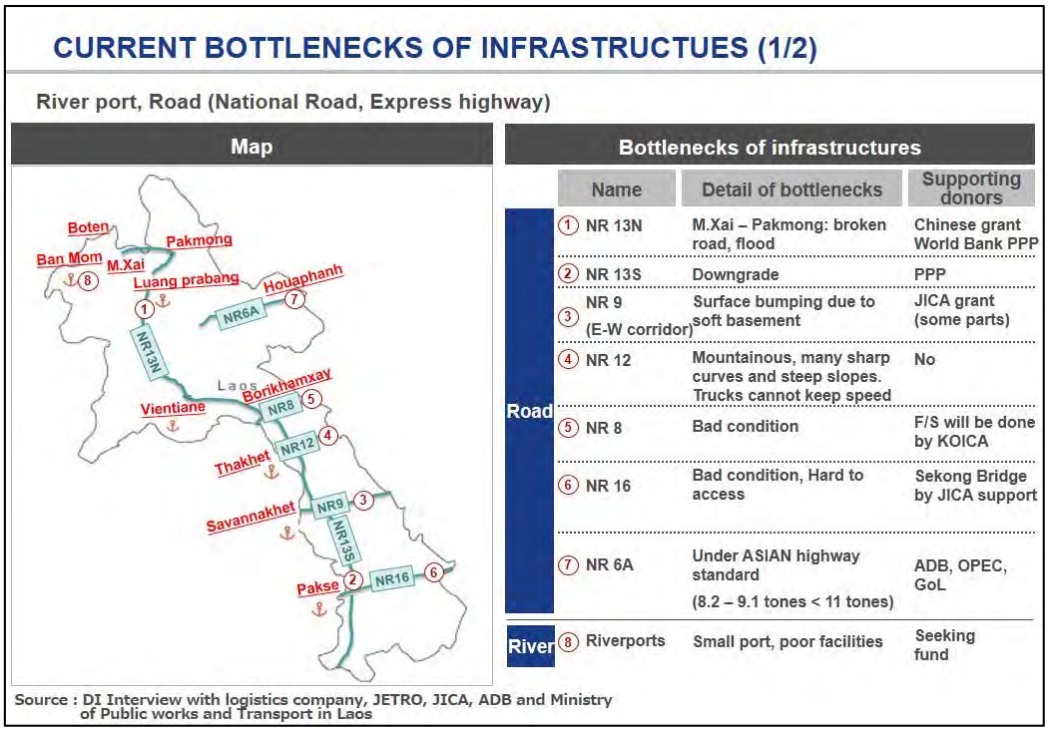

Figure 34: Current bottlenecks of road, river way

- Roadway: In general, heavily damage impacts from overloading trucks

  1) NR13N:
     - The northern part of this road has been broken and prevent to realize efficient logistics. Therefore, World Bank is preparing the bidding process to support upgrading NR13 by PPP pilot scheme.

  2) NR13S:
     - The quality of this road is also bad, and it becomes one bottleneck for domestic distribution. Under this circumstance, World Bank has plan to support upgrading partially as well as NR13N.

  3) NR9:
     - This road has surface bumping due to soft basement. JICA completed some upgrade of NR9; 3.1km (Strengthening Road Maintenance Capability Project) by technical assistance and 58.1km by grant project. Regarding the remaining 180km, Laos government is upgrading by governmental budget.

  4) NR12:
     - This road has so many sharp curves and steep slopes that trucks cannot keep speed due to location in mountainous area. But JICA doesn't have intention to support by regulation of Guidelines for Environmental and Social Considerations because 15km of this road from border with Vietnam locates in

national park.

5) NR8:
   - NR8 has a bad road condition, thus, most of transporters prefer using NR9 and NR12. Currently, the Government of Laos seeks for assistance from KOICA.

6) *NR16B:*
   - This road faces a bad road condition. Currently, local construction company is improving this road by utilizing BT scheme. Besides, 300m bridge is required to pass Sekong River in this area, so JICA starts supporting detail design and construction from 2014.

7) NR6A:
   - This road is able afford 8.2 – 9.1 tones/wheel, which is below ASEAN highway standard (11 tones). Therefore, ADB (grant), OPEC (Soft loan) and the Government of Laos are funding and upgrading.

- River way:

8) Compared with other transportations, it is less utilized than other transportations due to its poor facilities and NR13 exists for serving domestic transportation, however, the Government is still expecting support to develop river ports.

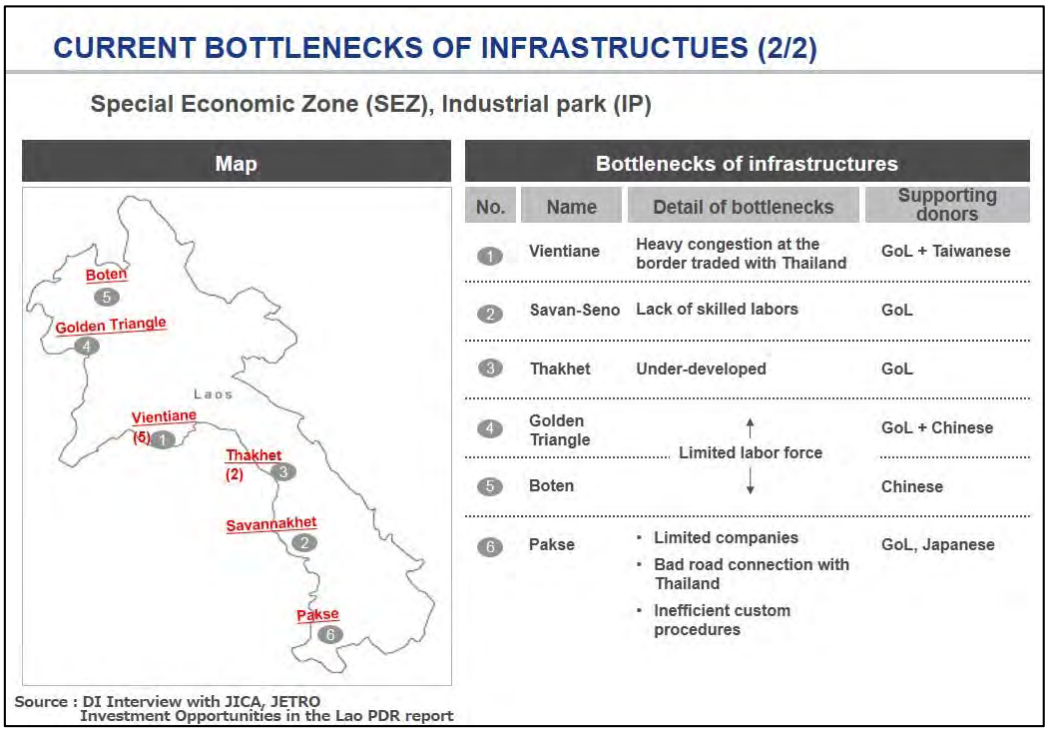

Figure 35: Current bottlenecks of SEZ

- SEZ:

According to the international institute and the economic experts in Laos, in addition to infrastructure, SEZ are also facing with obstacles: lack of skilled labor, poor hard and soft infrastructure, etc.

1) Vientiane:
   - Vientiane comprises mostly number of SEZs in Laos, which is invested by both Laos and Taiwan. Despite the fact that it is operating strongly and gradually attracts large scale companies, heavy congestion at the border with Thailand is deliberated as a critical matter for further industrial linkage.
2) Savan-Seno:
   - This SEZ locates in Savannakhet, where Nikon and Toyota Boshoku place their factories to produce camera parts and car seat covers. In these factories, only labor intensive process is proceeded, then ship them to Thailand for final production. Due to skilled labor shortage, Nikon has faced objection from the global users as they don't trust Laos worker's capability.
3) Two SEZs locates in Thakhet (Khammoune)
   - These two areas are approved as SEZ for the purpose to attract service industry, but still under-developed and are struggling to attract investors.
4) Golden Triangle and Boten SEZ:
   - Above two SEZs have labor force restraint due to the majority of population allocate in Vientiane, Savannakhet, etc. Therefore, they are also struggling to attract investors.
5) Pakse SEZ:
   - Many investors already entered or decided to enter this SEZ in the end of 2015. For example, bike starter by Shindengan, Kimono dress by Ando, artificial hair by Feather, automobile parts by Yamato Industry and precision coil by Japantech establish production base. Most of raw materials are imported and exported via Laem Chabang port instead of seaports in Vietnam due to the inefficient custom procedures (it requires hard documents submitted at the border with Vietnam, which is basically farer than the border with Thailand). In addition, still limited companies enter Pakse SEZ as it was launched in September, 2015 and the road connection with Thailand (from Bangkok to Pakse) is downgrade, causing freight from Thailand to go up Savannakhet, then follows NR13 to Pakse instead of using NR16.

Moreover, SEZs in Laos are pressured by both external and internal factors:

- External factor: Thailand tries to push its SEZs to the borders with neighboring countries, attracts labors from Laos by high pay.
- Internal factor: Besides low competency and management, Laos tries to increase minimum wage due to inflation at this stage which may cause difficulties to investors.

4-6. Current schedule projects by donors

In order to facilitate "Land-linked" strategy, the Government of Laos together with other supporters: JICA, ADB, KOICA, NEDA, etc or private sectors have discussed detailed plans for develop each transport infrastructure, which are visualized in this map with different colors in correspondence with each infrastructure's development (roadway by green, railway by orange, bridge by purple, river way by red and air way by blue).

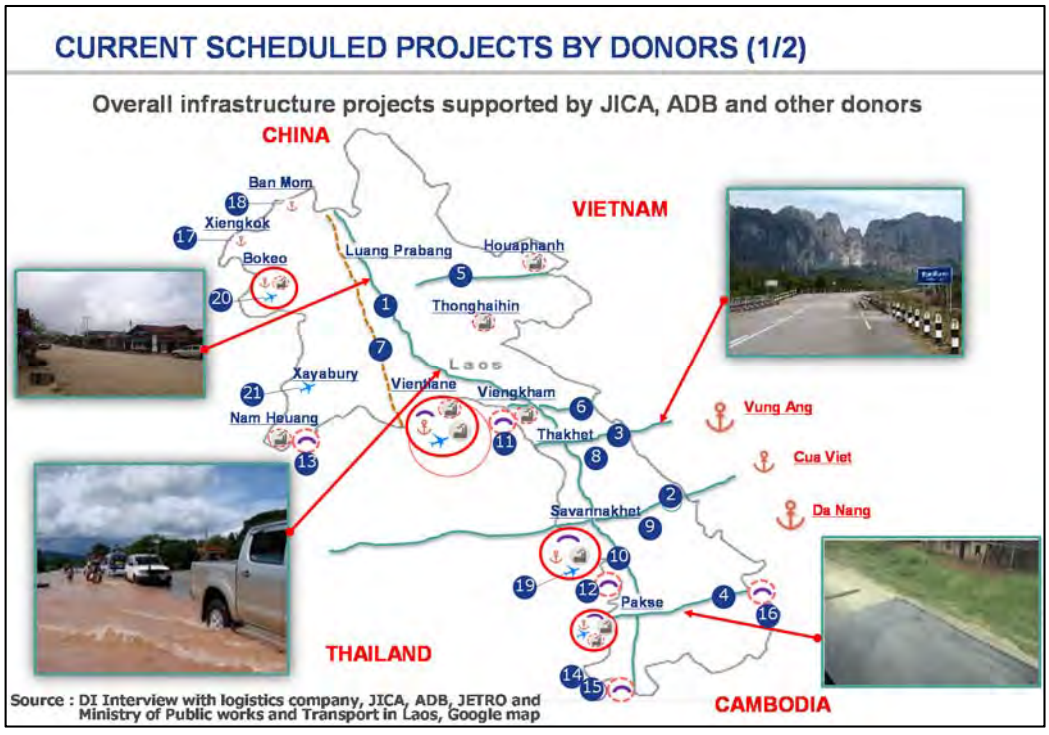

Figure 36: Current scheduled projects by donors

NR13 is still the most concerned route of Laos, more than five projects are implemented to upgrade condition of this road, with a main purpose of serving national transports. Other primary routes are also mentioned in the list: NR9, NR12, etc. Besides roadway, Laos also has conducted some projects to develop other transportation infrastructures

- Bridge: Most of bridges are built in Laos for friendship purposes with Thailand mainly

and are under planning phrase

- River port plays a minor role in term of freight transportation, however, Laos still suggests new construction in Xiengkok, Ban Mom and other regions.

Airport is primarily served for tourism purposes such as: Luang prabang, Vientiane, etc and more new airports in Thongphung, Xeno and Xayaburi are constructed by China

Further details of important projects are listed as below.

Table 3: List of current projects in Laos

Type	No.	Name	Detail	Total Amount (Mil USD)	Donor	Completion	Status
1. Road	1	NR13N (Xai - Pakmong)	Upgrade	82	China's grant	2017	38% done (01/2015)
		NR13N (Pakmong - Louangprabang)	Upgrade	70	NEDA (under negotiation)	N/A	F/S currently but not sure who
		NR13N Bypass (KokNgiew - Phnonxai)	Upgrade	22	BT	2015	On progress
		NR13N (Vangvieng - Ban Sikuet)	Upgrade	N/A	PPP (ADB)	2020	Done F/S
		NR13S (Lak21 - Paksan)	Upgrade	N/A	PPP (ADB)	2020	Done F/S
	2	NR9 (E-W Corridor)	Upgrade	44	GoL	2015	Under rehabilitation
	3	NR12 (A part of E-W Corridor)	Upgrade	N/A	N/A	N/A	N/A
	4	NR16 (Vangtao - Pakse)	Upgrade	31	BOT	2014	Done
		NR16 (Pakse - Sekong)	Upgrade	N/A	N/A	N/A	Done rehabilitation in 2015 (5 mil.USD) but not yet upgraded
		NR16A	Upgrade	45	BT	N/A	84.4% done (08/2014)
		NR16B	Upgrade	44	BT	N/A	60% done (01/2015)
	5	NR6A (Dan - Sopbao)	Upgrade	6.1	Worldbank	2014	Done upgrade
		NR6A (Dan - Sopbao)	New bridge construction	0.5	N/A	N/A	Under planning phase
		NR6A (Hanglong - Sopbao) + NR6B	Expand from 4m to 6m	42	ADB, OPEC	2017	In progress
	6	NR8	Upgrade to Asean standard	80	KOICA	2018	Under planning phase, KOICA shall do F/S
2. Rail	7	Boten-Vientiane	New construction	7,000	The Import-Export bank of China	2023	Construction will be started on 02/12/15
	8	Vientiane-Thakhet-Mugia	New construction	N/A	KOICA		Under F/S
	9	Savannakhet - Densavan	New construction	40	Giant consolidated Ltd (Malaysian)		Under planning phrase by MOU
	10	Khammouan-Vangtao	New construction	N/A	N/A		Korean company conducted F/S in 2012 but currently stop
3. Bridge	11	Laos - Thailand friendship	New construction	101	GoT, GoL		Under planning phase
	12	Laos - Thailand friendship	New construction	N/A	N/A		Under planning phase
	13	Laos - Thailand friendship	New construction	23	BOT		61% done (01/2015)
	14	Dongkhong Mekong	New construction	34	The Import-Export bank of China, GoL	2014	Done
	15	Selamphao	New construction	30	GoL, GoC	2020	Under planning phase
	16	Sekong	New construction	22	JICA	2018	On Progress
4. Riverport	17	Xiengkok	New construction	15	N/A	2017	Under planning phrase, for trading/tourism with Thailand
	18	Ban Mom	New construction	12	N/A	2017	Under planning phase, for trading between Thailand and China
5. Airport	19	Thongphung	New construction	500	BT	2016	Under planning: Contract signed in 2012
	20	Xeno	New construction	100	China		Under planning
	21	Xayaburi	New construction	N/A	Not yet defined		Under planning: Thailand and GoL are doing F/S

Source：ADB, JICA, JETRO (Infrastructure Map), DI interview with JICA and ADB

4-7. Necessary infrastructures to be prioritized highly

On-going and newly proposed projects listed above have proven the importance of infrastructure to the economy development in Laos. Transport infrastructure is not only to serve domestic consumption, tourist but also to connect Laos with neighboring countries. To transform Laos from landlocked to land-linked nation is to improve infrastructure. On the basis of interviews with governmental officer, international institutes and logistics companies, we would like to suggest crucial infrastructures as below

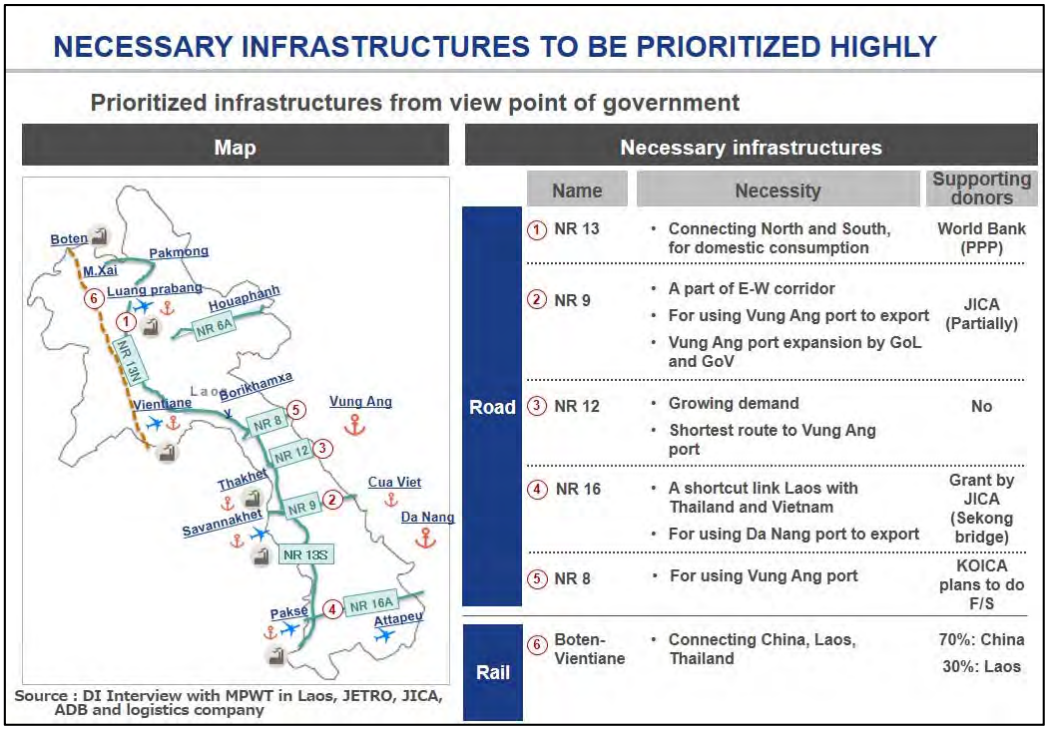

Figure 37: Necessary infrastructure to be prioritized highly

1) NR13:

This road is nominated as the most crucial served for domestic consumption in Laos, which draws attention from a lot of investors. This route comprises 5 main parts: 13N (Xai – Pakmong, Pakmong – Luang Prabang, KokNgiew – Phonxai, Vangvieng – Ban Sikuet) and 13S (Lak21 - Paksan), which are supported by China, NEDA, PPP supported World Bank, etc.

2) NR9:

NR9 is second priority after NR13 as it is a part of East – West corridor through interview with local logistics companies and international institutes. Besides, this road is considered to become more important due to high demand of utilizing Vung Ang port. This road has surface bumping due to soft basement. Therefore, JICA completed some upgrade of NR9; 3.1km (Strengthening Road Maintenance Capability Project) by technical assistance and 58.1km by grant project. Regarding the remaining 180km, JICA is sending just technician and Laos government is upgrading by governmental budget.

3) NR12:

NR12 is pointed out as the shortest route to connect Laos with Vung Ang Port. Currently, this road has so many sharp curves and steep slopes that trucks cannot keep speed due to location in mountainous area. But around 15km of this road from border

with Vietnam locates in national park. Therefore, JICA doesn't consider to support due to Guidelines for Environmental and Social Considerations in JICA.

4) NR16:

NR16 will be shortcut link Laos with Thailand and Vietnam, in order to use Leam Chabang and Da Nang port if this route is able to afford rising demands. This road faces a bad road condition. Currently, local construction company is improving this road by utilizing BT scheme. Besides, 300m bridge is required to pass Sekong River in this area, so JICA is supporting bridge construction from 2014.

5) NR8:

This road connects to Vung Ang port besides NR12, its feasibility study is still under negotiable between Laos government and KOICA.

6) Boten – Vientian railway:

This railway plays a very critical role to accelerate the transaction among Laos, China and Thailand besides roadway. In the end of 2015, the Government has finally come to a final decision of starting the construction from Boten to Vientiane. It is expected to implement in December 2015 with a total investment of 7 billion USD, contributed by 30% from Laos and 70% from China. Other small parts in the central of Laos are still under planning phrase.

Chapter 5: Analysis of Myanmar

5-1. Basic information

5-1.1. Overview

Myanmar is a sovereign state in Southeast Asia, bordered by Bangladesh and India to the west, China to the north east, Laos and Thailand to the east. According to World Bank statistics, its land reaches 676,578 km^2 and 51 million population recorded by 2014 with the capital known as Nay Pyi Taw. The country of golden temples is also one of the world's most diverse countries in terms of rich history and panoply of cultural as well as religious traditions. By 2014, its GDP was captured at USD 64 billion of which service sector had the most contribution (32%), followed by agriculture, manufacturing and others (Statistics data in World Bank and ITC). The tendency of gradually industrialized country transformation could be observed in the past five years, proven by a modest growth rate of agriculture sector at 4% compared with 2010.

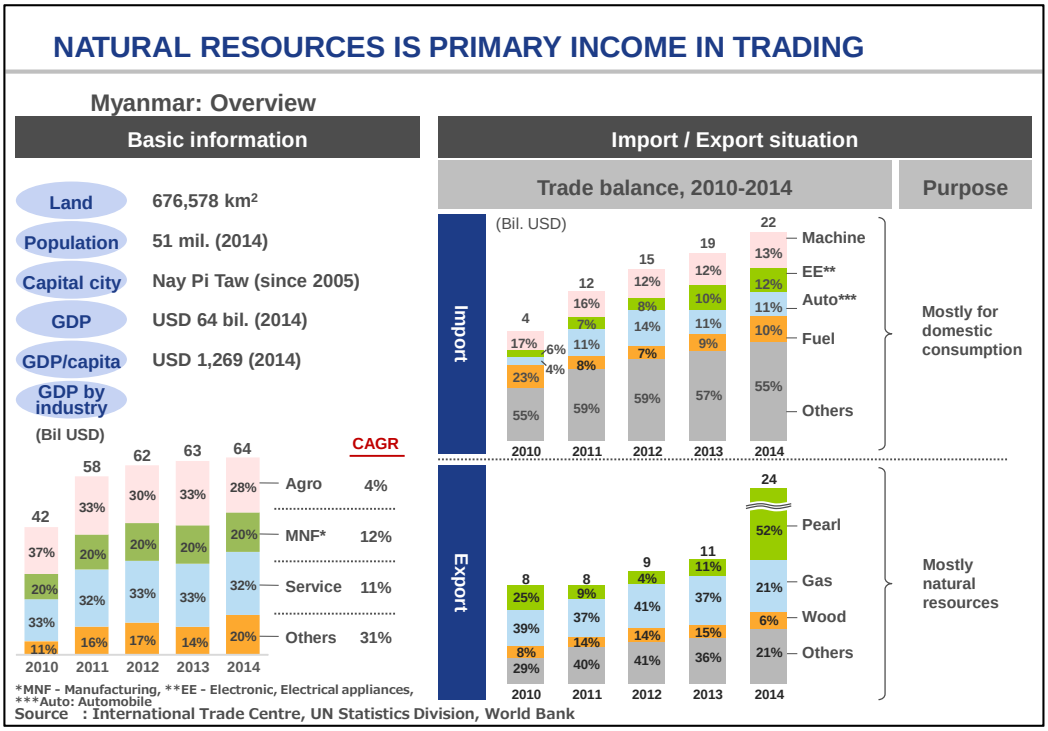

Figure 38: Overview of Myanmar

According to ITC statistics, the substitution of trade deficit for trade surplus in 2014 was acknowledged by a significant export value of pearl, accounted for more than 50%[1] of total

[1] According to ITC statistics, export amount of pearl increased rapidly from 2013 to 2014. On the other hand, custom statistics data in each country doesn't always include illegal trade. Therefore, export data might be different between some sources

products to export. Beside pearl, wood and gas are also mostly exported products to the world while this country imports fuel, automotive and electronic appliances for domestic consumption. In short, natural resources are primary income in trading of Myanmar with other countries.

5-1.2. Transaction with neighboring countries

Given its long coastline and large mainland, Myanmar has many advantages of trading with neighboring countries. Every transaction represents for a different characteristic, which could be natural resources trading, industrial linkage or domestic consumption.

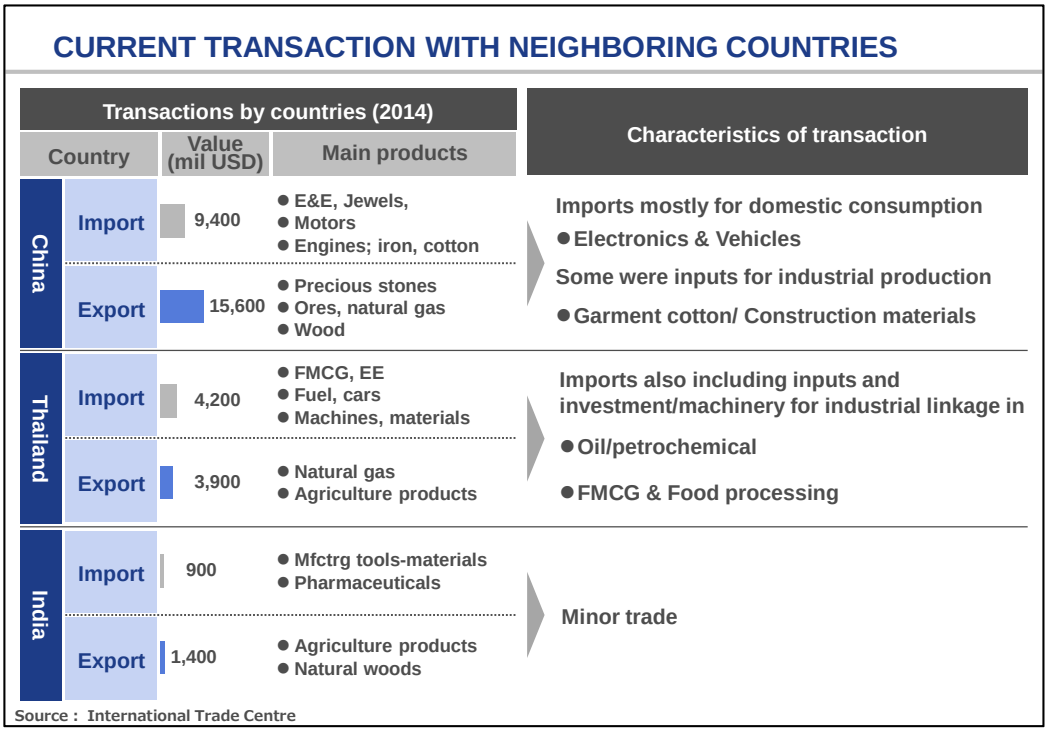

Figure 39: Current transaction with neighboring countries

- Myanmar – China:

  Among them, China has the most frequent interaction with Myanmar, more than 50% products trading come from/to China in 2014, mostly precious stones, ores, gas etc. to export and electronic, vehicles imported for domestic consumption or garment cotton/construction materials for industrial production.

- Myanmar – Thailand:

  An industrial linkage has been established between Myanmar and Thailand in oil/petrochemical and FMCG/Food processing, about USD 8 billion value of products traded in 2014 in order to facilitate this commercial exchange of two countries.

- Myanmar – India:

  Whereas, transaction with other countries: India, Laos or Bangladesh captured a very minor trade, for instance, approximately 5% products traded with India which comprises 60% export agriculture products and natural woods, 40% import manufacturing tools and pharmaceuticals.

5-1.3. Industrial allocation

According to the Myanmar Government's 2015-2030 Industry Policy under establishment by Ministry of Industry, Myanmar is aiming at transforming its agriculture-based economy to an industrial economy by 2030 by leveraging industrial clusters and service centers across the country. As illustrated in Figure 40, except Chin State, all current agriculture-focused regions will be revolutionized to industry and services centers by 2030 for example Sagaing, Magwe, Shan, Bago, Ayeyarwaddy, Mon. Yangon and Mandalay will be the two strategic locations for industrial development.

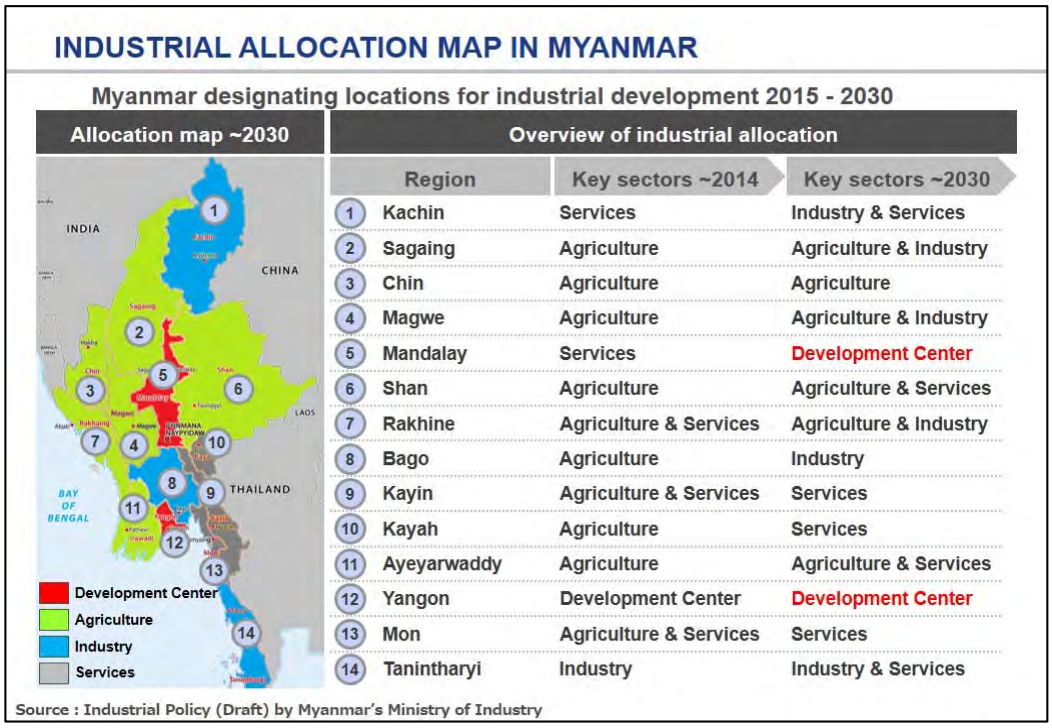

Figure 40: Industrial allocation map in Myanmar

5-2. Industrial master plan

Based on its latest industrial policy which is under planning, the Ministry of Industry in Myanmar has the vision to become a modern industrial nation with target industrial (Manufacturing, Electricity, Energy, Construction and service) contribution to GDP of 37% by

2030 as compared to 33% in 2013-2014. For that purpose, the Government has recently drafted the industrial master plan for the development during the period 2015-2030. However, the current plan has not specified the detail areas for development except general indication of two polar growth centers for manufacturing industries namely Yangon and Mandalay.

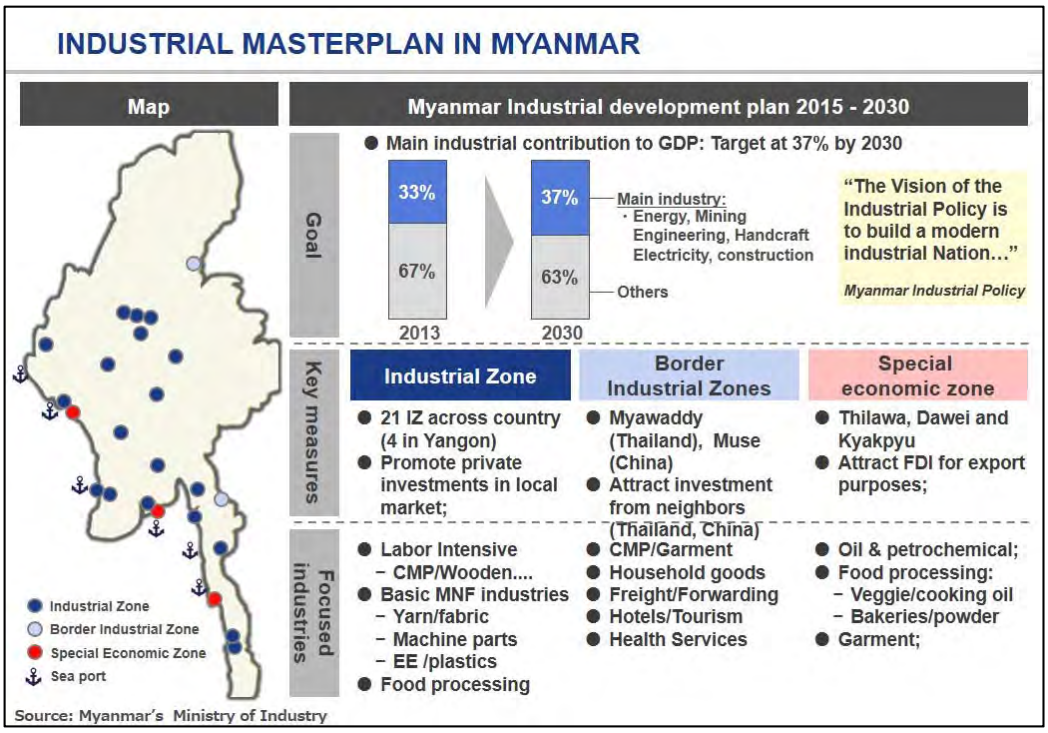

Figure 41: Industrial master plan in Myanmar

Under the new industrial policy, the country will establish several type of industrial clusters include industrial zones, border industrial zones and SEZs

A) Industrial zone: 21 will be established across the country of which 4 located in Yangon. These zones aim to promote private investment that serves the local market. At this stage, light industry will be targeted with not very high value added products that include labor intensive production for construction materials, wooden related works; basic manufacturing like yarn/fabric, machine parts and electrical electronics; and food processing.

B) Border industrial zone: develop in 2 key borders Myawaddy with Thailand and Muse with China. Target of these border zones is to attract Thailand and Chinese investors. Industry focus mainly to attract labor-intensive production outflow from neighboring countries such as construction materials, garment, household goods, freight/forwarding, tourism and health related services.

C) SEZ: plan to establish 3 SEZs in 3 key future ports namely Thilawa, Dawei and Kyakpyu. Key industry group will be target comprising oil & petrochemical; food processing for

veggie/cooking oil, bakery powder; and garment.

- Among three SEZ, Thilawa is the most promising are and located just 20 km away from Yagon. This SEZ represent the cooperation between Myanmar and Japanese Government. The project were developed by a joint venture called Myanmar Japan Thilawa Development Ltd., which each Government contributed 10% and private Japanese and Myanmar consortium devoted remaining stakes. In September 2015, 400 hectares in phase 1 of this industrial complex has commenced with commitment from 41 companies mainly from Japan. The companies invested in mainly labor intensive with diverse sector from garment, automobiles parts, and electric devices to industrial machinery and consumer products.
- Dawei SEZ is indeed long term to realize until the establishment of gigantic deep-sea port. Possible industry target for this cluster mainly heavy industry switching from Thailand namely oil and petrochemical.
- Kyakpyu SEZ gets attention mainly from Chinese companies. The area is strategic location for China to gain convenient access to India Ocean and reduce its reliance on narrow Malacca Strait. China plan to transform this area as oil and gas hub with investment in pipeline. With the fear of China possession, the Government has been carefully selected the developer with many postpone for the announcement. However, still no information regarding to the winner have been confirmed.

5-3. Infrastructure master plan

5-3.1. Summary of infrastructure master plan

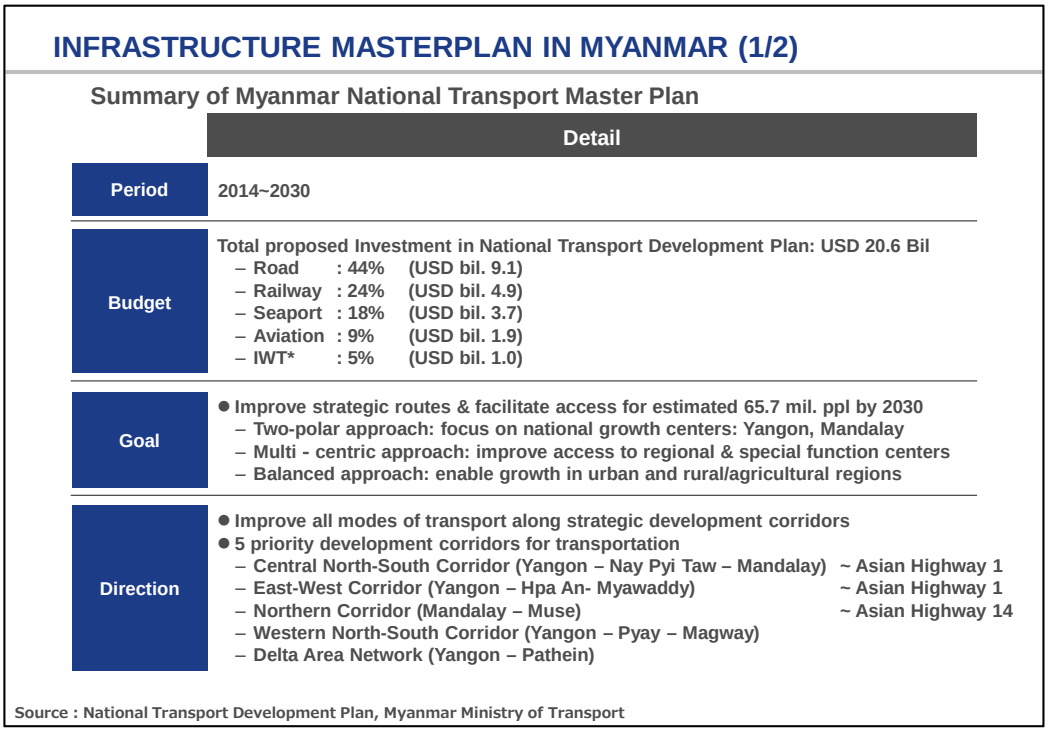

Figure 42: Summary of Myanmar National Transport Master Plan

According to Myanmar National Transport master plan for the period 2014 – 2030, the Government proposed total investment budget amounted to USD 20.6 billion. Road consume highest proportion with 44% budget (USD 9.1 billion), railway rank second place with 24% (USD 4.9 billion), seaport require 18% (USD 3.7 billion), and remaining budget of 14% (USD 2.9) dedicated for aviation and inland waterway.

The ultimate goal for national transport development is to strengthen the strategic routes and facilitate future assess for estimated 65.7 million people by 2030. To fully achieve the goal, the Government identifies three approaches: two-polar, multi-centric and balanced approach.

- Two-polar approach: indicate Myanmar focus on developing national growth centers namely Yangon, Mandalay.
- Multi-centric approach: plan to improve regional access and connection with special function centers
- Balanced approach: enhance infrastructure network to enable growth in urban and rural or agricultural regions.

In detail, all modes of transportation along the 5 strategic development corridors will be prioritized to improve. That comprises road network originate from Yangon, Mandalay to other

key areas namely Central North-South corridor (Yangon – Nay Pyi Taw – Mandalay) and East-West corridor (Yangon – Hpa An – Myawaddy) as part of Asian highway 1, Northern corridor (Mandalay – Muse) from Asian highway 14, Western North-South corridor (Yangon – Pyay – Magway) and Delta area network (Yangon – Phathein).

5-3.2. Detail of infrastructure master plans

Understand the necessity of infrastructure development to economic growth, the Government intends to rehabilitate or construct almost key infrastructure that reinforce connection to main cities, key industrial hub and ports.

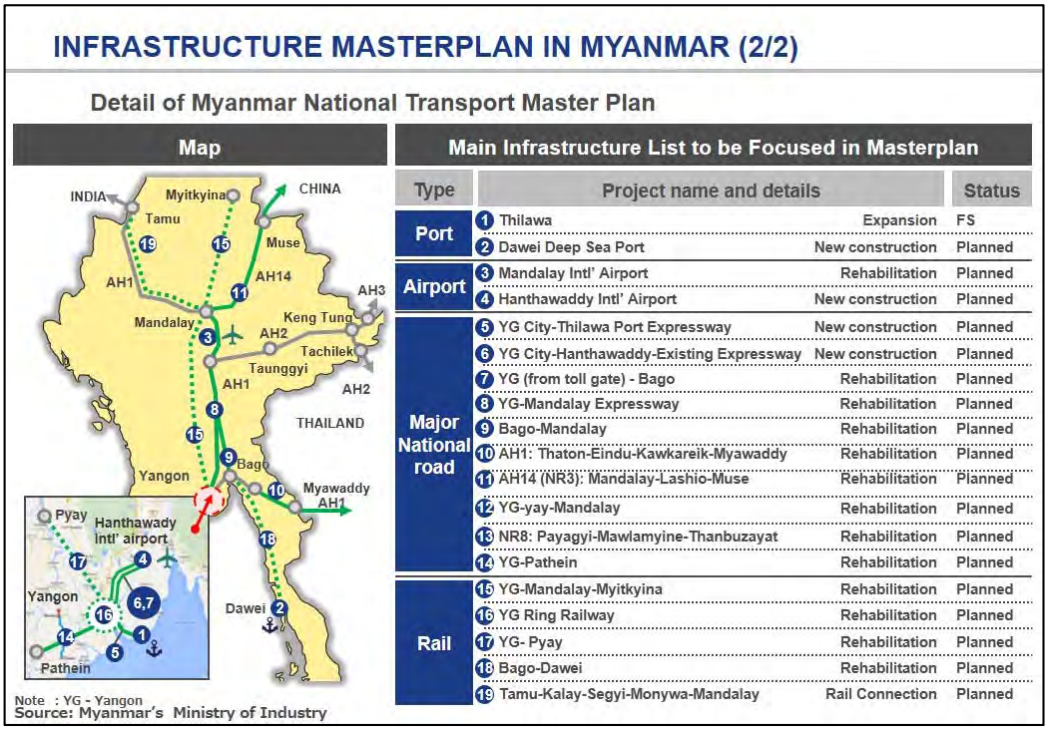

Figure 43: Myanmar National Transport master plan

The detail plan covers port, airport, road and rail as listing below:

- Port: consider the expansion of Thilawa port and new construction of mega deep sea port – Dawei.
  - Thilawa port: JICA conducted feasibility study and supported funding for developing Thilawa port and surrounding infrastructures. MOT plans establishment of new five terminals here to facilitate international shipping given the predicted potential demand from Thilawa SEZ.
  - Dawei deep sea port: this mega port, with 20 meter deepth in plan, will serve not only demand from Myanmar but also demand Indochina region to

European region. Presently, this project stay at planning stage and is not prioritized by the Government. Due to the fact that Dawei locate quite remote to Yangon, development of infrastructure and urbanization here are the most difficult tasks for the Government and required long period. According to interview with JICA Myanmar and local logistics companies, it is difficult to estimate future transportation demand of this port. Therefore, given the unsure demand and massive investment (USD 2.4 billion), the project struggle to approach the funding sources. Among all, Thailand is the most beneficial party given the port is shortest pathway to Europe but still recluctant to invest alone. Instead, Thailand would like to co-invest with other sponsors but still no partner yet. In 2015, Japanese government shows intention to support Dawei development.

- Airport: the Government intends to rehabilitate Mandalay international airport and build new Hanthawaddy international airport to boost air transport.
  - Mandalay airport: the project aim to improve capacity from 3 million pasenger to 15 million passenger per year. The expansion cost USD 100 million and will be constructed by joint venture between Mitsubishi, JALUX and subsidiary of local conglomorate – Yoma Strategic Holding Inc.
  - Hanthawaddy airport: the new airport was determined to replace current Yangon airport in the future. In October 2015, the USD 1.5 billion project was appointed to new contractor includes Singapore's Yongnam Holdings, Changi Airport Planners and Engineers, and Japan's JGC Corporation due to Government's disagreement with old contractor. The Government recently annouced the project delay till 2022 from initial planning in 2020, due to insufficient fund.
- National road:
  - Several projects plan to enhance city conneciton, city to key zone, city-city, port, airport and border. In detail, 2 express highway will be newly built linking Yangon to recent inaugurated Thilawa SEZ and future Hanthawaddy international airport. For expressway to new airport, estimated USD 620 million for phase 1, 2 groups from Korea and Myanmar conglomerate – Capital Diamond Star Group has recently proposed to MOT as the contractor.
  - Rehabilitation will be conducted in other roads which comprises city – city connection Yangon – Mandalay express way, Bago – Mandalay), border connection (Asian highway 1 via Mywaddy, Asian Highway 14 from Mandalay to Muse) and provincial area connection (NR 8, Yangon – Pathein).

Another project that pass through Dawei (Thanbyuzayat – Dawei – Myeik – Kawthong) was proposed by Government to JICA to seek finance and technical assistant which is under F/S study.

- In addition, according to the official news in Myanmar (Myanmar times) in November 2015, , JICA proposed to build 2 ring road around Yangon in 5 years and expect 20% contribution from Government as part of Yangon master plan to 2040.

- Rail: Most projects are to rehabilitate the existing railway of which 2 key projects cover Yangon – Mandalay and Yangon circular railway.
  - Yangon – Mandalay: JICA sponsored USD 202 million loan to modernize this route that include replacing aging facilities and equipment. The project will shorten 14 hours travel time to half with average speed increase to 60 km/h from current 40 km/h. Phase 1 is in process and expected to finish in 2021.
  - Yangon circular railway: JICA is also donor to upgrade this train by offering 250 million USD loan. The work include substituted new trains and signaling system, aim to meet demand from rising population.
  - Other projects include connection from Mandalay to Myitkyina, Mandalay – Tamu, Yangon – Pyay and Bago – Dawei would be less prioritized. Rail link from Mandalay to Myitkyina mostly depend on agriculture production and close to China, which seems to be less priority from viewpoint of JICA. Likewise, Mandalay – Tamu part is more favorable for India. Bago – Dawei connection would take long time until the realization of Dawei port

5-4. Potential connection with neighboring countries

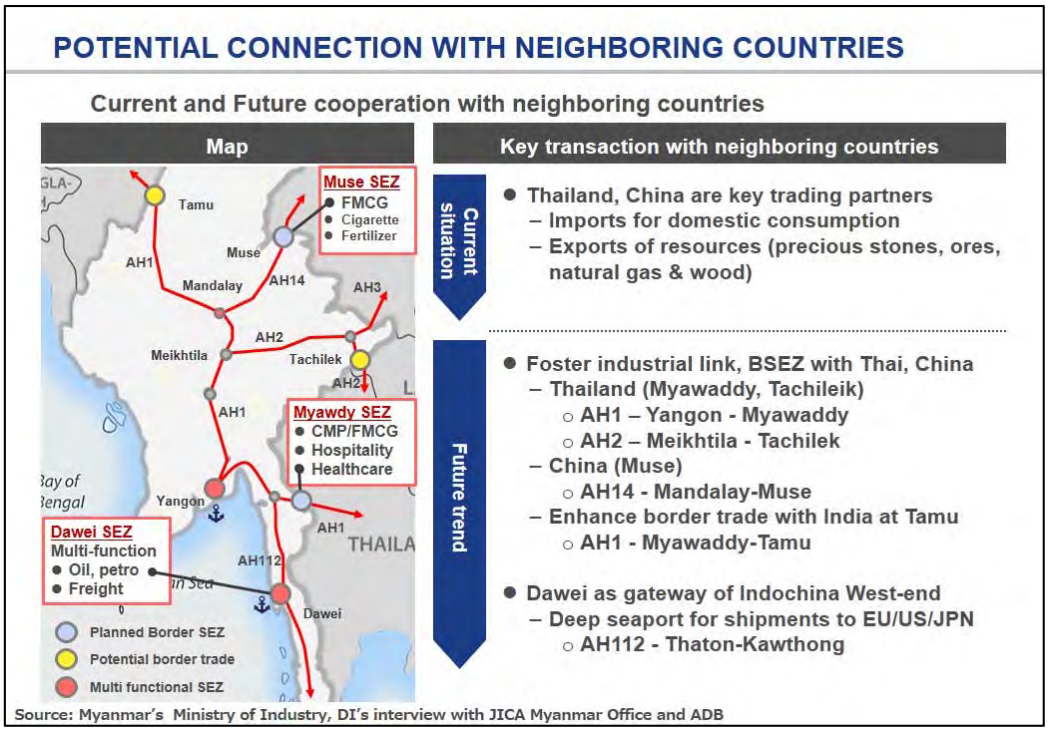

Figure 44: Potential connection with neighboring countries

A) Current situation:

The comprehensive landscape of Myanmar above has shown the current trend and the future cooperation between Myanmar and other countries. A multiplicity of goods crossed traded with China and Thailand annually, proving these two countries have a big influence to the economy of Myanmar. Imported products from China and Thailand mainly for domestic consumption, in return, they exploit natural resources which are precious stones, ores, natural gas and wood

B) Future trend:

The trend might still prevail in the future, however two new potentials would come about:

1. Foster industrial linkage with Thailand (Myawaddy, Tachileik) and China (Muse), particularly to utilize AH1, AH2 to Thailand and AH14 to China. In addition, the border trade with India at Tamu will be also enhanced
2. Dawei will be a gateway of Indochina West-end since this deep seaport serves shipment to EU/US.

5-5. Current bottlenecks of infrastructure

A growing economy always requires good infrastructure and notable investment in this area. To create a strong connecting hub in Indochina region, it is important to identify infrastructure

issues that not only threaten the potential trade of Myanmar with neighboring country, but also limit their country development. Hence, several bottlenecks have been raised below to be considered.

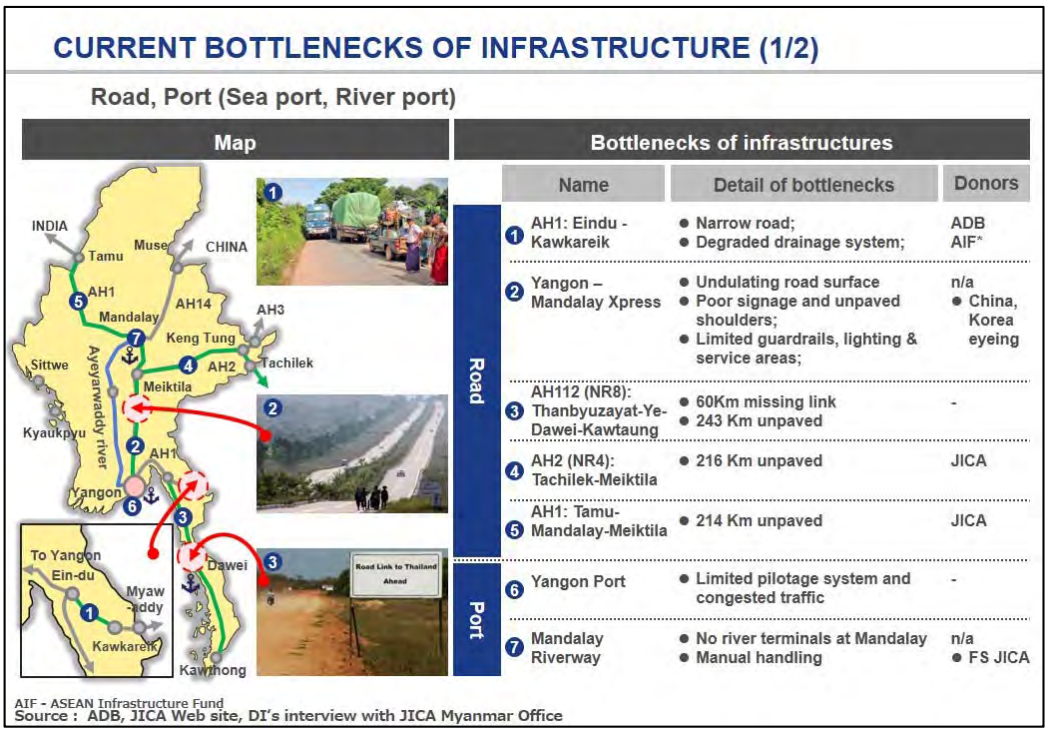

Figure 45: Current bottlenecks of road and port

- <u>Road:</u>
  1) Asian highway 1 (AH1):
     - AH1 connects Eindu with Kawkareik. Poor road surface and limited pavement (only 4.5-5.5m wide) are recognized for this route. Some parts do not have enough paved shoulders which slow down speed from vehicles passing by. Along this road, many degraded bridges and cross pipe culverts exist lead to inadequate drainage. Currently, the road is under rehabilitation which funded by ADB.

  2) Yangon – Mandalay expressway:
     - This road opened in 2009, the road is suffering the high accident rate due to poor road condition and necessary safety facilities in international standard. Notable issues comprise undulating road surface, lack of warning sign, unpaved shoulders, limited guardrails, as well as lighting and service areas. The Government is inviting bidders which Chinese, Korean companies show interest.

3) Asian highway 112 (AH112):
   - AH112 also called as NR 8, which connect Thanbyuzayat, Ye, Dawei and Kawtaung. The section has 60 km missing link and 243 km unpaved road.
4) *Asian highway 2 (AH2)*:
   - AH2 is the part of NR4, for the route Tachilek – Meiktila. This part incurred 216 km unpaved road.
5) Asian highway 1 (AH1):
   - Alike AH2, about 214 km unpaved road noticed from the road starting from India border Tamu to Meiktila via Mandalay.

- Port:

6) Yangon Port
   - With current limited pilotage system, the port incurred heavy congestion caused by the chaotic ship travel to this port.
7) Mandalay river way:
   - There is no river terminal at Mandalay and lack of handling facilities cause inefficient manual method. JICA is supporting the feasibility study for this port terminal.

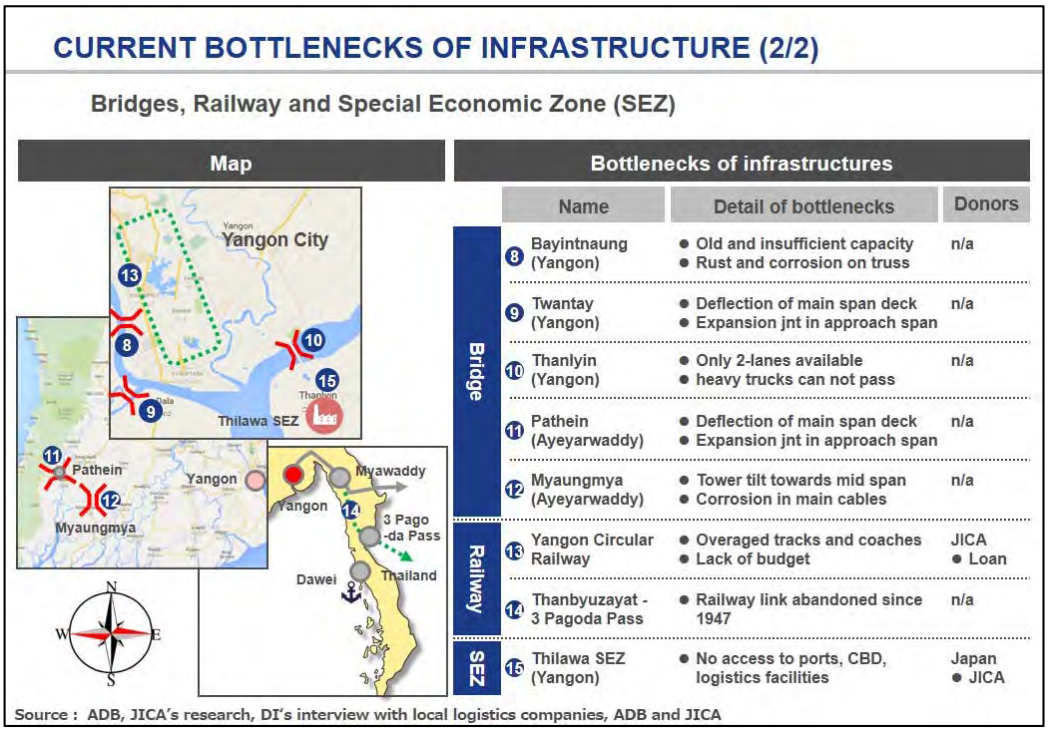

Figure 46: Current bottlenecks of bridges, railway and SEZ

- Bridge

  8– 10) 3 bridges in Yangon:

  - Bayintnaung is an old bridge with insufficient capacity, rust and corrosion on truss. Twantay has deflection on the main span deck and expansion joint in approach span. Whilst Thanlyin only has 2-lanes which does not allow heavy trucks passing through. No fund is available for renovation of these bridges

  11– 12) 2 bridges in Ayeyarwaddy:

  - The area locate in Western side of Yangon. 2 bridges need to rehabilitate in this region namely Pathein and Myaungmya. Pathein's main span deck incurred deflection. Similar to other bridge, it needs expansion joint in approach span. Another bridge is Myaungmya which main cables are corroded and the tower tilt towards mid span.

- Railway:

  13) Yangon Circular Railway:

  - The train is seriously poor condition with too little gravel and too loose connection. Some stations have poor drainage and control system. Also, overaged tracks and coaches and lack of budget to maintain are compounding problem. JICA has committed to provide funding for this rail's modernization.

  14) Thanbyuzayat 3 Pagoda Pass:

  - Railway link has been abandoned since 1947. In the past, the Government planned to retrieve this rail for tourism purpose but still pending due to low economic potential.

- SEZ

  15) Thilawa SEZ:

  - Commence first section in September 2015, it could be understand that not enough facilities and infrastructure available in and surrounding this zone. Especially, the electricity condition in this area is much weaker than one in the city center of Yangon. In addition, road connection to Yangon is not sophisticated as well. Therefore, JICA is supporting construction of port terminal and electric facilities as well as road expansion between Yangon and Thilawa.

5-6. Current projects by donors

Knowing an enormous role of transport infrastructure in economy development, thus, some

essential projects have been proposed by JICA, Thailand, etc. ; which are visualized in the map below. Among infrastructures, roadway and railway are prioritized higher than other infrastructures

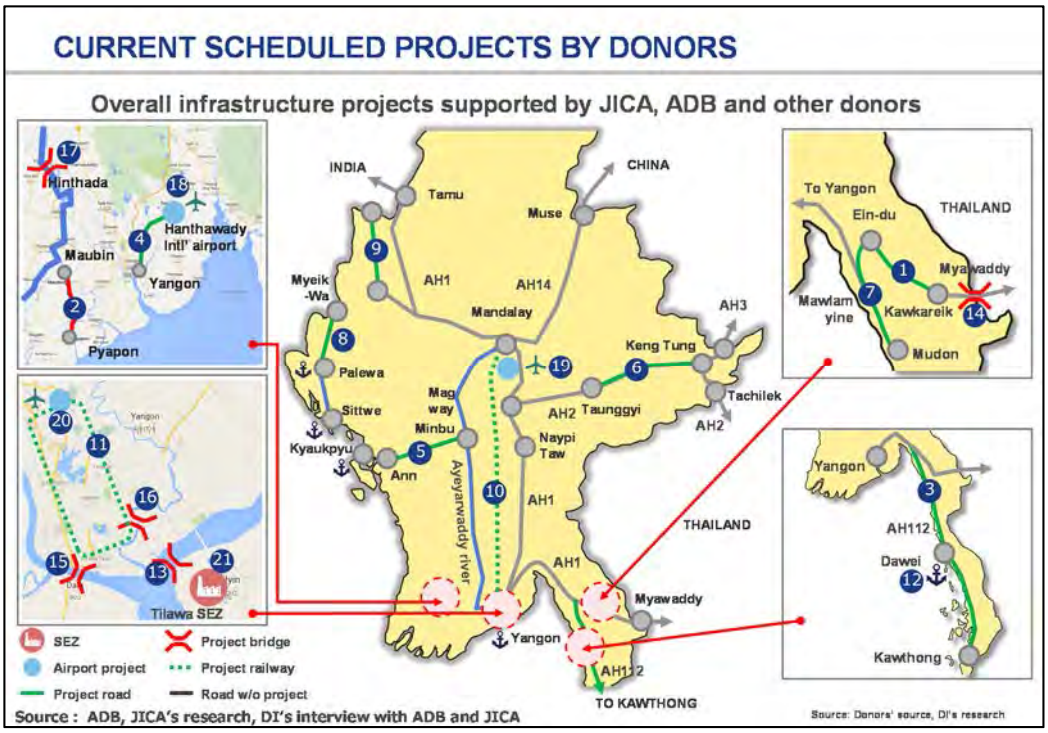

Figure 47: Current scheduled projects by donors

- Roadway:
  - Eindu – Kawkareik has 66.4km part upgraded by ADB & AIF with total investment around 120 million USD, which is expected to complete by 2020
  - Maubin – Phyanpon has 54.5km rehabilitated by ADB with total fund 80 million USD and expects to complete by 2018
  - Yangon – Hanthawady Express highway: Private companies (Korea and Myanmar) propose the overpass express highway with total amount of 620 million USD
  - Other critical routes improvement have been committed by Korea, including: Minbu – Ann, Taunggyi – Kyaington and Kawkareik – Mudon
  - Besides, India also supports the Government of Myanmar to upgrade two major routes: Paletwa – Setpyit – Myeikwa and Teetein - Reid
- Railway:
  - Railway is indicated as the second prioritized infrastructure in Myanmar, in order to meet a rising demand of freight transport between Mandalay and

Yangon city/Yangon port, JICA committed to get the railway of Yangon – Mandalay upgraded by 2021.

- Sea port:
  - Dawei port is going to be constructed with a capacity to hold 250 million tons of cargos. Total investment is simply divided 50:50 for Thailand and Japan.
- Bridge:
  - More new bridges are proposed in order to serve domestic transportation and friendship connection with neighboring countries. These bridges are going to be constructed by support from JICA, Thailand and Korea Eximbank.
- Airport:
  - A new international airport at Hanthawaddy is expected to launch by 2022, receiving funds from JGC and Changi airport planners and engineers.
- SEZ:
  - Some projects are being conducted around Thilawa SEZ in order to optimize the transaction from this zone to outside, such as: widening access road to SEZ and developing port's terminal, both of them are funded by JICA

Further details of key projects are listed as below.

Table 4: List of current projects in Myanmar

Type	No.	Name	Detail	Total Amount (Mil USD)	Donor	Completion	Status
1. Road	1	Eindu - Kawkareik Road	66.4km road upgrade	120	ADB & AIF	2020	Commited
	2	Maubin-Phyapon Road	54.5 km road rehabilitation	80	ADB	2018	Commited
	3	Thanbyuzayat – Dawei – Myeik – Kawthong Road	Upgrade and connect missing link		N/A		N/A
	4	Yangon - Hanthawaddy airport Xpress highway	Overpass express highway	620	Yooshin (Korea), Lotte E&C (Korea), Hara (Korea) and Capital Diamond Star Group (CDSG) (Myanmar)		Proposal
	5	Minbu-Ann	156.1 km Road upgrade		Korea Expressway Co.		Committed
	6	Taunggyi-Kyaington	452 km part of AH2		Korea Expressway Co.		Committed
	7	Kawkrate-Mudon	102 km Road upgrade		Korea Expressway Co.		Committed
	8	Paletwa-Setpyit Pyin-Myeikwa	129.1 km Road upgrade	120	India		Committed
	9	Teetein-Reid	50.9 km Road upgrade	60	India		Committed
2. Rail	10	Yangon-Mandalay Railway	Railway upgrade	164	JICA	2021	Commited
	11	Yangon circular railway lines	Rehabilitation	204	JICA	2020	Commited
3. Port	12	Dawei	Deep-sea port with a capacity to hold 250 million tons of cargo		Thailand & Japan (50-50)		Committed
4. Bridge	13	Yangon-Thilawa bridge (Thaketa. Bridge)	New bridge Yangon - Thilawa SEZ	42	JICA	2021	Committed
	14	Myanmar-Thai Friendship Bridge No. 2	Improve traffic at Myawaddy border		Thailand		FS completed
	15	Korea-Myanmar Friendship Bridge (Dala)	New bridge btw Yangon - Dala	183	Korea EximBank	2020	Under construction
	16	Bago River Bridge	New Bridge in Yangon City		JICA		FS
	17	Ayeyarwaddy Bridge (Hinthada township)	Replace the old damaged by flood	308	JICA		FS completed
5. Airport	18	Hanthawaddy Airport	New International Airport	1,500	JGC, Changi	2022	Under planning
	19	Mandalay International Airport	Upgrade to Intl' airport	14	Mitsubishi, JALUX, Yoma holdings		Under planning
	20	Yangon International Airport	Upgrade terminal to cater 6 million pax.	200	Asia World Group	2015	Under construction
6. SEZ	21	Thilawa Area SEZ Phase II	Widen access road to SEZ	38	JICA	2015	Completed
		Thilawa Area SEZ Phase II	Port terminal development	121	JICA	2017	Under construction

Source: ADB, JICA, The survey program for the national transport development plan in the Republic of the Union of Myanmar, Project for comprehensive urban transport plan of the greater Yangon, DI interview with ADB and JICA

5-7. Necessary infrastructure to be prioritized highly

Based on a comprehensive landscape of Myanmar's infrastructure and the Government's vision, infrastructure has been emphasized as the key sector for the country's development. A country which has young population and booming economy has drawn a lot of attention from affluent foreign investors. Many projects have been proposed for new construction, rehabilitation or upgrade recently. Among them, we would like to suggest the necessary infrastructure which should be prioritized firstly as demonstrated in Figure 48 below:

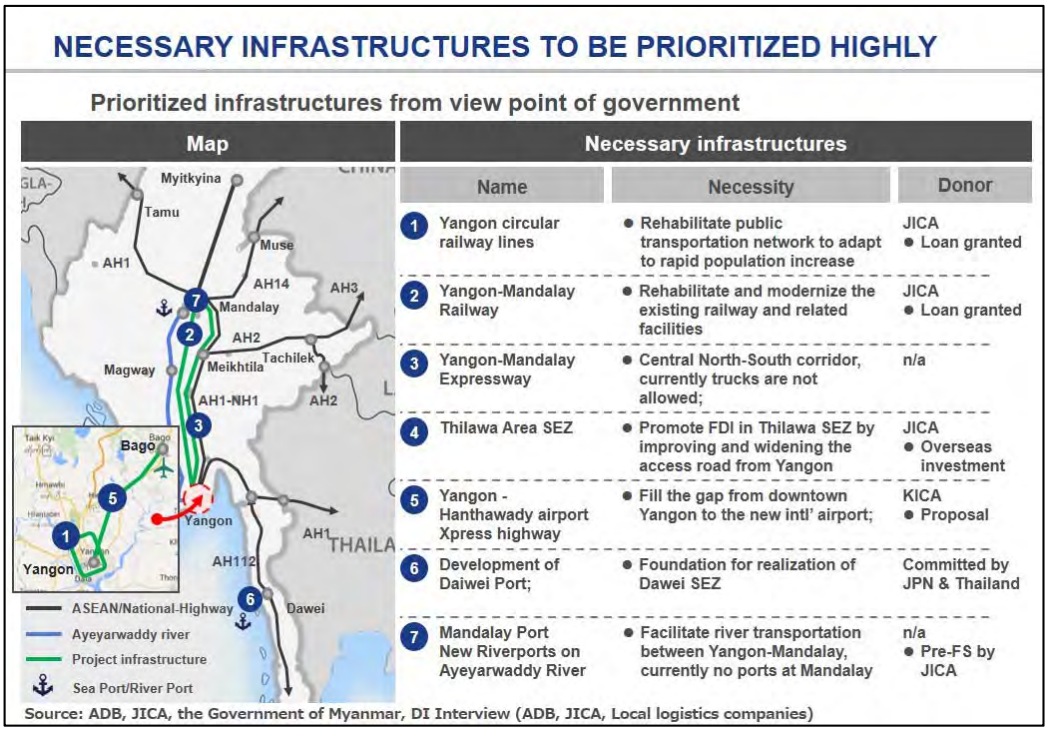

Figure 48: Necessary infrastructure to be prioritized highly

1) Yangon circular railway lines:

As the center of economic activity, Yangon has undergone a rapid population increase in recent years. As estimated by Yangon Government, the Greater Yangon population is expected to top 9.5 million by 2035. This calls for actions to update and rehabilitate the public transportation network to adapt to urban transportation problems as a result of rapid population increase.

2) Yangon-Mandalay Railway

This is part of the 6000-km railway network in Myanmar which connects Myanmar's largest city of Yangon with the capital Nay Pyi Taw, as well as with the nation's second largest city of Mandalay. However, this network is aging resulting in the alarming statistic of railway accidents occurring about 100 times each year. In addition to

solving such safety issues, there is a need to shorten travel times and improve transportation capacity.

3) Yangon-Mandalay Expressway

The Yangon-Mandalay highway opened in 2009 however it is missing many of the safety features found on international-standard highways, such as roadside reflectors, warning signs and rumble strips to alert drivers when their vehicles are leaving the road. The Government is planning to upgrade the Yangon-Mandalay highway to an international standard.

4) Infrastructure Development Project in Thilawa SEZ Area

The Government of Myanmar has been advancing the development of the Thilawa SEZ in Yangon, aiming at job creation and economic development through the expansion of direct investment and a further increase in trade. Based upon such vision, it is important to develop infrastructure that supports and promotes FDI inflow in the Thilawa area where rapid development is expected in the future.

5) Yangon - Hanthawaddy International airport express highway

Construction of the Hanthawaddy International Airport in Bago is set to begin in 2016 and will be completed by 2020. When finished, it will replace Yangon Mingalardon Airport as the primary gateway to Myanmar. The road to connect Yangon with the new airport will also enable link to Thilawa SEZ backed up by JICA and Japanese companies.

6) Dawei port:

Dawei's strategic position is grounded on the possibility of linking with the Southern Economic Corridor, which runs across Indochina from Ho Chi Minh City to Bangkok. By making it possible for goods to flow across Indochina, instead of taking the traditional route around the Malay Peninsula by sea, it will be easier for countries in the region to export to India, Middle East and Europe. Dawei seaport enhancement should be prioritized as it is a foundation for realization of its future.

7) Mandalay River Port

Among different transportation modes between Yangon and Mandalay, inland water transport is recognized as a cost efficient way of transporting. However, the use of this mode in Myanmar encounters many challenges. Poor terminal infrastructure of the river ports worsens the reliability of inland water transport mode. At Mandalay terminal, the river port is mere the landing beach without adequate handling equipment, which increases the handling time and the cost of handling cargo

Chapter 6: Analysis of Vietnam

6-1. Basic information

6-1.1. Overview

With population of 90 million, Vietnam ranks the second largest GDP and GDP per capita in Indochina region with dollar value in 2014 of USD 184 billion and USD 2,028 in 2014 respectively. According to General statistics of Vietnam Custom (GSVC), proportion break down by industry are dominant by service and agriculture with 49% and 18% respectively, while manufacturing sector accounted quite humble percentage of 13%. However, this sector experienced slightly higher growth than others.

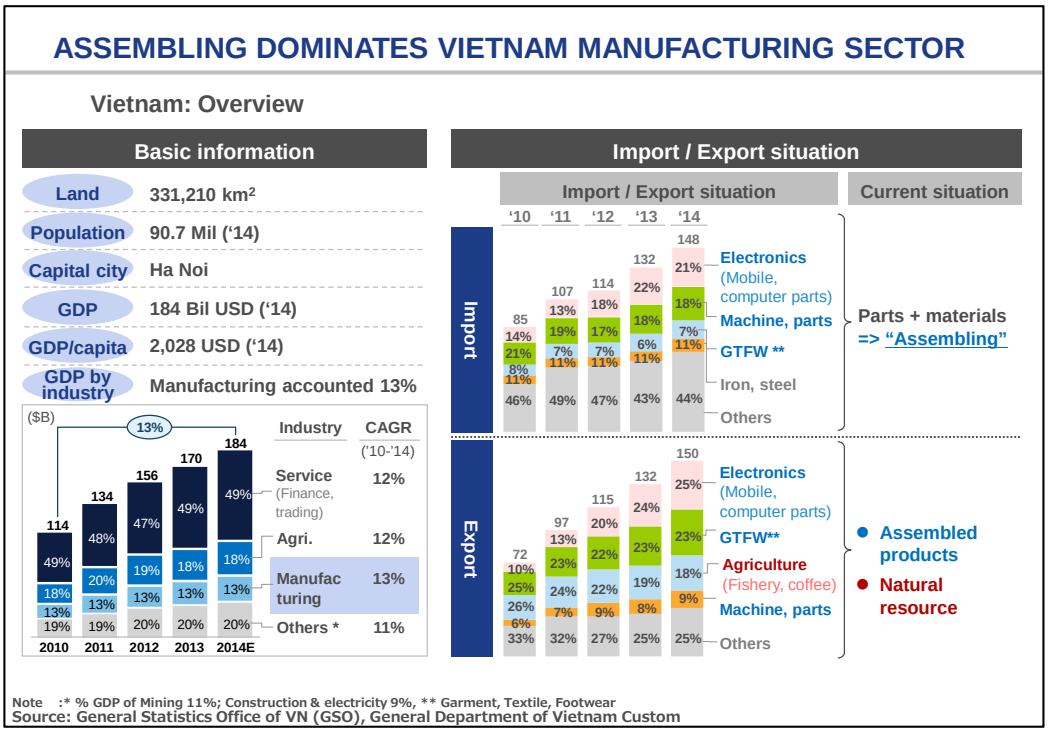

Figure 49: Overview of Vietnam

In Asia, Vietnam is well-perceived as assembling country with key trading products in category such as electronics (mainly mobile phone and computer parts), as well as garment, textile, footwear ("GTFW"). Looking specifically in export data by GSVC, electronics group which includes final products, equipment and related parts, accounted 25% equivalent to USD 37 billion; similar proportion of 23% and USD 35 billion was recorded for GTFW. Products import are mainly parts and materials supported for assembling production of electronics and GTFW which accounted for 28% of total import. Majority of imported products in these categories originate from China, Korea and Japan. After assembling, final products or parts

will be destined mainly to US, Europe and Japan. Besides these industrial products, Vietnam also well-known for agriculture products such as fishery and coffee exported to same destination mentioned-above.

6-1.2. Transaction with neighboring countries

Vietnam borders with 3 countries include China, Cambodia and Laos. Products import and export with these countries mainly low value and for domestic consumption or production purpose.

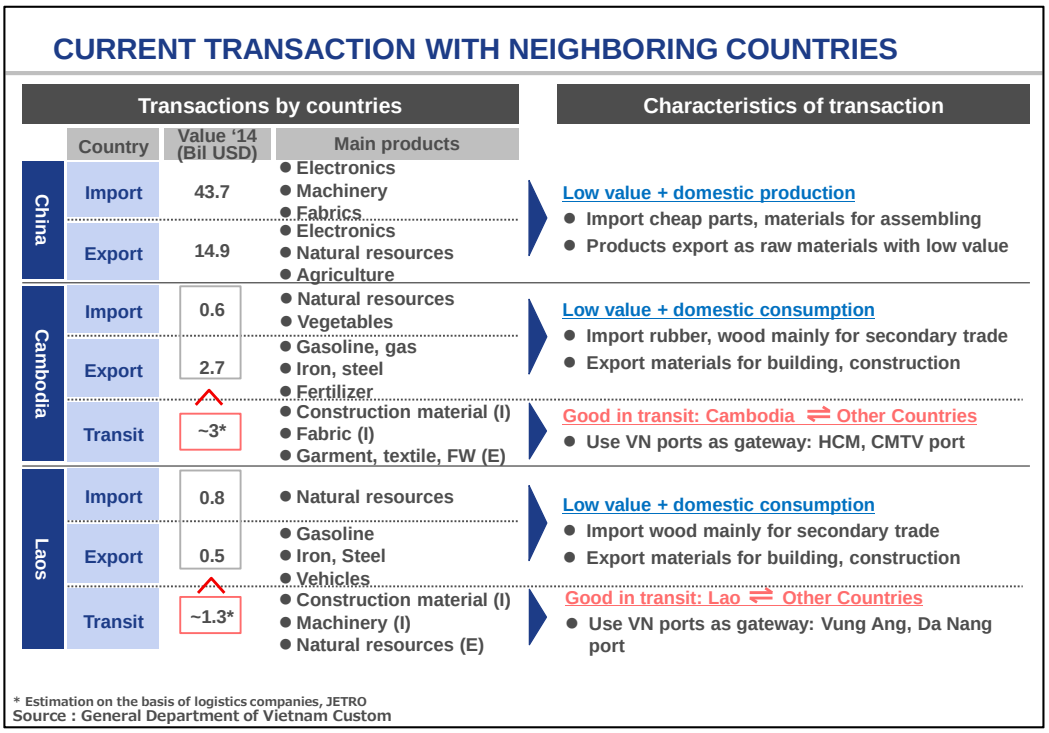

Figure 50: Current transaction with neighboring countries

- Vietnam - China

  China, with their strong position in the world, is vital trading partner around the globe and that is not exception to Vietnam. The trading data in 2014 by GSVC showed very high transaction value between Vietnam and China as compared to other neighboring countries with value of import and export was USD 43.7 billion, USD 14.9 billion respectively. Vietnam assembling industry such as electronics, GTFW heavily depends on China for materials and parts supply. Meanwhile, Vietnam's natural resources are being exploited considerably by China such as crude oil, coal, natural rubber and wood.

- Vietnam – Lao and Cambodia

  With less developed economy, Cambodia and Laos total trading value stay modestly with USD 3.3 billion and USD 1.3 billion respectively. Products exchange between Vietnam and these countries quite similar in term of category and purpose. For import, Vietnam is currently acting as middle trading partner of wood and rubber from Cambodia and Lao. While, the available sources of gasoline and construction steel are key products exported in return from Vietnam for demand in building, construction and domestic consumption. In addition to pure trade, Vietnam's long coastal lines and rich ports allow it to be international gateway for Lao and Cambodia due to Lao's land-locked nature and undeveloped ports situation in Cambodia. Good in transit demand weigh slightly higher than pure trade value with estimated value of about USD 3 billion from Cambodia and USD 1.3 billion from Lao. Presently, Cambodia transit most of their import goods via Cat Lai – HCMC, and export via Cai Mep Thi Vai – Ba Ria Vung Tau province. For Lao, Vung Ang and Da Nang ports are two nearest ports.

6-1.3. Industrial allocation

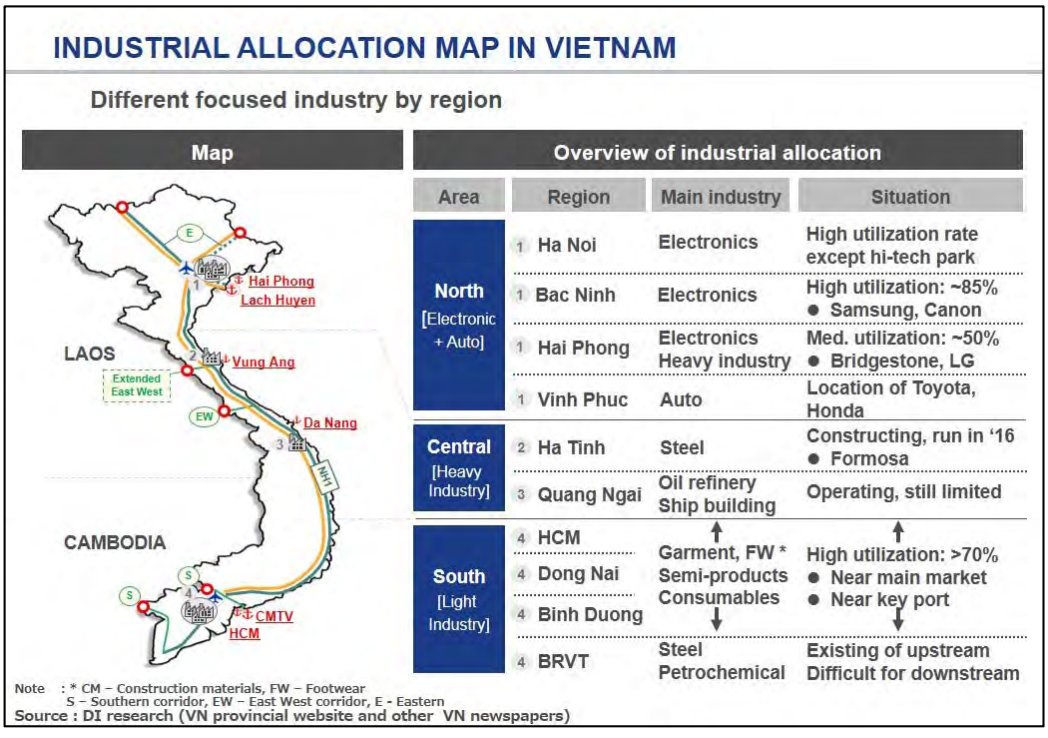

Figure 51: Industrial allocation map in Vietnam

As announced by the local newspapers in September 2015, Vietnam has 299 industrial zones of which 212 in operation, others are in land clearance and infrastructure construction. Most industrial zones locate in Southern and Northern areas, while only few established in Central region. Although there is no clear industrial allocation per region by the Government, investment from private sector formed key industry in each area.

- Northern region: Host of capital-intensive specifically electronics and electrical appliances. Manufacturing hub center in 3 main provinces Ha Noi, Bac Ninh, Hai Phong where almost global brand such as Canon, Panasonic, Fuji Xerox and recently Samsung place factory here. The presence of Samsung in Bac Ninh province has led to the promising development of electronics in the region. Besides Bac Ninh, Thai Nguyen province just recently invested by Samsung as part of their expansion plan, bring their total investment in this region up to USD 10 billion. In 2014, Samsung products accounted for 17% of total Vietnam export and expected with unstoppable rising trend. Samsung strategizes 30% of their products will originate from Vietnam factory. With Samsung investment, Northern region is expected to welcome big wave of ancillary industry forming the full value chain and create strong base of electronics production first time in Vietnam. Besides, the region also famous with automobile and motorcycle production where Toyota, Honda, Piaggio chose their factory here namely Vinh Phuc.
- Central region: The region was favorable location of heavy industry due to availability of deep seaport. Ha Tinh caught the investment of steel and metallurgical industry of which Formosa project marked the turning point. Formosa's giant investment plan value up to USD 28.5 billion of which phase 1 expected to operate in 2016. Another famous area is Quang Ngai, location oil refinery and shipbuilding industry mainly invested by local companies
- Southern region: Majority of industrial zones situated in this region gathered mainly in Ho Chi Minh, Dong Nai, Binh Duong, Ba Ria Vung Tau ("BRVT"), Long An. Light industry is dominant in this region such as GTFW, semi-products and consumable products production. In the areas, the occupancy rate reached more than 70% due to near main market and main port. Unlike the other industry group, BRVT is ideal location for heavy industry (steel, petrochemical) due to international deep sea port.

6-2. Industrial master plan

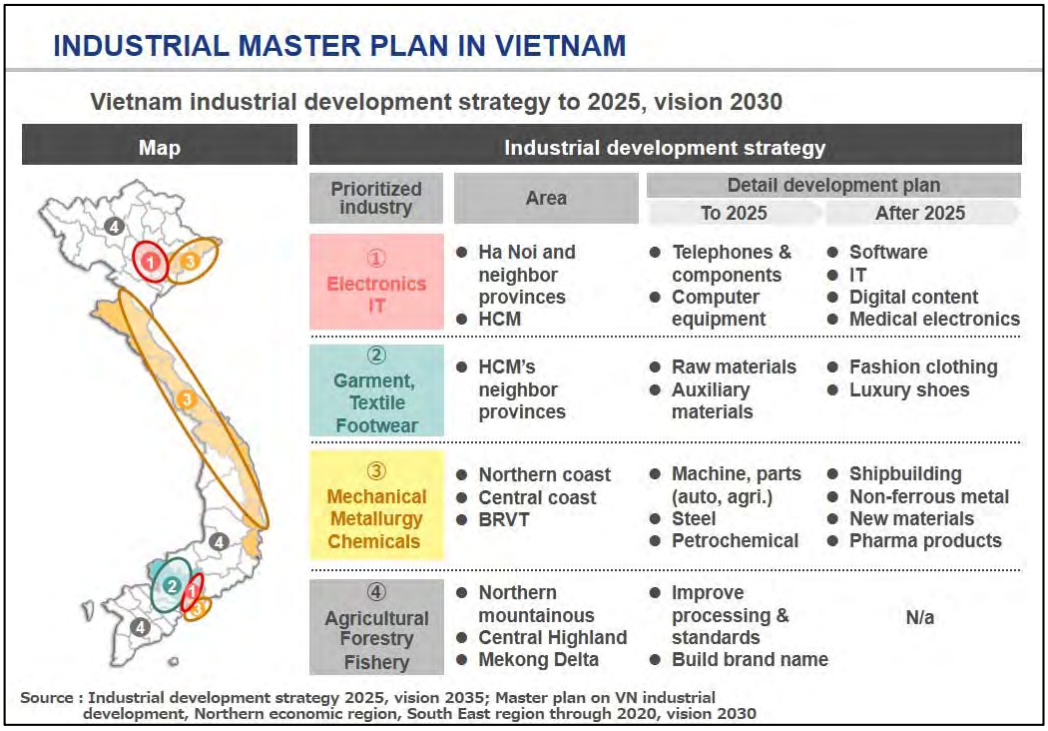

Figure 52: Industrial master plan in Vietnam

The Government recently announced the Industrial Development Strategy through 2025, vision toward 2035; indicated the prioritized group of industries for development focus to the target time. That includes (1) Electronics and telecommunication industry, and manufacturing group consist of (2) Garment, textile, footwear; (3) Mechanical metallurgy chemical; (4) Agricultural, forestry, fishery products processing. Besides, developing new energy and renewable energy is also highly promoted. Detail plan for each manufacturing related industry except energy sector will be mentioned as below:

1) Electronics and telecommunication industry:

   Potential location will be Ha Noi for more hi-tech development, and Bac Ninh, Thai Nguyen, Hai Phong where there is presence of many global brand of electronics such as Samsung, LG, Canon, etc. Similar to Ha Noi, HCM will be foreseen as future hi-tech zone proven by the investment from Intel (board) and Samsung (hi-tech LCD).

   For this category, telephones and components as well as computer equipment will be focused to 2025. More advanced and hi-tech products such as software, IT, medical electronics are expected to produce in after 2025.

2) Garment, textile, footwear (GTFW):

Although some GTFW factories located fragmented in some areas belong to Northern and Central region, biggest cluster are actually gathering around HCM and surrounding satellite provinces such as Dong Nai, Binh Duong, and Long An. Participated in TPP turn Vietnam GTFW to further development and potential to encourage integration of full value chain. Since the downstream of this industry focus mainly in aforementioned areas, value chain expansion resulted from TPP will be highly retained in this region.

In term of timing, production of raw and auxiliary materials will be target to 2025, while further downstream and higher end such as luxury shoes, fashion are expected after 2025

3) Mechanical metallurgy, chemical:

Looking at current industrial allocation, Vietnam has already receive big wave of investment to open steel cluster in 3 regions namely Hai Phong (North), Ha Tinh (Central) and BRVT (South). Similarly, with available oil resources, super petrochemical plants are expected to be constructed soon in Nghi Son (North) and BRVT (South). Therefore, this industry group would be foreseen to continue the development in these areas.

In period to 2025, the country plan to produce downstream of steel and petrochemical output, while after 2025 is the era of shipbuilding, non-ferrous metals and pharma products from petrochemical.

4) Agricultural, forestry, fishery products processing:

One of key industry in Vietnam in more rural and less-developed area, the industry will be continued with current key areas such as Northern mountainous region (tea, wood), Central highland (vegetables, coffee, tea); and Mekong Delta (fishery, rice).

For future development, it is necessary to apply international standards to improve current processing and production. Later plan will be building trademarks and brand name for Vietnam agriculture products.

6-3. Infrastructure master plan

With ambition to become industrialization and modernization country, improving related infrastructure is indispensable. That is why infrastructure development is highly focused and occupied large sum of budget allocation in the next 5 years.

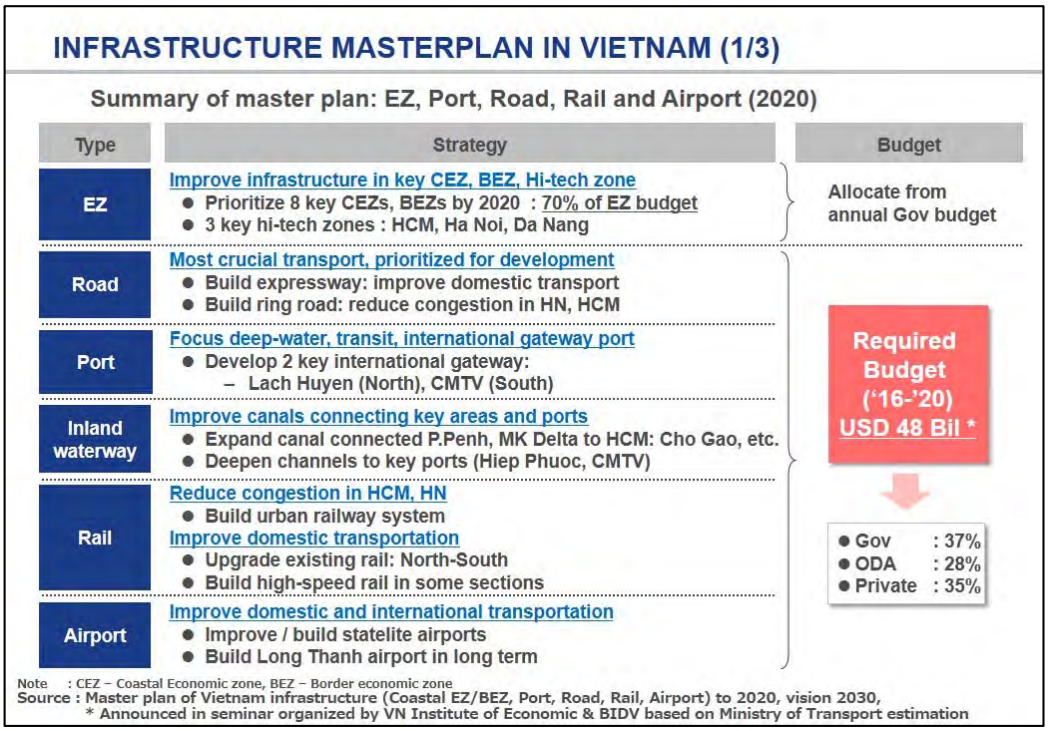

Figure 53: Summary of infrastructure master plan in Vietnam

According to estimation of Ministry of Transport (MOT) which was announced by BIDV, Vietnam need budget of USD 48 billion for development transportation infrastructure during 2016 – 2020. Of which, the plan for contribution proportion will be 37% by Government, 28% from ODA and remaining from private investors. The development of economic zone and hi-tech zone will be allocated annually from Government budget. The required fund constituted from the Government plan to improve the infrastructure quality for cohesive connectivity across the country.

- Economic zone:
  - Vietnam currently has 44 economic zones ("EZ"), includes 16 coastal economic zone ("CEZ") and 28 border economic zones ("BEZ"). Comparing to IZ (Industrial Zone), EZ has more affordable incentives (tax, land price) and received more funding support from Government to develop infrastructure. Tax incentives for EZ include CIT (lowest rate), PIT (50% reduction to employees), import and export tax (free for some products) and VAT (free,

applied for BEZ). Without clear focus industry and development of necessary infrastructure, not all EZ succeeded to attract investors. Understand the necessity of infrastructure investment to activate these EZs, the Government announced priority lists (8 CEZs and 8 BEZs) to receive 70% budget allocation in infrastructure. Further to the economic development, Government also encourages hi-tech zone and dedicates portion of budget to develop infrastructure in key location: HCM, Ha Noi and Da Nang.

- Road:
  - Most crucial element for country development, regional and international integration, investment is highly prioritized by the Government. Key projects are construction of expressway for North-South route, linking key cities, connecting Vietnam with key borders and building ring road in Ho Chi Minh, Ha Noi.
- Port:
  - Deep water, transit, international gateway ports are Government focus to enhance the competitiveness of Vietnam's ports in international markets. There will be 2 key international gateways with deep-water ports in Vietnam, Cai Mep Thi Vai port in the South and Lach Huyen port in the North. Lach Huyen port is in construction in December 2015,while Cai Mep Thi Vai port already started operation. But, this port complex struggles to fulfill the occupancy due to delaying relocation from HCMC to this area and over-supplied ports in surrounding area. Therefore, it is said that establishment of port management system is required to respond to the demand in this area for future port development in Vietnam. Besides, other provincial ports also place a vital role and needed to improve connectivity and capability such as HCM, Dong Nai, Da Nang, Ha Tinh, etc.
- Inland waterway:
  - One of economically viable mode of transport especially from Mekong Delta, Phnom Penh to HCM ports. To ensure smooth transport, several canals along this route were planned to rehabilitate consist of Cho Gao canal, Quan Chanh Bo to Hau river. In addition, canal/river parts channel to key ports such as Hiep Phuoc port, CMTV and Lach Huyen ports were planned for further dredging to accommodate bigger ships.
- Railway:
  - Given the heavy congestion situation in city center areas, the Government urges for the construction of sky rail and urban rail in HCM and Ha Noi.

Besides, Vietnam also plans to renovate current railway for North-South route and build high speed rail for same itinerary in long term.

- Airport:
  - Improve domestic and international transportation by expanding key airports, constructing new satellite ports. In the long term, new Long Thanh airport will be biggest in Vietnam which improves competitiveness in the region.

6-3.1. Economic zone infrastructure development plan

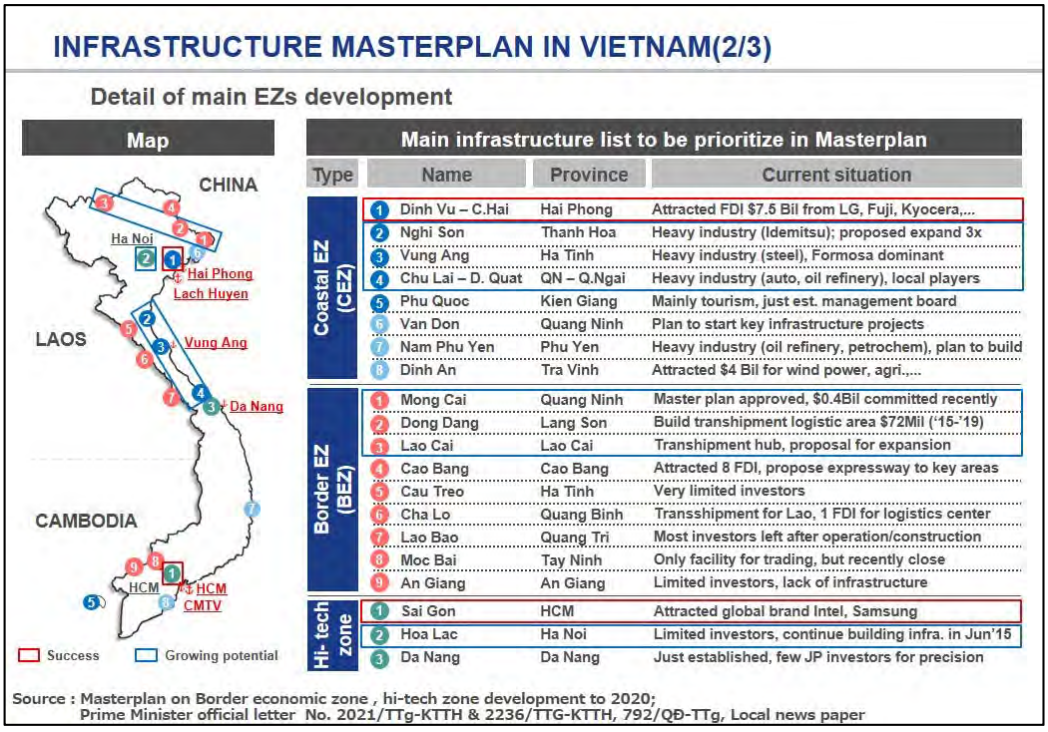

Figure 54: Infrastructure master plan in Vietnam (EZ)

According to Prime Minister decisions (No. 2021, No. 2236, No.792) , 8 CEZs, 9 BEZs and 3 hi-tech zones was highlighted to be prioritized for development till 2020. Most zones have already established by using Government and private funding sources. Among these zones, only two are in good operation and successfully attract FDI, about 7 zones have growing potential, while the remaining zones are facing difficulty and less growing potential.

- CEZ:
  - Tthe Government divides the investment in 8 zones into two phases, first phase includes 5 zones from 2016-2017 and remaining 3 zones after that to 2020. Amid the first 5 CEZs, Dinh Vu-Cat Hai succeeded to capture FDI

investment of USD 7.5 billion from LG, Fuji Xerox, KYOCERA. Even not fully operational, 3 heavy industry clusters (Nghi Son, Vung Ang, Chu Lai – Dung Quat) have growing potential constituted from big investment of Idemitsu (petrochemical) and Formosa (steel). Other zones, focus mainly in tourism and agriculture and no big investment yet, cause doubtfulness for their future success.

- BEZ:
  - Presence of BEZ in Vietnam mostly abundant due to less-developed infrastructure and limited demand from investors. However, the Government is anticipated to enrich the BEZ's role to strengthen trading with neighboring countries. In 9 highlighted BEZs, only connection with China comprising Mong Cai, Dong Dang and Lao Cai BEZ are most potential due to high transaction via these gates. Development master plan of Mong Cai BEZ has just publicized in November 2015, pinpointed the Government aggressiveness to develop the model case. Already ten projects with investment value to USD 400 million was committed to pure in this BEZ. With smaller scale, Dong Dang and Lao Cai BEZ are potential to serve as transshipment logistics hub. Since trading with Cambodia and Lao are still low compared to China, the BEZ along border with these countries struggles to attract investment.
- Hi-tech zone:
  - 3 zones established in HCM, Ha Noi and Da Nang are emphasized to be core hi-tech zones and development focus till 2020. Established 4 years after Hoa Lac, Sai Gon hi-tech zone hit more achievement marked by total USD 2.4 billion investments of Samsung and Intel. Meanwhile, Hoa Lac hi-tech challenges to call investors due to lacking of infrastructure and slow land clearance process. In June 2015, the Government commenced the construction unfinished parts of Hoa Lac hi-tech zone with total investment of USD 450 million (Japan ODA USD 400 million, Government USD 50 million), mark the promising growth. Unlike other zones, Da Nang hi-tech is still at early stage with few Japanese investments in precision industry.

6-3.2. Transportation infrastructure plan

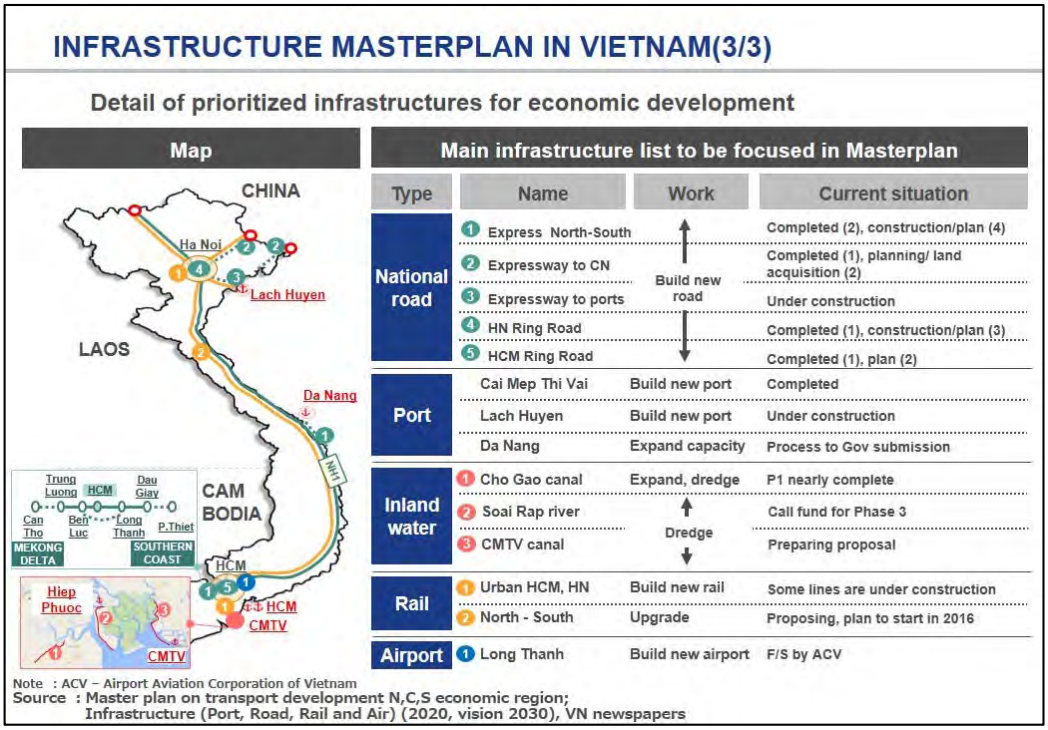

Figure 55: Summary of infrastructure master plan in Vietnam (prioritized infrastructure)

As aforementioned above, below is the detailed list of main infrastructure which is more prioritized among other projects in the master plan for each type of transportation

- <u>National road:</u>
  - Build express way that enhances connectivity for North – South route, strengthens connection to China and key ports. Up to now, some parts from prioritized projects have been completed including sections from HCM to surrounding areas (Trung Luong, Dau Giay) and Ha Noi – Lao Cai, Ha Noi – Hai Phong route. Others important parts comprise Ben Luc – Long Thanh, Da Nang – Quang Ngai are constructing; while some projects are still at planning stage.
  - Apart from national route, construction ring road in HCM and Ha Noi city is extremely necessary to solve crucial traffic congestion. About 4-5 ring roads plan to build in each city. Among all Ha Noi ring road No. 3 has completed, other roads are either constructing or planning.
- Port:
  - With the focus of developing international gateway ports, 2 international deep sea ports have been built. In the South, Cai Mep Thi Vai is in operation but

struggles to fill the redundant occupancy due to issues of port develop management. In the North, Lach Huyen started construction in 2013, and expected to operate in 2018. Aside from international ports, Vietnam planned to improve or expand satellite ports in other regions especially Central area. Among them, Da Nang port retain important role and is in submission process to Government for capacity expansion.

- Inland waterway:
  - Two main types of project to improve river way: 1) expand canal from Mekong Delta and Phnom Penh via Mekong river to HCM and CMTV port complex: Cho Gao; 2) dredging river channel to key ports: Soai Rap river (to Hiep Phuoc port) and canal along CMTV ports. Project to expand Cho Gao canal was already finished phase 1 and is considered phase 2. For Soai Rap River, after phase 2 completion, HCM PPC has requested MPI to acquire ODA or concessional loans for continuing dredging phase 3. Meanwhile, project for additional dredging of CMTV canal has just recently praised by Vinamarine and in preparation of proposal.
- Railway:
  - Building urban railways in Ha Noi and HCM are part of resolution for congestion issue. Currently, 9 rail systems (Urban Railway Line 1-8 and 2A) are planned in Ha Noi, and 7 rail systems (Urban Railway Line 1-6, No3 is divided into 3A and 3B) are planned in HCM. In Ha Noi, line 2A and 3 have started construction since 2010 but seem to be delayed due to unexpected extra investment. Other lines might take long time to start. Unlike Ha Noi, urban rail line 1 in HCM started later in 2012 but still keep timely progress up till now.
  - In addition to urban rail, upgrading North-South rail is also important project which in proposing stage. Other highlighted projects contain rail network from HCM to key provinces (Can Tho, Vung Tau), Vung Ang to Vientiane (Lao) and North-South high-speed rail take time to evaluate the feasibility.
- Airport:
  - Long Thanh airport super project aims to upgrade Vietnam aviation position and take part in regional aviation transshipment hub. The budget to develop this airport is considered to be offered from the Governmental budget, funding by privatization of state owned enterprises in airline sector, ODA and investment by PPP scheme. According to Vietnam News Agency, ACV was approved as one of investors to this airport by prime minister in August 2015, and they required to submit the F/S report in phase 1 to prime minister by

utilizing budget for development. Responding to above situation, the bidding for F/S is being prepared currently, and F/S will be conducted by three phases.

6-4. Potential connection with neighboring countries

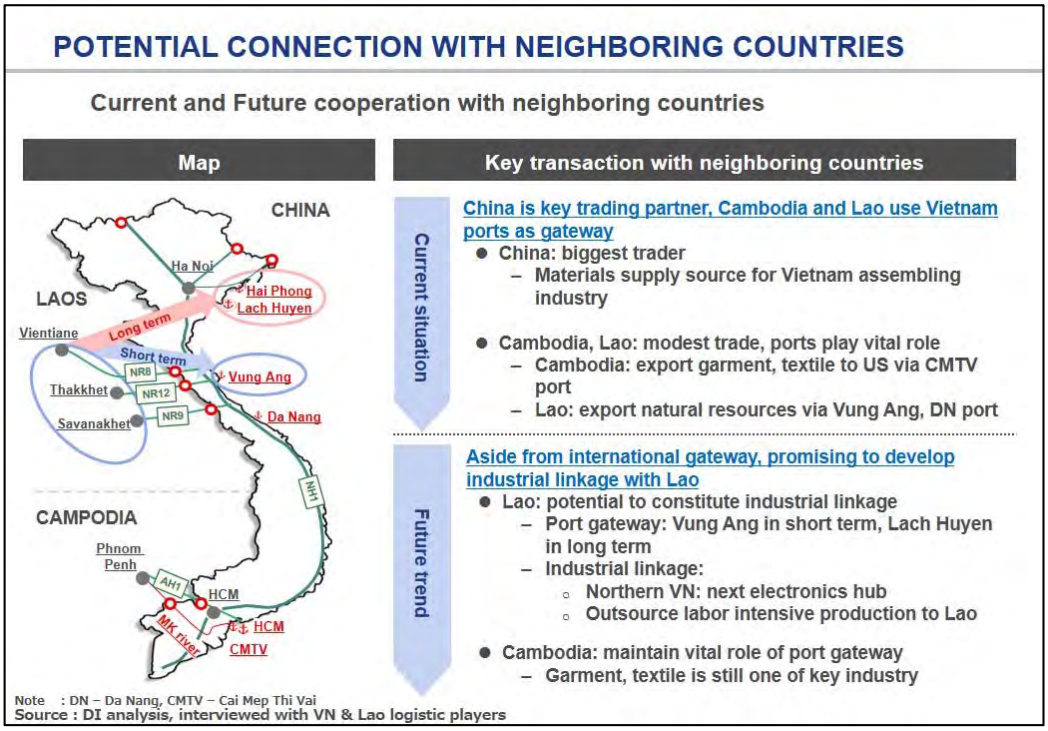

Figure 56: Potential connection with neighboring countries

A) Current situation:

- China position as key trading partner to Vietnam where majority of materials source originated from here. Import from China account 29% of total import in Vietnam.
- Although trading with Cambodia, Lao is still modest as compared to China but Vietnam ports play important role for their export. Cambodia mainly uses CMTV port for their garment, textile export to US. Likewise, Central ports of Vietnam such as Vung Ang, Da Nang facilitate lots of natural resources export to the world. Lao Government even invested in Vung Ang port to strengthen their relationship with Vietnam.

B) Future trend: Vietnam still maintains gateway handle international shipment for Cambodia and Lao. Besides, Vietnam has high potential to establish industrial linkage with Lao in the near future.

- Lao: Vung Ang port continues to preserve essential role to Lao export. According to Lao Government, this port is most preference due to closest distance and presence of Lao investment. Foreseen Lao's potential demand, as announced in local newspapers, one of big consortium from Lao called Phongsavanh has expressed their interest to invest in Vung Ang port. In the long term, with better road connection to Lach Huyen international deep-sea port, Lao might shift their port demand here.
- In the future, Northern Vietnam region will be promising to become next electronics hub after Thailand resulted from investment trend to this area. By that time, Lao has high potential to catch up outsourcing trend of labor-intensive production from Vietnam.
- Cambodia: since garment, textile will retain as one of key industry in Cambodia. Vietnam port, specifically CMTV, will be continuously in high demand.

6-5. Current bottlenecks of infrastructure

With rising trade between Vietnam with neighboring countries, infrastructure quality play indispensable role to foster the economic development in Vietnam. However, still the existence of bottlenecks related to road, rail and seaway network, minimize Vietnam's growing potential. Vietnam is not exceptional with other less-developed countries to encounter issues related to transportation infrastructure

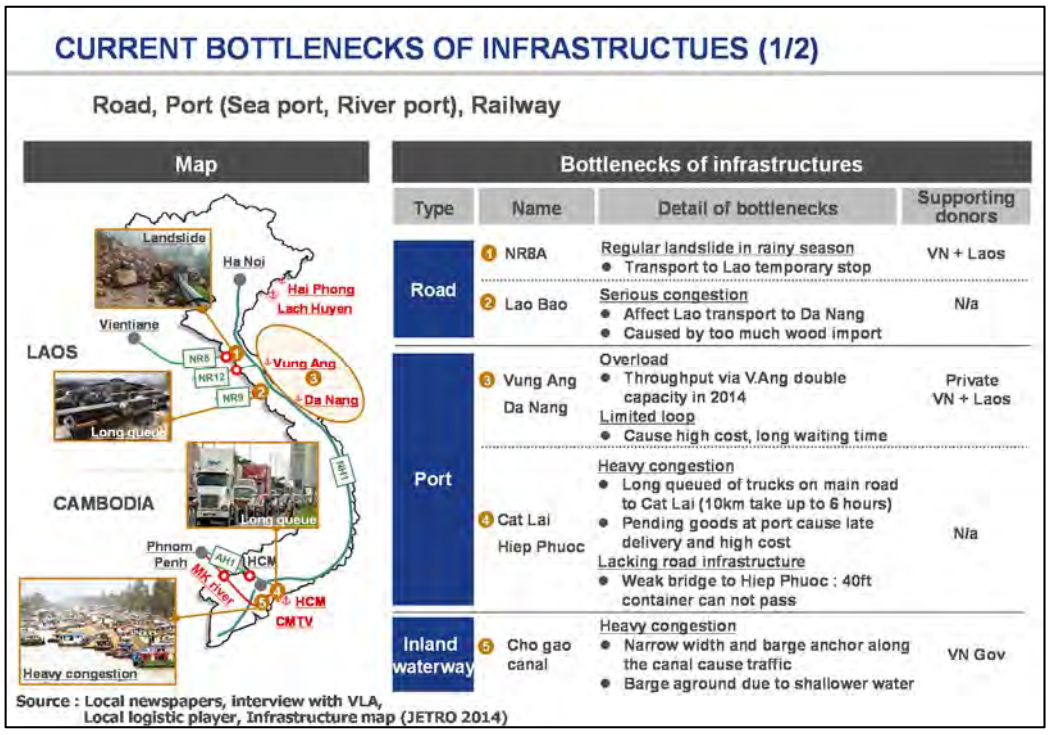

Figure 57: Current bottlenecks of road, port, and railway

- Road
  1) NR8 (Laos):
     - This road is extended part from East-West corridor connect Lao and Vietnam via Cau Treo border. The road section right after the border encounter regular landslide during rainy season that lead to temporary block the transportation to Lao for the next few days. In addition to NR8, other national roads also have bottlenecks related to quality of road condition, but these roads such as NR9 and NR12 are expected as East-West Economic Corridor
  2) Lao Bao border:
     - Serious congestion has been arisen from too much wood import from Lao. The long queue of truck limits the transportation from Lao side to nearby port.

- Port

  3) Vung Ang, Da Nang port:
     - These two ports are important gateway of Lao export. Vung Ang port is in overload situation with throughput recorded in 2014 double its designed capacity. It pushes urgent demand for capacity expansion in this port. Dissimilar, Da Nang was least chosen by company, logistics players due to limited loop. This resulted higher charge and long waiting time for shippers so reducing the competitive advantage.

  4) Cat Lai, Hiep Phuoc port:
     - With crucial congestion in Cat Lai port, HCM PPC is facing pressure to improve the current situation. On the way to Cat Lai, long queue of trucks always being captured. It is waste of resource, time and money for traveling in only 10 km but eat up 2-6 hours transportation. Shippers always claim the goods pending at port and late delivery to the clients bring headache to the operator.
     - Hiep Phuoc port located further to rural area than Cat Lai, is alternative option to shift Cat Lai cargo to this port. However, the weak bridge connect hinder land to Hiep Phuoc port does not allow 40 feet container passing through according to local logistics company. Besides, the river channels to Hiep Phuoc port limited at 9.5 meter which restrict big ship to enter.

- Inland waterway

  5) Cho Gao Canal:
     - this small canal is key river transportation route from/to HCM, CMTV ports to/from Mekong Delta and Phnom Penh. Transportation channel through Cho Gao regularly stuck by heavy congestion caused by barge anchoring along the canal with. Besides, in dry season, the barge even aground due to shallower water. Therefore, MOT led expansion project of this canal. Currently, phase 1 was already completed, so now phase 2 is planned.

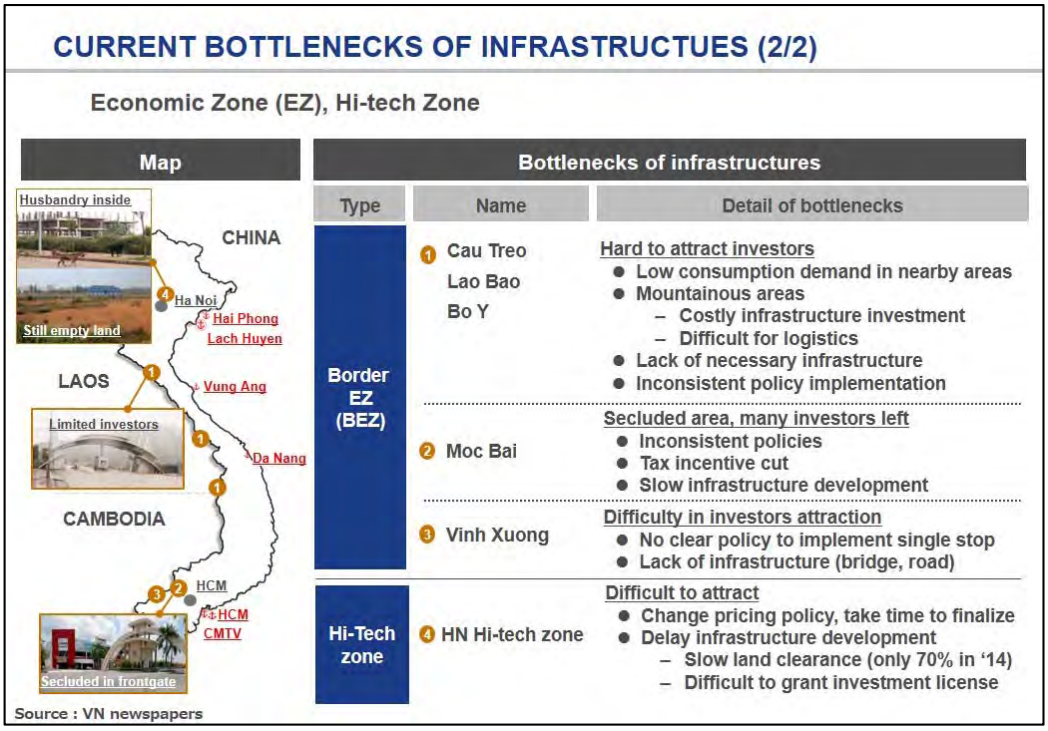

Figure 58: Current bottlenecks of economic zone, Hi-tech zone

- Economic zone

1) Cau Treo, Lao Bao, Bo Y BEZ:
   - 3 zones face similar issues which limit capability to attract investors. These areas located quite far demand market and in remote mountainous terrain which is highly difficult to develop logistics facilities here. Besides, basic infrastructure yet to be fully built and complicated policy while implementation, are the reasons explained for low attractiveness to investors.
2) Moc Bai BEZ:
   - This BEZ used to be crowded with many trading activities and trading duty free products. With current policy change by cutting incentives, many investors decided to leave to secure their investment.
3) Vinh Xuong BEZ:
   - This BEZ is struggling to attract investors due to lacking of basic infrastructure such as road and bridge. Besides, implementing single stop seems not to be feasible due to unclear policy cause more problem to this area.
4) Ha Noi Hi-tech zone:
   - In this area, related infrastructures are not yet developed. The zone unsuccessful operation caused from slow land clearance (only 70% in 2014) and difficulty to obtain investment license. Majority of land are still empty.

Some people even occupy some land for husbandry activities.

6-6. Current scheduled projects by donors

Currently, Vietnam has more than 43 big projects to improve national connectivity. Among which many key projects receive sponsorship from JICA and ADB. JICA actively involve to most important projects which have high potential for economic ripple effect namely Noi Bai airport, Lach Huyen international deep sea port, some parts in North-South express highway, ring road, and urban railway. ADB sponsors similar type of projects but in different sections. In addition to these super projects, other smaller scale such as road connect Ha Noi, HCM with key nearby provinces and neighboring countries, funded by World Bank, China, and other European donors. Below map show key projects are currently constructing or planning.

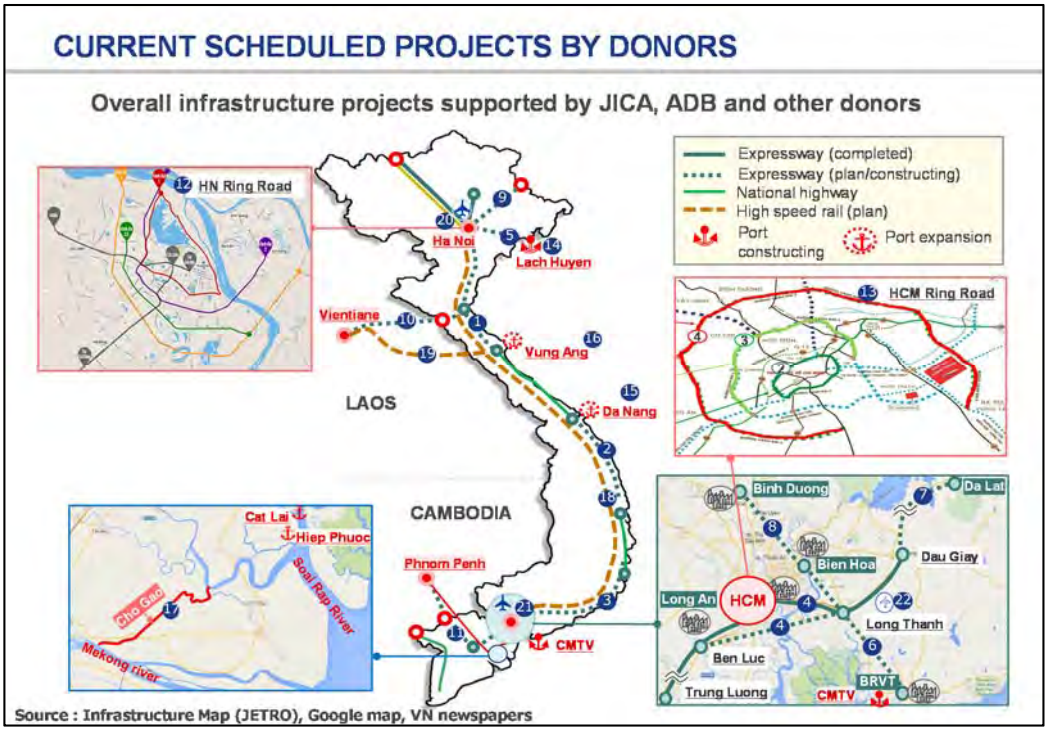

Figure 59: Current scheduled projects by donors

Further details of key projects are listed below.

Table 5: List of current projects in Vietnam

Type		No.	Name	Detail	Total Amount (Mil USD)	Donor	Completion	Status
1. Road	Express Highway	1	Cau Gie - Ninh Binh	• Length: 50km; 4 lanes • Max speed 100km/h	399	Gov bond: 91% Private: 9%	2012	Completed since 2012
			Ninh Binh - Thanh Hoa	• Length: 121km; 6 lanes • Max speed 100-120km/h	151	P1: ODA 30%, OCR 40%, Private 30% P2: ODA 50%, Private 50%	2020	Proposed investment plan
			Thanh Hoa - Ha Tinh	• Length: 98km; 4-6 lanes • Max speed 100-120km/h	1,627	Operator, Private, ODA: 56% Gov: 44%	2018	Waiting for approval • Fecon, Cienco, Cotec plan to invest
		2	Da Nang - Quang Ngai	• Length: 131km; 4-6 lanes • Max speed 100km/h • 26 big bridges, 106 tunnels	1,243		2017	Under-construction
			Quang Ngai - Quy Nhon	• Length: 156km; 4 lanes • Max speed 120km/h	1,556	WB, ODA: 89% Gov: 11%	2020	No progress • Investment plan approved • But, not yet in Master plan
		3	Nha Trang - Phan Thiet	• Length: 235km; P1 4lanes, P2 6 lanes • Max speed 120km/h	3,422	Gov, private	2017	No progress • Submit plan in 2012 • No progess after cost estimation
			Dau Giay - Phan Thiet	• Length: 98km; P1 4lanes, P2 6 lanes • Max speed 120km/h	957 *(P1 757, P2 200)*	Gov, Worldbank	2018	Planning • Plan to started in Sep '15 • Delay due to not enough funding
		4	HCM - Long Thanh - Dau Giay	• Length: 98km; P1 4lanes, P2 6 lanes • Max speed 120km/h	980 (P1 only)	ODA: 65% ADB (OCR): 28% Gov: 7%	2015	Completed Feb '15
			Ben Luc - Long Thanh	• Length: 57km; 4 lanes • Max speed 100km/h • 2 bridges	1,600 (P1 only)	ADB: 40% JICA: 40% Gov: 20%	2018	Under-construction
			HCM - Trung Luong	• Length: 62km; 8lanes, • Max speed 120km/h	439	Gov : 100%	2011	Completed Feb '11
		5	Ha Noi - Hai Phong	• Length: 105km; 6 lanes • Max speed 120km/h	222	Operator, VDB VCB, others	2015	Completed
		6	Bien Hoa - Vung Tau	• Length: 68km; 4 - 6 lanes • Max speed 120km/h	1,111	JICA: 80% BVEC: 20%	2017	Stop FS • Proposing to reduce scale, divide to 2 phases
		7	Dau Giay - Da Lat (1) Lien Khuong - Da Lat (2) Dau Giay - Lien Khuong	• Length: 208km, 4 lanes • Max speed 80km/h	1,415	Korea ODA: 83% Lam Dong PPC + others: 17%	2020	(1) Completed (2) MOT submitted Gov to decrease: to 2 lanes, reduce 60-80km/h speed, reduce investment
		8	My Phuoc - Tan Van	• Length: 30km, 6 lanes • Max speed 80 - 100km/h	1,415	Becamex: 51% Binh Duong PPC: 49%	2014	Under-construction
		9	Ha Noi - Lang Son	• Length: 154km; P1 4lanes, P2 6 lanes • Max speed 120km/h	1,400	ADB: 36%, China: 21%, Gov, Others: 43%	2016	Land acquisition process
		10	Ha Noi - Vientiane	• Length 760 km, 4 lanes • Width > 22.5m	2,500 (P1 1,500, P2 1,000)		2020 onward	Discussing to conduct FS
		11	Can Tho - Phnom Penh	• Only VN side • Length 250 km • Max speed 120km/h	4,400 (P1 1,800, P2 2,600)		-	Looking for new investor • Initially ITD signed MOU with Can Tho PPC • ITD withdraw due to no money
	Ring road	12	Ha Noi Ringroad No. 2	• Nhat Tan - Cau Giay • Length: 6km, max speed 80km/h	305	WB: 51% HN PPC: 46% GEF: 3%	2015	Under construction • Expect to completed in Jan '16 • Delay vs. initial plan Jun '15
			Ha Noi Ringroad No. 3	• Mai Dich - Tu Liem • Length: 19km, max speed 100km/h	247	JICA 100%	2012	Completed
			Ha Noi Ringroad No. 4	• Ha Noi - Bac Ninh • Length: 98km, max speed 100km/h	2,959	ODA, Gov, Gov Bond, HN PPC, Others	2020	PM approved to Master plan • Not yet started
			Ha Noi Ringroad No. 5	• Son Tay - Thai Nguyen • Length: 331km	3,803	-	-	PM approved to Master plan • In funding process
		13	HCM Ringroad No. 2	• Thu Duc - Binh Chanh - D9 • Length: 70km	114	-	2015	Completed some sections (Delaying) • Others in funding process
			HCM Ringroad No. 3	• HCM - DN - LA - BD • Length: 89km	2,480	ODA, Gov, Gov Bond, HCM PPC, Others	2020	Plan to start in Jan '16
			HCM Ringroad No. 4	• BRVT - DN - BD - LA-HCM • Length: 198km	4,379	ODA, Gov, Gov Bond, HCM PPC, Others	2025	Funding process

Type		No.	Name	Detail	Total Amount (Mil USD)	Donor	Completion	Status
4.Rail	National railway	18	North - South	Upgrade existing rail, 2 sections: ● HN - Vinh: upgrade tracks, sleepers	170	Gov	2020	Proposing ● Plan to start in 2016
	International railway	19	Vung Ang - Vientiane	● Vietiane - Thakket - V.Ang ● Length: 500 km	-	KOICA	2018	FS on progress
	Urban rail	20	Ha Noi Urban railway Line1 (P1)	● Yen Vien - Ngoc Hoi ● Length : 39 km	865	JICA: 71% Gov: 29%	2020	Contracted, but temporary stop
			Ha Noi Urban railway Line2 (P1)	● Nam Th.Long - Thuong Dinh ● Length : 28 km	869	JICA: 84% Gov: 16%	-	Land clearance, but delay ● Changed investment to USD 2,3 bil in 2013 ● MPI is revaluating the adjusted investment
			Ha Noi Urban railway Line2A	● Cat Linh - Ba La ● Length : 13 km	533	China ODA: 76% Gov: 24%	2015	Under-construction (Delaying) ● Delay and investment increase USD 300 mil ● Plan to complete in mid 2016
			Ha Noi Urban railway Line3	● Nhon - HN - Hoang Mai ● Length : 21 km	1,357	P1: France ODA, AFD, ADB, EIB, Gov P2: ADB, Gov	2018	Under-construction ● P1: Completion plan 2018, but maybe delay ● P2: ADB signed loan contract ($59M) to
			Ha Noi Urban railway Line4	● Dong Anh - Me Linh ● Length : 53 km	-	-	-	Similar BRT route Start after BRT
			Ha Noi Urban railway Line5	● Nam Tay Ho - Hoa Lac ● Length : 41 km	6,100 - 7,500 (Estimating)	JICA	2030	JICA is doing FS
			Ha Noi Urban railway Line6	● Noi Bai - Ngoc Hoi ● Length : 48 km	-	-	-	HN PPC proposed investment plan Wait MOT approve, FS stage
			Ha Noi Urban railway Line7				-	Undevplanning
			Ha Noi Urban railway Line8				-	Under planning
		21	HCM Urban railway Line1	● Ben Thanh - Suoi Tien ● Length : 20 km	2,103	JICA : 89% Gov : 12%	2018	Under-construction
			HCM Urban railway Line2	● Thu Thiem - An Suong ● Length : 20 km	1,374	ADB : 36% Private : 23% Others (Germany, EIB, KFW) : 41%	2017	Planning + bidding process
			HCM Urban railway Line3A, 3B	● Ben Thanh - Tan Kieng	3,300	-	-	3A: JICA Preparatory Survey (1/2016-11/2016)
			HCM Urban railway Line4	● Ben Cat - Nguyen Van Linh ● Length: 33 km	2,500	-	-	Looking for investors
			HCM Urban railway Line5	● Can Giuoc - SG ● Length: 26 km	2,300	ADB: 22% Others (EIB, Spain) : 17% Gov: 61%	2025	Looking for investors
			HCM Urban railway Line6	● Tan Phu - Phu Lam ● Length: 7 km	1,300	-	-	Looking for investors
5. Airport		22	Long Thanh (phase 1)	● Build new airport	7,800	ACV	2025	Preparation of F/S

Source: ADB, JICA, JETRO (Infrastructure Map), DI Interview with JICA and ADB

6-7. Necessary infrastructures to be prioritized highly

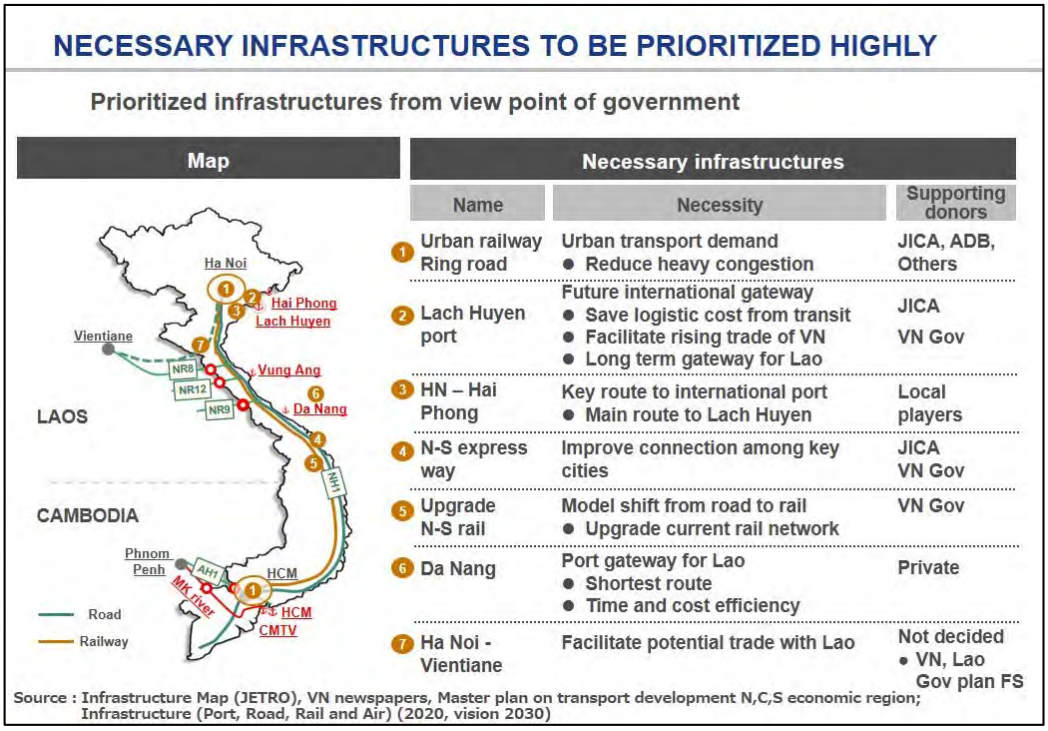

Figure 60: Necessary infrastructures to be prioritized highly

1) Urban railway, ring road:

In recent years, two biggest cities (Ha Noi, HCM) have tackled critical congestion with increasing level. Vehicles (motorcycles, cars) hardly move around these cities with more than 16 km/h speed. Hence, sluggish traffic consume time and cost for city dwellers, business man here which might drag down the economic growth in the near future. With the vital role to Vietnam economy, population of 7 million each and accumulated GDP accounted 35% of total Vietnam's GDP, solving this issue should be top priority. For that reason, many donors including JICA, ADB are actively involved to support Vietnam constructing urban railway and ring road.

2) Lach Huyen port

Lach Huyen port was highlighted as one of the key project in Vietnam as part of economic development plan. Construction of Lach Huyen port as international gateway is at right time to catch rising cargo demand given overload situation in Hai Phong port complex. This port can now handle bigger ship; hence no transshipment required resulted to ample time and cost saving for shippers. According to local logistics companies, Lach Huyen port is expected to respond to the increasing demand from Laos in long term.

3) Ha Noi – Hai Phong express way

Location of biggest port complex (Hai Phong and Lach Huyen), it is understandable that connection between Hai Phong and nearby key provinces rank higher prioritized. Ha Noi, one of most important market with high demand for freight cargo, was always the prioritized city to be urged for improving linkage with other provinces. Consequently, express highway is constructing to connect Ha Noi – Hai Phong funded by local players, and it's completed in December 2015.

4) Upgrade North-South railway

Under the master plan, the Government indicated railway proportion target to reach 1-2% in total freight transport by 2020. This rate was recorded at under 0.5% in 2012. As part of the plan, project to upgrade current North-South railway is considered in short term utilizing the Government budget.

5) North – South express railway

In the long term, Vietnam target to achieve cohesive connection among big cities by providing the more convenient and time saving transport. To that purpose, the North-South express railway was raised and JICA is preparing the proposal.

6) Da Nang port

With geographic landscape, routing to Da Nang port via East West corridor is physically the shortest way from Lao's key cities. However, Lao have not yet fully leveraged the time and cost effective from this distance due to weak capability of this port. The port has yet to feed enough loops resulting high cost and long waiting time for shippers. Instead, considerable trading volume still route via Laem Cha Bang port in Thailand even longer distance. Understand the situation, Provincial Government put prioritization to expand Da Nang port to serve unmet and rising demand from both Lao and Central Vietnam.

7) Ha Noi – Vientiane

In September 2015, Vietnam and Lao signed MOU to mark transport cooperation during 2016-2025. One of the targets is improving the key connection between 2 capital Ha Noi and Vientiane. MOT is discussing for preparation of F/S which will be done by TEDI (Transport Engineering Design Inc.).

Chapter 7: Direction of future development in Indochina region

7-1. Goal for Indochina region

As explained before, Indochina region is a promising area to be expected economic growth and industrial development in the future, but there are various bottlenecks related to infrastructures. In addition, each country in Indochina follow their own directions because of dissimilar industrial policies. For example, Thailand government introduces industrial policies that contradict with border SEZs in neighboring countries, specifically they established new SEZs in the borders with neighboring countries to retain labor intensive industries within Thailand. But, it is considered that Indochina region takes important position as "The Workshop of the World" on the basis of abundant working population achieving peak time and realization of ASEAN Economic Community in the near future. Actually, shifting of manufacturing base from China to Indochina reason is expected given the difficulty to secure labor force and increasing labor cost in China recently. Therefore, in order to consider the development of whole Indochina region, the priority order of future required infrastructures will be considered by defining necessary criteria for economic growth and industrial development of Indochina region as one entity.

In order to realize economic growth and industrial development and make Indochina region to the next "The Workshop of the World", three key criteria are required.

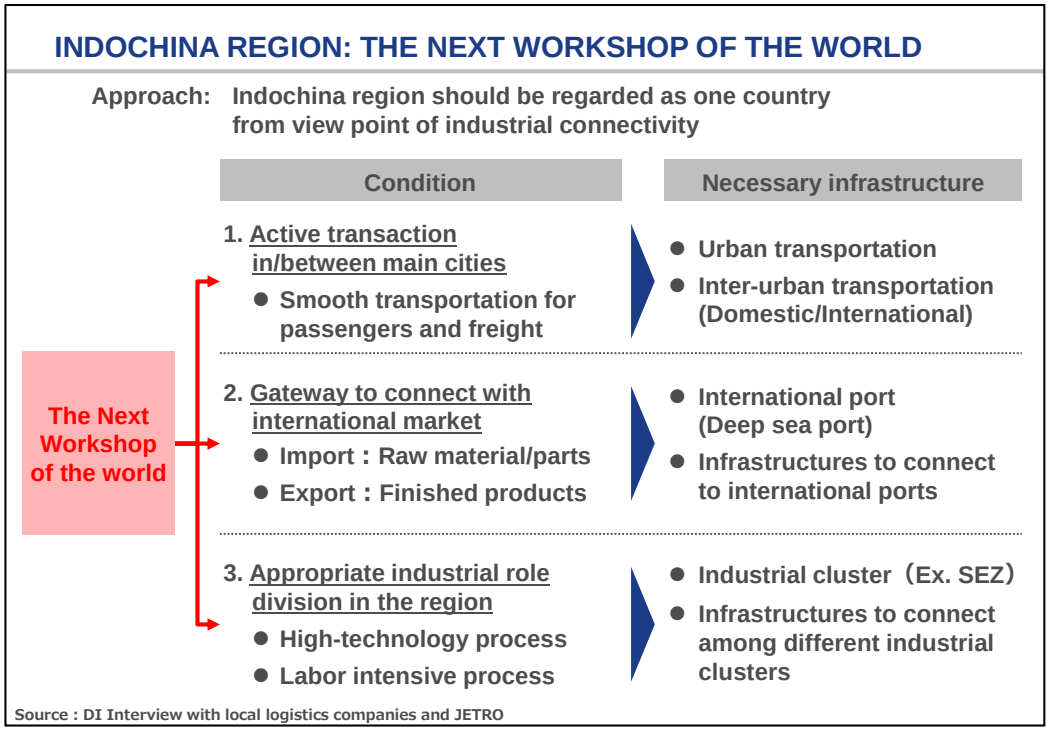

Figure 61: Goal for Indochina region

1. Realize active transaction in/between main cities in Indochina region
2. Establish gateway to connect with international market
3. Realize appropriate industrial role division in Indochina region

First of all, “1. Realize active transaction in/between main cities in Indochina region” means realization of smooth transportation for both passengers and freight by activating and optimizing economic transaction in/between main cities. As explained in analysis of each country from chapter 2 to 6, chronic traffic congestion is social issues in large cities that have big population, and it becomes one hindrance for efficient economic activities. In addition, road networks are still not well-functioned between some main cities, therefore optimal transportation for both passengers and freight is not realized. Especially, many inter-urban infrastructures in Cambodia and Laos are still not sufficient and they are required urgent improvement. In this context, Indochina region is required to develop infrastructures in/between main cities continuously.

Secondly, “2. Establish gateway to connect with international market” takes important role to transact with international market smoothly. Countries in Indochina region still cannot establish whole value chain within each country due to dependence on import of raw materials and industrial machineries. In the aspect of export, Indochina countries need to keep connection with international market because of large export of light industry products (Furniture, Garment and textile etc.) to developed countries (USA, Europe, Japan etc.). In order to import and export effectively, arrangement of ports is indispensable. Especially deep sea ports are required to be utilized by large vessels for long distance transport such as USA and European countries. Besides, related infrastructures to ports are necessary to utilize deep sea port efficiently. For instance, Leam Chabang port has high utilization ratio, but chronic traffic congestion generates inefficient transportation condition due to lack of related infrastructures (express highway, railway). Currently, Leam Chabang port is attracting not only demand from Thailand, but also demand of industrial linkage with Laos and Cambodia. Therefore, urgent improvement is required for other countries as well.

Lastly, “3.Realize appropriate industrial role division in Indochina region” means enhancement of international competitiveness by establishing appropriate industrial role division system corresponding to characteristics of each area in Indochina region and realizing efficient manufacturing system. In Indochina region, Bangkok in Thailand has successfully attracted many factories from global brand and realized high technology industrialization. In contrast, Cambodia and Laos are still engaged in labor-intensive industries. Therefore, some private companies shifted partial function from Bangkok to neighboring countries such as Phnom Penh (Cambodia) and Savannakhet (Laos) due to increasing labor wage in Bangkok. By allocating several functions to other areas, they import raw materials and process in Bangkok,

Thailand, then transport to neighboring countries. After that, partial labor-intensive process is conducted in Cambodia and Lao, and transport back to Bangkok. In Bangkok, products are finalized and export to overseas. Above industrial linkage already starts constructing. It is considered that this industrial role division is developed continuously, therefore, establishing SEZs and transportation infrastructures are indispensable to accelerate these linkages.

7-2. Necessary condition and required infrastructure

7-2.1. Realization of active transaction in/between main cities

Transaction in/between main cities is indispensable to realize active economic activity. Actually, urban transportation is highly demanded for continuous attraction of private investment and realization of efficient economic activity. Inter-urban transportation is also important for smooth product distribution and human transportation. Table 6 shows the population, density and current situation in main cities (Province, City) in each country. Large cities that have more than 5 million populations are suffering from heavy traffic congestion. Especially, economic centers such as Bangkok, Ho Chi Minh, Ha Noi and Yangon are required urgent action to overcome serious traffic issues. Besides, other areas such as Phnom Penh, Nakhon Ratchasima, Chiang Mai, Mandalay and Bago are also necessary to be solved in the near future because of increasing traffic volume. Actually, according to statistics data in local government, the number of registered vehicles is increasing rapidly in these areas such as 8.38 million in Bangkok, 6.73 million in HCM, 5.15 million in Hanoi and 1.53 million in Phnom Penh. On the other hand, Vientiane and Yangon have smaller number of vehicles compared to previous areas, specifically 690 thousand and 430 thousand respectively, but the traffic of each city is concentrated on small areas. Therefore, traffic congestion is being serious more and more.

In addition to urban transportation, inter-urban transportation also has important role to transport passengers and distribute daily necessities. Especially, for Cambodia and Laos in Indochina region, international infrastructures to be connected with neighboring countries are important because these countries cannot produce enough daily necessities in own country and depend on import products from neighboring countries (Thailand and Vietnam). For example, many products for domestic consumption are exported from Bangkok in Thailand to Phnom Penh in Cambodia and Vientiane in Laos, therefore road infrastructures to connect between Bangkok and both cities (Phnom Penh and Vientiane) play crucial role for Cambodia and Laos. As regards to these urban and inter-urban transportation, above actualized issues need to be solved in short term (-3 years). In addition, these transportation infrastructures are required to be sophisticated to realize effective transportation system in middle-long term (-10 years).

Table 6: Population and traffic situation in main cities in Indochina region

Country	Provine/City	Population ('000)	Density (/km2)	Current situation
Thailand	Bangkok	8,280	5,300	Chronic heavy traffic congestion due to increasing cars
	Nakhon Ratchasima	2,620	128	Partial trraffic congestion
	Ubon Ratchathani	1,844	117	No big issue
	Khon Kaen	1,790	164	No big issue
	Chiang Mai	1,678	84	Traffic congestion, Air polution
	Buriram	1,579	153	No big issue
	Udon Thani	1,570	134	No big issue
	Nakhon Si Thammarat	1,544	155	No big issue
	Sisaket	1,465	166	No big issue
	Chonburi	1,421	326	No big issue
Vietnam	HCMC	7,982	3,800	Chronic heavy traffic congestion, Serious air polution
	Hanoi	7,088	2,100	Chronic heavy traffic congestion, Serious air polution
	Thanh Hoa	3,496	314	Bad road condition partially
	Nghe An	3,037	184	No big issue
	Dong Nai	2,839	480	Partial trraffic congestion
	An Giang	2,155	609	No big issue
	Hai Phong	1,946	1,260	No big issue
	Nam Dinh	1,840	1,13	No big issue
	Dak Lak	1,833	139	Bad road condition partially
	Thai Binh	1,787	1,139	No big issue
Cambodia	Kampong Cham	1,680	373	Bad road condition partially
	Phnom Penh	1,501	2,200	Chronic traffic congestion, Not enough traffic facilities
	Battambang	1,036	89	Bad road condition partially
	Banteay Meanchey	677	100	No big issue
	Kampong Chhnang	472	86	No big issue
Laos	Vientiane	1,171	59	No big issue
	Savannakhet	825	38	No big issue
	Champasak	607	39	Bad road condition partially
	Louangprabang	408	24	No big issue
	Sainyabuli	382	23	No big issue
Myanmar	Yagon	7,360	720	Chronic heavy traffic congestion
	Mandalay	6,165	160	Partial traffic congestion
	Bago	4,867	120	Partial traffic congestion
	Mon	2,054	170	No big issue
	Naypidaw	1,160	165	No big issue

Regions which already have serious traffic congestion issue

Potential regions which have serious traffic congestion issue in the near future

Source: Statistics office in each government

Short term: Alleviate traffic congestion in urban area / Solve inter-urban missing-link

- As shown in table 6, chronic traffic congestion is already becoming one of the most serious social issues in some cities, and it is one critical factor to prevent effective economic activity. Especially, the extreme congested situations in Bangkok, Ho Chi Minh, Ha Noi and Yangon are escalating, therefore urgent actions are required from now on due to future expansion of traffic volume. Specifically, construction of urban railway and ring road surrounding cities are required in these cities.
- In addition, construction of inter-urban transportations among cities mentioned in table 6 is also necessary. Currently, some claims have been raised due to disorganized road network and unstable logistics in some cases. For example, national road 13 (Louangprabang - Vientiane - Savannakhet - Champasak) in Laos, which is main inter-urban transportation network for domestic distribution still has bad road condition. Besides, some issues exist in a part of road section to connect between Bangkok and

Phnom Penh and between Bangkok and Yangon which prevent the realization of stable logistics. In order to solve these issues, additional road construction is required to minimize missing-link between main cities.

Middle term: Accelerate modal shift from road transportation to railway transportation

- After realizing minimum level of transportation in/between urban areas, modal shift needs to be considered to achieve more efficient transportation. Actually, logistics cost in Thailand is selected as one of social issues, so Thailand government has plan to promote gradual modal shift. In other countries, construction of railway network is necessary to establish efficient logistics system in middle term. Besides, securing several option for transportation is important from view point of risk management, In fact, Thailand's master plan indicate intention to expand existing railway from single track to double track in many areas and Cambodia is also required to rehabilitate existing destroyed railway. Meanwhile, currently Laos doesn't have any railway network to connect among cities, therefore, constructing new railway should be considered to achieve efficient domestic distribution.

Long term: Realize high-speed railway

- Construction of high-speed railway is also required to be examined to evolve railway transportation network in long term. The plan of high-speed railway needs to be investigated carefully from viewpoints of the necessity and the profitability on the basis of the relationship with demands of express highway and airplane. Currently, Thailand has plan to construct high-speed railway for several routes such as Bangkok-Chiang Mai, Bangkok-Hua Hin, Bangkok-Nong Khai. Likewise, Vietnam is also considering construction of high-speed railway from Ha Noi to Ho Chi Minh, but it's more appropriate to consider this plan in long term.

7-2.2. Establishment of gateway to connect with international market

Indochina region has long coast line, so countries such as Cambodia, Thailand, Myanmar and Vietnam have own sea ports. However, there are only a few deep sea ports even take into account of ports in planning and construction phase. Specifically, Leam Chabang port in Thailand and Cai Mep Thi Vai port in Vietnam are already operating. Besides, Lach Huyen port in Vietnam is now under construction and Dawei port in Myanmar is still under planning. While, Vung Ang port in Vietnam also sometimes regards as deep sea port. In contrast, there are a lot of international ports such as Bangkok port and Map Ta Phut port in Thailand, Cat Lai port and Da Nang port in Vietnam, Phnom Penh port and Shihanoukville port in Cambodia, and Yangon port and Thilawa port in Myanmar. Notwithstanding, the role of international port

will be lessen by shifting to deep sea port given enlarging large vessels for long distance transportation in long term. On the other hand, existing ports, except for deep sea ports, are considered to take a role of international ports focused on Asian transportation.

Table 7 shows the list of current situation and future plan of ports in Indochina region. Leam Chabang port which is already operating is almost full capacity and has plan to expand capacity, but chronic traffic congestion is serious issue because of lacking construction and expansion of related infrastructures. On the other hand, Cai Mep Thi Vai port still have capacity, but waterway from Phnom Penh port to Cai Mep Thi Vai port / Cat Lai port is reaching limit due to heavy traffic congestion. Under these situations, infrastructures to utilize existing deep sea ports need to be upgraded in short term. Besides, infrastructures to effectively utilize Lach Huyen port and Dawei port are also required in middle-long term. Additionally, ports except for deep sea ports are also necessary to be expanded, especially Vung Ang port is increasing the demand from Laos and congestion is being serious. Therefore, expansion of Vung Ang port and related infrastructures are required in short term. In middle-long term, Vung Ang port needs to identify the role division with Lach Huyen port and Da Nang port to develop continuously. Da Nang port cannot secure sufficient demand to fill the capacity so far and need to clarify the role-division with surrounding ports (especially, Vung Ang port), so they need to consider future expansion from long term point of view.

Table 7: Main ports in Indochina region

Country	Port	Type	Depth (m)	Main destination	Current situation
Thailand	Bangkok	River	8.5 – 11	Asia	Overcapacity, Difficult to expand any more
	Map Ta Phut	Sea	9 – 12	Asia	Difficult to expand any more due to resistance by local habitants
	Laem Cha Bang	Sea (Deep)	14 –16	Asia, USA, Europe	Plan to expand (3rd phase) ・Modernize berths, Upgrade capacity
Vietnam	Hai Phong	Sea	5 – 9	Asia	Expand wharf in one port ・Just approved by Gov in Oct '15
	Lach Huyen	Sea (Deep)	14	Asia, USA, Europe (Plan)	Under construction (completed in September, 2017)
	Cat Lai	River	10–12	Asia	Heavy congestion ・Many delay the shipper
	Hiep Phuoc	River	9.5	Asia	Seeking fund for dredging 2nd phase (9.5=>12m) ・Just complete (1st phase: 9=>9.5m)
	Cai Mep Thi Vai	Sea (Deep)	12–14	Asia, USA, Europe	Limited loop lead (under capacity) ・Modernize berths ・Upgrade capacity
	Vung Ang	Sea	11 – 13	Asia	Building 3rd wharf to reduce congestion ・Plan to construct 9th wharf by Laos company
	Da Nang	Sea	9 – 10	Asia, Domestic	Expand Tien Sa port ・Increase depth to 14m
Cambodia	Phnom Penh	River	4.5 – 5.5	Vietnam, Domestic	Plan for expansion ・Build new wharf sponsored by China
	Sihanoukville	River	10.5 – 11.5	Asia	Under-expansion ・Build new wharf sponsored by China
Myanmar	Yangon	River	9	Asia	Heavy congestion ・JICA granted for improving piloting system
	Thilawa	River	9 – 10	Asia	Under construction (completed in 2017)
	Daiwei	Sea (Deep)	20	Asia, USA, Europe (Plan)	Plan to construct

Source: Website of each port operator, JETRO

Short term: Effective utilization of existing international deep sea ports / Role division and continuous utilization of other existing international ports

- Leam Chabang port and Cai Mep Thi Vai port, which already start operating in potential main gateway of deep sea port in Indochina region, are required to sophisticate infrastructures to be utilized effectively. Specifically, the congestion in Leam Chabang port will become more serious due to future expansion, so construction of infrastructures is indispensable. The railway from Bangkok (Lat Krabang) already upgraded to double track, but the congestion is still one bottleneck because express highway from Bangkok terminates on the way to Leam Chabang port. Cai Mep Thi Vai port attracts demand of transshipment from Phnom Penh port, but the capacity of Cho Gao canal which connects between Mekong River and Soi Rap River is lacked. Therefore, expansion and dredging projects are conducted and planned by Vietnamese government. In addition, land transportation from Phnom Penh to Ho Chi Minh is also necessary to be improved.
- Regarding other existing ports, Vung Ang port and Da Nang port in Vietnam, Sihanoukvilleville port in Cambodia and Thilawa port in Myanmar which receives increasing demand from Yangon port also doesn't have enough infrastructures related to ports, so these infrastructures need to be upgraded.

Middle term: Establishment of north gateway (Lach Huyen port) in Indochina region

- After completing Lach Huyen port, this port needs to become north gateway in Indochina region in middle term. Currently, Vientiane and Savannakhet in Laos are utilizing Leam Chabang port in many cases, but Lach Huyen port has possibility to acquire the demand from Leam Chabang port after completing surrounding infrastructures (road between Vientiane-Ha Noi, etc.) because the capacity of Leam Chabang port is expected to reach limit soon. Therefore, in order to utilize Lach huyen port effectively, constructing infrastructures to connect between Vietnam and Laos is indispensable.

Long term: Establishment of west gateway (Dawei port) in Indochina region

- Dawei port will take a position of main port as west gateway in Indochina region in long term. Currently, this port is under planning and it takes time to be realized, but Dawei port is quite potential port as the base for export in Indochina region in the future because this port locates in west of Malay island and can easily access to India, European countries and east coast of USA without passing Strait of Malacca. Therefore, development of SEZs surrounding Dawei port and south economic corridor which connects from Bangkok to Dawei port is necessary in long term.

7-2.3. Realization of appropriate industrial role division in Indochina region

There is still large gap among 5 countries in Indochina region (Thailand, Vietnam, Myanmar, Cambodia and Laos) regarding to level of industrial clusters and labor cost in each country. Consequently, the case of role division responding to characteristics in each country is increasing now and in the future to realize more efficient production. Presently, Bangkok in Thailand is the center of high-tech industry, so neighboring countries (Cambodia and Laos) establish SEZs near the border with Thailand and cooperate with high-tech processing in Bangkok. Table 8 shows the example of current industrial role division between countries, but all examples are the case of Bangkok with surrounding areas, namely Phnom Penh and Koh Kong in Cambodia and Savannakhet in Laos where labor intensive process is conducted. Besides, Poipet near the border with Thailand in Cambodia, Thakhek and Champasak (Pakse) in Laos and Myawaddy in Myanmar are also remarkable areas to establish industrial role division with Thailand in the future.

Table 8: Examples of industrial role division between Thailand and neighboring countries

High-tech process	Labor intensive process	Company	Role division	Status
Thailand (Bangkok)	Cambodia (Phnom Penh)	Denso	Outsource processing of automobile parts to factory in Phnom Penh and finalize products in Bangkok	Established
		Minebea	Outsource processing of small motor to factory in Phnom Penh and finalize products in Bangkok	Established
Thailand (Chonburi)	Cambodia (Phnom Penh)	Marunix	Outsource processing of wire harness to factory in Phnom Penh and finalize products in Chonburi	Established
Thailand (Bangkok)	Cambodia (Koh Kong)	Yazaki	Outsource processing of wire harness to factory in Koh Kong and finalize products in Bangkok	Established
Thailand (Bangkok)	Laos (Savannakhet)	Nikon	Outsource processing of camera parts to factory in Savannakhet and finalize products in Bangkok, after that export	Established
		Toyota Boshoku	Outsource processing of automobile seat to factory in Savannakhet and finalize products in Bangkok, after that export	Established
Thailand (Chonburi)	Cambodia (Poipet)	ToyotaTsusho	Plan to outsource processing to factory in Poipet and finalize products in Bangkok	Commited
		NHK		Commited

Source: JETRO, NNA, DI Interview with JETRO

In contrast, Thailand government also has plan to establish SEZs near the border with neighboring countries to prevent outflow of labor intensive process, but the plan has yet to accomplish because minimum wage of labor in Thailand is higher than neighboring countries. As a result, industrial role division initiated from Bangkok will expand contentiously. In order to accelerate above trend, development of infrastructures is indispensable. In short term, infrastructures between existing SEZs and Bangkok need to be upgraded, and new SEZs in neighboring countries from Thailand are also required infrastructures to connect with Bangkok in middle term. Especially, Myanmar is considered to accelerate cooperation with Thailand, but infrastructures connecting to the border with Thailand are still not well developed. Therefore, these infrastructures need to be improved in middle term.

In addition to industrial role division with Bangkok, Ha Noi in Northern Vietnam arises as a new promising area for high-tech processing to realize industrial role division. In reality, many large corporations such as Samusung and LG electronics is establishing large manufacturing base in Northern Vietnam, and this area has possibility to become second high-tech processing hub in Indochina region. In this context, infrastructures surrounding Northern Vietnam (Ha Noi), especially connectivity with Northern Laos, will become more important.

Short term: Development of infrastructures to accelerate cooperation between Bangkok and existing border SEZs

- As explained above, industrial role division with Bangkok is expanding in Indochina region, and this trend seems to accelerate in existing SEZs such as Phnom Penh, Koh Kong and Savannakhet. Since these SEZs located nearby the border with Thailand, transportation served for these industrial transactions mainly use Thailand's infrastructures, where no issue has been found. But, custom clearance facilities in borders (Aranyaprateth-Poipet and Nongkhai-Vientiane) and infrastructures in neighboring countries (Battambang-Sisophon in Poipet-Phnom Penh) appear to be current bottlenecks, hence these infrastructure should be improved in short term.

Middle term: Development of infrastructures to accelerate cooperation between Bangkok and new border SEZs

- In addition to existing SEZs that have cooperation with Bangkok, new SEZs will also increase to realize industrial role division. Poipet (Cambodia), locates in the border with Thailand, is constructing SEZ and anticipate future cooperation with Bangkok. Besides, Thakhek, Champasak (Pakse) in Laos and Myawaddy in Myanmar are also potential to be new partners with Bangkok. However, infrastructures are still not well-established to fully connecting Bangkok with these areas. For example, national road 16 connect from (Champasak) Pakse to Vantao, a city located in border with Thailand, is in bad condition. Therefore, transporters sometimes have turned their direction to north, pass through Savanakhet, then go down to Bangkok. Regarding role division between Thailand and Myanmar, road from Maesot in Thailand to Myawaddy in Myanmar is one bottleneck. Mutual traffic could be realized by constructing bypass road from Myawaddy to Kawkareik, but some parts of infrastructures are not enough to facilitate smooth transportation. Therefore, improvement of these infrastructures is required.

Long term: Development of industrial role division with Northern Vietnam (Ha Noi)

- Following industrial role division with Bangkok, Ha Noi area is second promising area to realize industrial role division. After realizing industrial connection with Northern Vietnam, cooperation with central-north Laos (Vientiane, Thakhek、Savannakhet, etc.) will be important. Establishment of infrastructures for long term industrial role division is necessary to be considered, like current discussed plan of express highway from Ha Noi to Vientiane.

7-3. Step of infrastructure developments for Indochina region

7-3.1. Necessary infrastructures in each phase (Overall image)

As explained in before (7-2), necessary infrastructures are considered from view point of short term, middle term and long term. It is shown in Figure 62 below

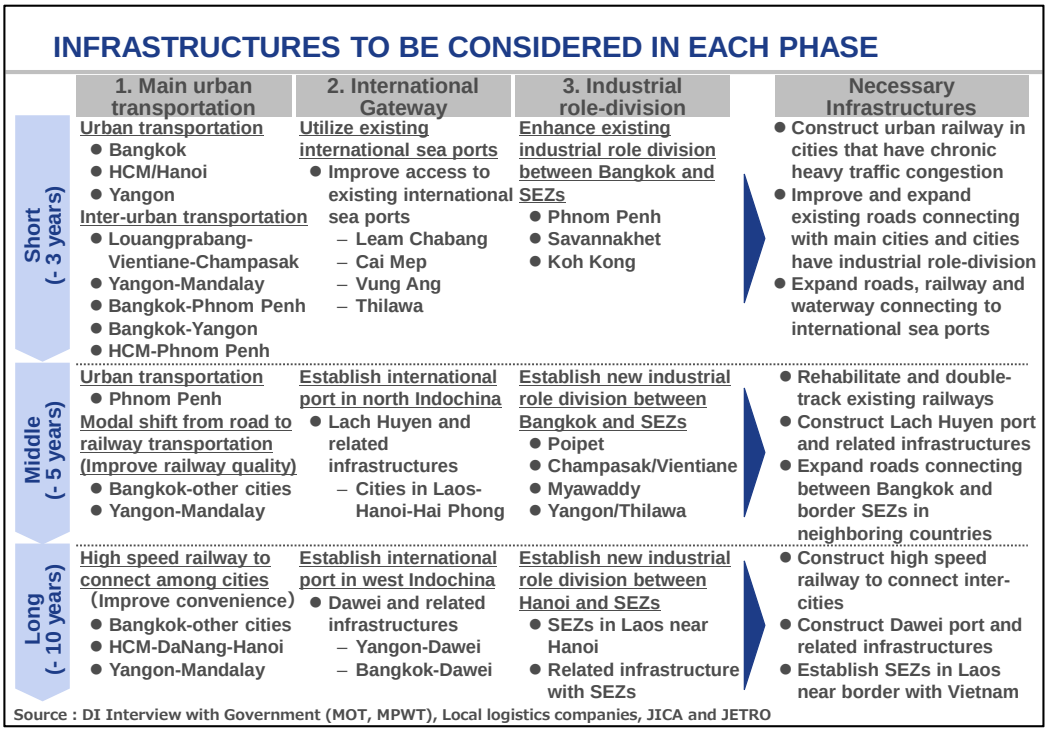

Figure 62: Necessary infrastructures in each phase (Overall image)

7-3.2. List of main infrastructures to be considered in short term

- Bangkok urban transportation (Thailand): Urban railway
- Ho Chi Minh urban transportation (Vietnam): Urban railway, Ring road
- Ha Noi urban transportation (Vietnam): Urban railway, Ring road
- Yangon urban transportation (Myanmar): Urban railway, Ring road
- Louangprabang- Vientiane-Savannakhet-Champasak (Laos): NR13
- Yangon-Nepitaw-Mandalay (Myanmar): AH1
- Bangkok-Sakaeo-Poipet-Phnom Penh (Thailand-Cambodia): NR5 (Cambodia)
- Bangkok-Tak-Maesot-Myawaddy-Yangon (Thailand-Myanmar):
  NR12 between Tak-Mesot (Thailand), AH1 between Kawareik –Thaton (Myanmar)
- Ho Chi Minh-Bavet-Phnom Penh (Vietnam-Cambodia): NR1 (Cambodia)
- Leam Chabang port and related infrastructures (Laos, Cambodia-Thailand): Port expansion, Bang Na-Chon Buri express highway
- Cai Mep Thi Vai port and related infrastructures (Cambodia-Vietnam): Waterway from

Phnom Penh port (Cho Gao canal between Mekong river and Soai Rap river)

- Vung Ang port and related infrastructures (Laos-Vietnam):
  Port expansion, NR8 (Laos), NR12 (Laos)
- Thilawa port and related infrastructures (Myanmar): Port construction, Bridge
- Bangkok-Mukdahan-Savannakhet (Thailand-Laos): Bangkok-Mukdahan road

7-3.3. List of main infrastructures to be considered in middle term

- Phnom Penh urban transportation (Cambodia): Ring road
- Bangkok-Nakhon Ratchasima-Khon Kaen-Udon Thani-Nong Khai-Vientiane (Thailand): NR2, Railway expansion
- Bangkok-Buriram-Sisaket-Ubon Ratchathani (Thailand): Railway expansion
- Bangkok-Tak-Chiang Mai/Chiang Rai (Thailand): Railway expansion
- Bangkok-Chonburi-Rayong (Tahiland): NR3 expansion, Express highway
- Yangon-Nepitaw-Mandalay (Myanmar): Ayeyarwady waterway, Railway
- Lach Huyen port and related infrastructures (Laos-Vietnam) : Port construction, NR8 (Laos), NR12 (Laos), NR13 (Laos), Ha Noi-Hai Phong Express highway (Vietnam), Ha Noi-Vientiane Express highway (Laos-Vietnam)
- Bangkok-Champasak (Thailand-Laos): NR16 (Laos)

7-3.4. List of main infrastructures to be considered in long term

- Bangkok-Nakhon Ratchasima-Khon Kaen-Udon Thani-Nong Khai-Vientiane (Thailand): High-speed railway
- Bangkok-Tak-Chiang Mai/Chiang Rai (Thailand): High-speed railway
- Ha Noi-Da Nang-Ho Chi Minh (Vietnam): High-speed railway
- Bien Hoa-Vung Tau (Vietnam): Express highway
- Ho Chi Minh-Can Tho (Vietnam): Express highway, Railway
- Yangon-Nepitaw-Mandalay (Myanmar): Express highway
- Dawei port and related infrastructures (Thailand-Myanmar): Port construction, NR323 (Thailand), Sinbyudaing-Dawei road (Myanmar), AH112 (Myanmar)
- Da Nang port and related infrastructures (Laos-Vietnam): Port expansion, NR9 (Laos), NR16 (Laos)

Chapter 8: Potential infrastructure supported by JICA-ADB collaboration

8-1. Role of JICA and ADB collaboration

In order to define potential infrastructures supported by JICA-ADB collaboration, necessity of cooperation between both institutes is clarified. Expected cases required collaboration by JICA and ADB are below patterns. In this chapter, infrastructures in list (7-3) considered in each phase are screened from 3 viewpoints.

1. Case to require large amount of loan due to large scale projects
2. Case to need technical assistance (such as dispatch of specialists) from JICA
3. Case to contribute to the improvement of connectivity among Indochina region

Regarding first criteria, as explained in Chapter 1 of this report, JICA and ADB committed to offer 110 billion USD for infrastructure projects in Asia over the next 5 years and are considering co-finance by JICA and ADB. Therefore, budget is needed for allocation to infrastructure projects required relatively enormous investment through this scheme. Specifically, construction of railway and express highway which are planned recently is one target.

The second criteria is considered as one of the important factor to maintain high quality infrastructures. Long term support programs such as dispatch of specialists are one kind of effective model. From viewpoint of the operation, there are some cases that could not achieve sufficient output despite funding support exists. Therefore, JICA-ADB collaboration scheme is effective in the case of projects which require coherent support by specialists. Particularly, technical assistance for execution management should be a critical need at the construction phase in order to ensure international roads that qualified ASEAN standard, easing freight trucks to go through. After completing international road, regulation for weight limit is necessary to utilize constructed road continuously. In addition, custom clearance system and traffic regulation for international trucks are required to be improved for international truck to pass every countries smoothly. Therefore, it needs to be considered at high priority in the case that required soft infrastructure systems like above.

Third criteria is indispensable to consider the future development of whole Indochina region. Both JICA and ADB need to consider the support from viewpoint of optimization in whole region because international infrastructures are not always high priority from view point of optimization in each country. Therefore, international roads to contribute to enhancement of cooperation among Indochina region and international ports that take a role of international gateway in Indochina region in Chapter 7 should be prioritized to develop.

8-2. Prioritized infrastructures to be supported

8-2.1. Hard infrastructures (Road, Railway, Port)

<Short term (- 3years)>

1. Bangkok-Sakaeo-Poipet-Phnom Penh (Thailand-Cambodia)

- NR5 from Phnom Penh to Poipet (Cambodia) expansion

Road from Bangkok to Phnom Penh has an important role for import/export and industrial role division between Thailand and Cambodia. Regarding to import/export between two countries, import from Thailand is dominating transaction, mostly fast moving consumer goods (FMCG) and durable consumer goods from Bangkok to Phnom Penh. Sea transportation is prominently account at around 50% of total transportation between these countries due to cheap transportation cost. However, the route from Leam Chabang port to Shihanoukville port requires two weeks as ships must go through Singapore. On the other hand, land transportation takes only one day, hence food and spare parts with urgent requirement tend to utilize land transportation. In fact, AEON, recently opened in Phnom Penh, highly depends on imported products from Bangkok which require regular container truck transportation. Above transaction will increase responding to economic growth in Cambodia. In this context, this road will have more important role in the near future. Besides, industrial role division between Bangkok and Phnom Penh has already existed, and the relationship will also increase between Bangkok and Poipet SEZ which locates near border with Thailand. This road also take main position for industrial role division between Thailand and Cambodia. However, currently some parts of NR5 still remain some problems of inadequate pavement and insufficient lanes. Especially, road between Battambang and Sisophon has bad road condition, and it prevents efficient logistics. Therefore, road expansion of NR5 needs to be considered at high priority.

NR5 has been supported by donors including JICA continuously, currently JICA is supporting detailed design between Battambang and Sisophon. Besides, commitment for road expansion between Thlea Ma'am and Battambang, and between Sisophon and Poipet have been actualized via loan agreement signed in March, 2015 and is scheduled to expand road until 2020. In addition, railway from Phnom Penh to Poipet has been exist for decades which seriously destructed by the landmines in 2008, is rehabilitating by Cambodia government

2. Bangkok-Tak-Maesot-Myawaddy- Yangon (Thailand-Myanmar)

- NR12 from Tak to Maesot (Thailand) expansion
- AH1 from Kawareik to Thaton (Myanmar) improvement and expansion

Road between Bangkok and Yangon plays important role for both of import/export and industrial role division between Thailand and Myanmar. Especially, road from Bangkok to Tak-Maesot, Myawaddy, Kawkareik, Eindu, Thaton, Kyaikto, HpaYarGyi to Yangon is the

most major road for land transportation. Sea transportation from Thailand to Myanmar takes longer time (around 2 weeks) than land transportation (only one day) due to going through Malay Peninsula. Therefore, land transportation can shorten a lot of time compared to sea transportation. Many kinds of products such as food and consumer goods will be imported from Thailand through this route in responding to the growth of Myanmar economy. In addition, cities like Myawaddy and Mawlamyine are expected as a base for future industrial role-division with Thailand, so this road will take important role for industrial development. Currently, road condition is too bad to transport precision machinery and sea transportation is major form for this transaction, but rapid expansion of demand is expected responding to future economic development in Myanmar. The road condition has been improved with the implementation of new bypass road from Myawaddy to Kawkareik in 2015 which supported by ADB. Mutual transportation currently get better than before where only one-way transportation per one day back then. However, some issues still remain in road from Yangon to Mawkamyine. In addition, road between Tak and Maesot in Thailand is still one lane for one direction, so it cannot fully handle expanding demand from Thailand to Myanmar.

AH1 in Myanmar has been supported by ADB continuously such as bypass road as explained before, and ADB also decided to support finance (100 million USD) to improve road between Kawareik and Eindu. Besides, ADB is also considering to offer the loan for road between Eindu and Thaton. In terms of NR12 between Tak and Maesot in Thailand, expansion project is existing, but donor is not decided.

3. Ho Chi Minh-Bavet-Phnom Penh (Vietnam-Cambodia)

- NR1 from Phnom Penh to Bavet (Cambodia) expansion

Road from Ho Chi Minh, Bavet to Phnom Penh has an important role for cooperation between Vietnam and Cambodia. Currently, import/export between Ho Chi Minh and Phnom Penh utilizes this road or waterway through Mekong River. Especially, food requires short time transportation, so regular land transportation is operated from Ho Chi Minh to Phnom Penh. Besides, import/export between Cambodia and other countries utilize Vietnamese ports (Cat Lai port, Cai Mep Thi Vai port) in many cases. In this point of view, transportation between Phnom Penh and Ho Chi Minh needs to be sophisticated. Currently, river transportation is dominating at around 70% because of cheap transportation cost. However, it is operated with some limitation due to fluctuated level of water by natural condition and is reaching to full capacity of waterway. Therefore, improvement of land transportation is indispensable to secure alternative stable transportation network. In addition to realization of smooth transaction for increasing demand between Vietnam and Cambodia, effective utilization of Cai Mep Thi Vai port, which is the second international deep sea port following Leam Chabang port in

Indochina region, requires improvement of this road. Up to now, NR1 in Cambodia has only one lane for one direction, and it's difficult to deal with future expanding demand. Therefore, additional road expansion should be considered.

About NR1 from Phnom Penh to Bavet, JICA is supporting feasibility study for expressway and it will be completed in 2016. Regarding road in Vietnam side, KOICA is considering to do feasibility study for the road between HCM and Moc Bai. Besides, express highway to connect between Can Tho and Phnom Penh is considered, and Italian Thai Development Public in Thailand tried to commercialize after feasibility study, but they decided to withdraw due to lack of funding. Currently, this project is not proceeding.

4. Leam Chabang port and related infrastructures (Cambodia, Laos, Thailand)

- Bang Na-Chon Buri express highway expansion between Bangkok and Leam Chabang port

Leam Chabang port is main international deep sea port in Indochina region, and it is utilized as a gateway to all over the world including USA and Europe. The users are not only in Thailand, but also companies in Laos, where doesn't have any sea ports. Consequently, infrastructures to connect between main cities and Leam Chabang port need to be improved. Besides, industrial role division with Bangkok outsources labor-intensive processes from Bangkok to cities in neighboring countries (Phom Penh, Koh Kong, Vientiane, Savannakhet, etc.), after that products are transported back to Bangkok after finishing some processes. In Bangkok, pro inducts are finalized and exported to overseas, so Leam Chabang port also take important role in industrial role division. This port is considered as one of the main international gateway in Indochina region in the future, and future demand is also expected to increase. Therefore, continuous expansion plan is existing. But, this port is locating in 135 km south east from Bangkok and almost freights go through Bangkok city. As a result, this port causes serious traffic congestion surrounding Bangkok city. Main transportation from Bangkok to Leam Chabang port is railway or road. Regarding railway, it's possible to transport from Lat Krabag, which locates in 30 km east from Bangkok. This railway has already completed upgrade to double track, but it requires further improvement for more convenient condition. On the other hand, express highway from Bangkok to Leam Chabang port is finished at Chon Buri, so it is required to be improved to resolve heavy traffic congestion. The extension of this express highway can contribute to not only Thailand economy, but also to neighboring countries.

Currently, Joint Venture between Japan Railway Freight and Toyota Tsusho is doing investigation for commercialization to connect 470 km between Leam Chabang and Sakaeo, which locates in border with Cambodia.

5. Cai Mep Thi Vai port and related infrastructures (Cambodia, Vietnam)

- Expansion of Cho Gao canal between Mekong River and Soai Rap River

As explained in transportation from Ho Chi Minh, Bavet to Phnom Penh, Cai Mep Thi Vai port has important function for Cambodia as international deep sea port. In order to expand export from Cambodia, cooperation with Cai Mep Thi Vai port (and Cat Lai port) needs to be enhanced. But, river transportation from Phnom Penh, which is dominating around 70% of total transportation, has some bottlenecks. Freights from Phnom Penh port are transported to ports in Vietnam through Mekong River by barge. On the way, transportation on the sea is dangerous for barge, so it is utilized route from Mekong River to Soai Rap River in many cases. However, Cho Gao canal to connect between Mekong River and Soai Rap River is very narrow route, so it becomes bottleneck to connect between Phnom Penh port and ports in Vietnam due to heavy congestion. Therefore, it doesn't have enough capacity to cope with increasing demand in the future. In addition, Cho Gao canal is utilized for demand from Mekong Delta area, which is expected future growth. From above viewpoints, expansion of Cho Gao canal is indispensable to utilize Cai Mep Thi Vai port effectively as international deep sea port in Indochina region in the future.

Expansion work for this canal is proceeding by support from Vietnamese government, but it is required to improve continuously to develop Cai Mep Thi Vai port, which becomes important gateway in Indochina region.

6. Vung Ang port and related infrastructures (Laos, Vietnam)

- Vung Ang port expansion
- NR8 between Viengkham and Nam Phao (Laos) upgrade
- NR12 between Thakhek and Na Phao (Laos) upgrade
- NR13 between Vientiane and Viengkham (Laos) upgrade

For Laos as inland country, securing ports in neighboring countries is indispensable. In this context, Vung Ang port which locates in Ha Tinh province is one of the candidates. Actually, Vung Ang port is already invested by Laos proactively, for example, Laos company establishes new Joint Venture with Vietnamese company in Vung Ang port. Recently, demand in Vung Ang port is increasing rapidly because of development of SEZs in Savannakhet and Thakhek, where locates in central-north Laos. Besides, Vung Ang port is one of the nearest sea ports from Vientiane by passing NR13 in Laos, and Leam Chabang port will reach full capacity in the future, therefore it is expected to shift a part of demand form Leam Chabang port to Vung Ang port. As a result, Vung Ang port has possibility to be promising port backed-up by future economic growth and industrial development in Laos. Currently, Vung Ang port doesn't have enough capacity to accept increasing demand, so expansion of capacity is necessary in short

term. But, expansion should be conducted gradually because of necessity of role division with large international ports such as Leam Chabang port and Lach Huyen port, which will be completed in 2017. Regarding to related infrastructures, NR8, NR12 and NR13 in Laos to connect to Vung Ang port from main cities in Laos still not have enough capacity, so future improvement is required.

Vung Ang port has expansion plan for 9th wharf in parallel with construction of 3rd wharf by joint venture with Phongsavanh group and Vietnam-Laos Vung Ang Port Company. In addition, NR8 is considered to be upgraded and feasibility study will be conducted with support from KOICA. On the other hand, NR12 was also considered upgrading project, but JICA cannot support this road because last 15km to border with Vietnam locates in national park.. But, NR12 passes national park in Laos, so it's difficult to expand more. Moreover, NR13 between Vientiane and Paksan is scheduled to be developed by utilizing PPP scheme until 2020.

7. Bangkok-Mukdahan-Savannakhet（Thailand-Laos）

- Road between Bangkok and Mukdahan (Thailand) upgrade

Savannakhet in Laos, which locates near the border with Thailand, is promising area to attract industrial clusters in the future, and examples of industrial role division with Bangkok has already existed. For example, Japanese manufacturers such as Nikon and Toyota Boshoku already have established factories in Savannakhet, and cooperated with Bangkok. In addition, Japanese logistics players are also entering actively with establishment of logistics base, and it is expected to connect with Da Nang port in Vietnam in the near future due to short distance. Besides, Savannakhet locates on the way of east-west economic corridor, so additional expansion of demand is expected in the long term. Notwithstanding, transaction between Da Nang port and Savannakhet has not achieved enough volume as east-west economic corridor currently plan, so logistics between both areas will not boom in the short time. On the other hand, players use Leam Chabang port instead for transportation from/to Savannakhet to/from Bangkok via shortest route through Mukdajam in many cases due to more convenience and cost effective. Currently, there is no serious bottleneck in this road, but expansion requirement will be large responding to increasing demand from now on.

Thailand government is considering to expand road between Bangkok and Mukdahan, but existing national park is one bottleneck. Therefore, road expansion plan which makes a detour by digging tunnel is also considered.

<Middle term (- 5years)>

8. Bangkok-Champasak (Thailand-Laos)

- NR16 between Vangtao and Pakse (Laos) upgrade

Champasak area locates in Bolaven highlands, which is famous as a production area for highlands agricultural products. Besides, Pakse, which is the city near border with Thailand and Cambodia, is approved as one SEZ focusing on SME (small medium-size enterprise). Currently, some Japanese companies has already decided to invest in this area. Responding to above movement, Champasak is potential area to attract investment and cooperate with Bangkok for industrial role division in middle term. But, road from Pakes to Vangtao, which is border city with Thailand, has inadequate quality for logistics purpose, so many players are utilizing longer route by go north to Savannakhet pass by Mukdahan before heading to Bangkok.

Currently, road from Pakes to Vangtao, border city with Thailand is being upgraded by Douangdy Road and Bridge Construction Company by BOT scheme, and it will be completed in 2015. Besides, Pakse Bridge which was supported by JICA grant project has only two lanes, but this bridge attracts large traffic volume of cars and bikes. Therefore, this bridge is becoming one bottleneck for truck transportation due to a lot of traffic accidents. In order to solve this issue and improve future connectivity, construction of bypass road and new bridge need to be considered.

9. Lach Huyen port and related infrastructures (Laos, Vietnam)

- Lach Huyen port construction
- NR8 between Viengkham and Nam Phao (Laos) upgrade
- NR12 between Thakhek and Na Phao (Laos) upgrade
- NR13 between Vientiane and Viengkham (Laos) upgrade

Lach Huyen port is considered to become one of the main international ports in Indochina region, and it is expected to be north gateway in Indochina region in middle term. Currently, Leam Chabang port in Thailand and Vung Ang port in Ha Tinh province, Vietnam are taking the role as international port, but some of increasing demands will be shifted to Lach Huyen port as future international deep-sea port. Actually, the capacity of Leam Chabang port is expected to reach limitation in the near future, and Vietnamese government regards Lach Huyen port as main international port (not Vung Ang port). In the context, Lach Huyen port will be key port in Indochina region. Currently, domestic transportation infrastructures to connect from Ha Noi to Hai Phong and Lach Huyen port are under construction, and infrastructures to connect with Laos is also required to realize linkage with cities in Laos in middle term. Specifically, the upgrade of NR8 and NR12 is necessary, it’s the same road as

infrastructures related to Vung Ang port. In addition, NR13 between Vientiane and Viengkham has also important role to connect between Vientiane and Lach Huyen port, so the upgrade is also needed.

As aforementioned above, NR8 is under feasibility study supported by KOICA. NR12 was also considered upgrading project, but donors have some hesitations to support this road because last 15km to border with Vietnam locates in national park.NR13 between Vientiane and Paksan finished feasibility study, and it will be upgraded to 2020. Besides, express highway from Ha Noi to Vientiane is scheduled to investigate the possibility of commercialization.

<Long term (- 10years)>

10. Dawei port and related infrastructures (Thailand, Myanmar)

- NR323 between Bangkok and Kanchanaburi (Thailand) upgrade
- Road between Sinbyudaing and Dawei (Myanmar) construction
- AH112 between Yangon, Mawlamyine and Dawei (Myanmar) upgrade

Dawei port locates in west side from Malay Peninsula, which has the most convenient location accessing to Europe and the east cost of USA in Indochina region. Consequently, it is expected to be the west gateway in Indochina region in long term. Besides, industrial role division with Bangkok will be established in the future due to short distance from Bangkok. Actually, Thailand government is supporting the development of Dawei SEZ proactively, and industrial role division between Thailand and Myanmar is considered. But, the development of Dawei port is facing difficulties because of unsuitable geographical condition and lacking of labor force for industrial clustering. This means long term development is required. Part of prevention to Dawei development is the long distance from Yangon, so infrastructures to connect with this city need to be considered for improvement. Besides, road construction from Bangkok and Dawei needs to be constructed because of uncompleted road.

Currently, road expansion plan between Bangkok and Kanchanaburi is existing and under bidding process, so it is expected to be improved in the near future. In addition, the road between Sinbyudaing and Dawei is constructed by Italian Thai Development Public Co in Thailand. Regarding to AH112 between Yangon, Mawlamyine and Dawei, some donors pay attention to support. Currently, feasibility study is being conducted by support from JICA.

11. Da Nang port and related infrastructures (Laos, Vietnam)

- Da Nang port expansion
- NR9 between Savannakhet and Densavan (Laos) upgrade
- NR16 between Pakse, Sekong and Dakchung (Laos) upgrade

Da Nang port locates at destination of east-west economic corridor, and it has possibility to have important role as east base in Indochina region in the future. Actually, Savannakhet has already attracted some Japanese companies and have some demand for Da Nang port. In order to adopt these demands, Japanese logistics companies are entering in this area. However, Da Nang port needs to be considered from long term view point because of undeveloped infrastructures and current limited demand. In long term, it should be considered as the main transportation route from Pakse to Da Nang for agricultural products and minerals. Consequently, industrial clustering and cooperation with Da Nang port will be proceeded. Currently, continuous upgrade of infrastructures is progressing due to undeveloped road.The expansion plan of Tien Sa in Da Nang port is considered by private investment.

Regarding to NR9 between Savannakhet and Densavan was already rehabilitated partially by support from JICA and ADB. The remaining parts are rehabilitated by Laos government budget. About NR16, the road between Pakse and Sekong is being rehabilitated by Somsay Chaleun Construction Company. The road between Sekong and Dakchung, which is border with Vietnam is upgraded by BOT scheme. Sekong Bridge in NR16 is supported by JICA for design investigation.

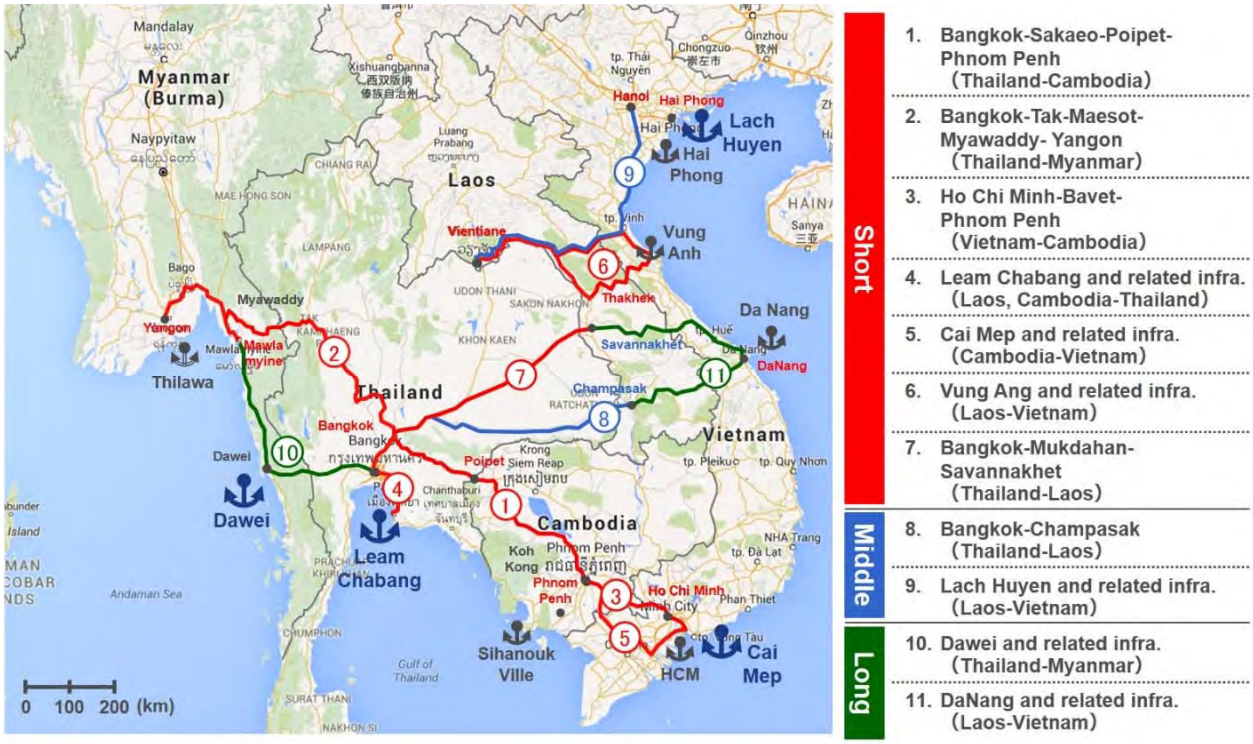

Figure 63: Infrastructure list to be considered at high priority

8-2.2. Soft infrastructure (Custom, Regulation, Quality management)

In order to realize close connectivity with neighboring countries, soft infrastructures also have important role in addition to previous hard infrastructures. Regarding international logistics, it seems to be difficult to achieve active transaction with neighboring countries unless custom clearance procedure, regulations related to road transportation and management policy of infrastructures in each country are standardized. In short, soft infrastructure has been mentioned as a critical issue by private companies and governmental officers.

Custom clearance/Border facility

One of the most intense matters causes inefficient international logistics is the system of custom clearance, in which, paper documents are still utilized instead of E-Clearance. Especially in Cambodia, some custom clearance application is processed in Phnom Penh, so it requires very long time. In other example, custom clearance operation at the border between Thailand (Maesot) and Myanmar (Myawaddy) is not changed though increasing regular mutual transportation. Therefore, logistics time is not reduced sufficiently. Besides, the operation of border facilities to wait for custom clearance procedure at Le Thanh border in Vietnam is monopolized by one company, causing extremely high fee for facility utilization. Moreover, shortage of qualified border facilities in Poipet (Cambodia) and Vientiane (Laos) causes longer time to process custom clearance. In addition, unreasonable toll and bribe happen in some cases by police offices and governmental departments except for custom clearance lead to increase logistics cost.

In order to improve connectivity among Indochina regions, simplifying custom clearance procedure and enhancing border facilities are necessary by cooperation among Indochina countries. Especially, given the indispensable road of standardization among all countries, the support from JICA and ADB collaboration seems to be effective from viewpoint of neutral third parties because conversations between two countries have some conflicts of interest in many cases.

Regulation (international truck transportation)

The regulation of international truck transportation to limit runnable areas is another factor to prevent active international logistics. Even if the fiscal connectivity between two countries is improved by construction hard infrastructures, the convenience of international logistics cannot be improved unless international truck can transport in neighboring countries smoothly. Given the fact that the transshipment at the border causes high logistics cost and longer transportation time, the international truck regulation needs to be deregulated.

- *Thailand truck (in the case between Bangkok and Ha Noi):*

Thailand trucks can freely pass through Laos, but they can go to Da Nang only in Vietnam. Therefore, transloading to Laos truck or Vietnamese truck is required for the transport route to Ha Noi.

- *Vietnamese truck (in the case between Bangkok and Ha Noi):*
  Vietnamese trucks can pass through Laos, but they are only permitted going to Khon Kaen in Thailand when transporting from Ha Noi to Bangkok. Therefore, they need to transload the container at the border with Thailand as well.
- *Laos truck (in the case between Bangkok and Ha Noi):*
  Laos trucks have the widest runnable territory to pass from Ha Noi to Bangkok smoothly. But, Laos trucks cannot enter ports in Thailand, so they are also required to transship to Thailand trucks in Thailand.

Like this, the runnable area for international truck is regulated in detail. Consequently, deregulation needs to be considered to realize active international logistics. This has also conflicts of interest in each country to protect domestic logistics players, so the cooperation with neutral third parties is one effective approach.

Quality management of infrastructures

The different road quality in each country is also one serious bottleneck. The international transportation passes through various roads in different countries, but imbalanced road quality are one obstacle to prevent active transaction. For example, NR8, NR9 and NR13 in Laos under qualified ASEAN standard in many parts, causing dissimilar weight limitation compared to other countries. Moreover, quality of roads depends on quality of construction companies and consultants. As a result, different scheme to construct infrastructures such as PPP, BOT and different donors causes volatility of quality in same country, especially in Laos. Besides, additional cost and fixing time is required to rehabilitate when roads are damaged. It prevents stable logistics, so quality management at construction phase is very important function.

As a result, the support from JICA and ADB collaboration to construct high quality infrastructures including technical assistance is indispensable especially for international roads which list up as high priority.

8-3. Collaboration scheme between JICA and ADB

In order to realize collaboration with JICA and ADB in aforementioned hard infrastructures and soft infrastructures, appropriate cooperation model and role division is required on the basis of characteristics and strength of each entity. Through interviews with each branch of JICA and ADB, three collaboration models below are promising cooperation.

Co-finance for large scale project (Role division by components)

As mentioned in background and purpose in this report, huge scale projects which only one donor cannot support by oneself are potential by JICA- ADB co-finance. In these projects, position of each donor (JICA: Japanese institute and ADB: International institute) needs to be considered to establish cooperation scheme for co-finance. Actually, while JICA needs to consider the benefit to Japan in addition to the contribution to target countries, ADB can focus on more contribution to target countries. Therefore, JICA should focus on components which are required high technology to differentiate from others for Japanese companies. For instance, bridge, tunnel, elevated road, urban railway (sky train and metro), express highway and systems for custom clearance are potential components for JICA. On the other hand, normal national road and railway should be less priority for JICA because these infrastructures are not required high technology. In this context, in order to support aforementioned international roads which are defined as necessary infrastructures, JICA should support the parts required high technology such as bridges and tunnels, while ADB needs to focus on other normal road.

For example, the tunnel for road between Bangkok and Mukdahan, the elevated road for Bang Na-Chon Buri express highway between Bangkok and Leam Chabang port, the bridges for NR13 and NR16 in Laos and the bridge for connection road to reach Cai Mep Thi Vai port in Vietnam need to be constructed, so JICA and ADB can cooperate with each other in these infrastructure projects.

Facilitation support from ADB for regional integration

In order to realize cooperation among countries in Indochina region, international infrastructures which cover several countries such as international road are required. Therefore, the discussions among several countries are indispensable to proceed projects. But, JICA is Japanese governmental entity, so one to one projects between Japan and one target country seem to be suitable, but one to some projects between Japan and several countries are not always suitable due to conflict of interest. On the other hand, ADB is in the position of international institute, hence they can easily facilitate discussion among several countries without conflict of interest due to relationship between some and some. In this context, ADB is better than JICA to lead international projects such as international road (East-West Economic Corridor, South economic Corridor and so on) and international railway. From viewpoint above, while JICA can focus on separated components, ADB leads total management of infrastructures.

For instance, the road expansion project of NR12 in Thailand between Tak and Maesot (a part of East-West Corridor) and the improvement project of AH1 in Myanmar between Kawareik

and Thaton are utilized as international roads, so high quality roads which are satisfied with ASEAN standard are required. Besides, system for custom clearance is also important to realize smooth process. To achieve goal above, facilitation by ADB will be important to accelerate cooperation between both governments of Thailand and Myanmar. The collaboration is expected that JICA supports custom clearance system while ADB manages total project and supports normal road.

Technical support from JICA for implementation project

The improvement both of hard infrastructures and soft infrastructures is indispensable to develop Indochina region. Regarding the improvement of soft infrastructures, there are a lot of cases which need the support for long period to penetrate into the implementation of policies and regulations in each country. Currently, ADB is not good at supporting implementation process which is required close contact with the site by sending expertise for a long time. Therefore, JICA can be in charge of this part by collaboration with ADB. For example, the role division that ADB focuses on establishment of top-master plan and finance to infrastructures (ADF, OCR) while JICA contributes to penetration of technology and operation in the site is expected.

Actually, JICA and ADB can corporate with each other for the urban transportation project in Vientiane, where is suffering from serious traffic congestion in Laos. Currently, ADB is supporting Vientiane Sustainable Urban Transport Project by technical assistance. In parallel, JICA also supports the project to improve capability of public bus corporation. It seems that these projects can be collaborated to make them more effective.

Appendix A: Full list of transportation infrastructure projects

A-1. Thailand

Type	Name	Detail	Total amount (mil USD)	Donor	Completion	Status
1.Road	Phitsanulok - Lom sak	Road widening to 4 lane	114	ADB	2015	Ongoing
	Sarakham - Sakaeo		51	(46%)	2015	Completed
	Tak - Maesot		39	TBA	2017	Planned
	Bang Pa-in - Nakhon Ratchasima	Road widening to 8 lane	4,500	TBA	2015	Still bidding
	Pattaya - Maptaput			TBA	2015	Still bidding
	Bang Yai - Kanchanaburi			TBA	2015	Still bidding
2.Rail	Bangkok - Chiang Mai	Construct new high speed rail	5,700	Japan	2027	Only FS
	Bangkok - Nong Khai		21,460	TBA	2019	Planned
	Bangkok - Sadao					
	Bangkok - Rayong					
	Bangkok - Nong Khai	Double track	3,900	China	2020	Planned
	Bangkok - Chiang Mai			TBA	2020	Planned
	Bangkok - Nong Khai					Planned
	Bangkok - Udon Ratchathani					Planned
	Pink line (Kaerai - Minburi)	Urban planning	1,560	None	2022	Committed
	Yellow line (Lat Phrao - Samrong)		1,510	None		Committed
	Blue line (Bang Sue - Bang Khae)		2,270	None		Committed
	Purple line		7,120	PPP		Under construction
	Green line expansion			PPP		Under construction
	Orange line			None		Waiting for approval
	Red line			JICA		Planned
3.Port	Laem Chabang	Capacity expansion	3,728	TBA	2020	Planned
4.Air	Suvarnabhumi	Capacity expansion	1,736	JICA	2017	Ongoing
5.SEZ	Mukdahan	Establish new border SEZ	280	TBA	2019	Planned
	Sakaeo				2019	Planned
	Trad				2019	Planned
	Kanchanaburi		TBA		2019	Planned
	Chiang Rai				TBA	Planned
	Nong Khai				TBA	Planned
	Nakhon Phanom				TBA	Planned

Source: ADB, JICA, JETRO (Infrastructure Map), DI Interview (JICA, ADB)

A-2. Cambodia

Type	Location	Fund	Investment (Mil USD)	Completion	Status
1. Road	NR1	JICA	239	2016	Only FS (Express highway)
	NR2	ADB, Korea, Japan	12	2007	Completed, rehabilitate and improve road quality
	NR3	ADB, Korea, WB	136	2011	Completed, rehabilitate and improve road quality
	NR4	China	51		Planned (Widen to 4-lane / Expressway)
	NR5	JICA	213	2020	Committed
	NR6	China	319	2016	Ongoing, paving only 24%
	NR7	ADB, China, Japan	87	2007	Completed, rehabilitate and improve road quality
	NR8	China	87	2012	Completed, rehabilitate and improve road quality
	NR9	China	64	2016	Ongoing, paving 98%
	NR11	China	63		Completed, rehabilitate and improve road quality
	NR13	ADB	23	2016	Ongoing, rehabiliate and improve road quality
	NR21	ADB, Korea, VN	57		Ongoing, rehabiliate and improve road quality
	NR23	China	33		Ongoing, rehabiliate and improve road quality
	NR31	WB	13	2005	Completed, rehabilitate and improve road quality
	NR33	ADB, WB	13	2010	Completed, rehabilitate and improve road quality
	NR41	WB, China	95	2013	Completed, rehabilitate and improve road quality
	NR43	China	42		Under negotiation
	NR44	China	80	2015	Ongoing, paving 65%
	NR48	Thailand	22	2007	Completed, rehabilitate and improve road quality
	NR51	WB, China	33	2006	Completed, rehabilitate and improve road quality
	NR55	China	140		Under negotiation (5 year plan)
	NR56	ADB, Korea	30	2015	Completed, rehabilitate and improve road quality
	NR57	China	296	2014	Completed, rehabilitate and improve road quality
	NR58	China	77		Under negotiation
	NR59	China	73	2013	Completed, rehabilitate and improve road quality
	NR60	China	130		Ongoing, rehabiliate and improve road quality
	NR62	China	110	2013	Completed, rehabilitate and improve road quality
	NR64	China	100	2014	Completed, rehabilitate and improve road quality
	NR67	Thailand	35	2009	Completed, rehabilitate and improve road quality
	NR68	Cambodia	33	2011	Completed, repavement 100%
	NR70	China	90		Ongoing, rehabiliate and improve road quality
	NR71	China	66		Ongoing, rehabiliate and improve road quality
	NR76	China	144	2016	Ongoing, repavement 52%
	NR78	China	73	2013	Completed, rehabilitate and improve road quality
	NR92	China	75		Ongoing, rehabiliate and improve road quality
	NR258	China	48	2013	Completed, rehabilitate and improve road quality
	NR378	China	85		Ongoing, rehabiliate and improve road quality
	NR1551	China	72		Ongoing, rehabiliate and improve road quality
	NR1554	China	41		Ongoing, rehabiliate and improve road quality
	NR1577	China	25		Ongoing, rehabiliate and improve road quality
	NR3762	China	15	2012	Completed, rehabilitate and improve road quality
	NR3787	China	98		Ongoing, rehabiliate and improve road quality
2. Bridge	Kampong cham, NR7	Japan	60	2001	Completed
	Phnom Penh, NR6	Japan	27	1993	Completed
	Kandal, NR1	Japan	85	2015	Completed
	NR2 and NR3	Japan	8	2007	Completed
	NR1	Japan	7	2006	Completed
	Prey Veng, NR11	Japan	15	2015	Completed
	Kandal, NR6 vs 8	China	44	2010	Completed
	Along NR48	Thai	7	2007	Completed
	Sisophon - Samraong - Kralanh	ADB	11	2008	Completed
	Phnom Penh	Cambodia		2009	Completed
	Kampot, part of NR3	Korea		2007	Completed
	Stoeung Treng, part of NR7	China	15	2007	Completed
	KohKong, NR48	Private	7		Completed
	Stung Meanchay	Private	5		Completed
	Phnom Penh, NR6	China	30	2013	Completed
	Phnom Penh, NR6	Private	42	2010	Completed
	Stung Treng (NR7 vs NR9)	China	53	2015	Completed
	Takhmao Town	China	33	2016	Completed
	Vietnam border	Vietnam	36	2015	In progress
	SHN - Morokot island	Private	31	2011	Completed
3.Rail	Poipet - Phnom Penh		142	2020	Ongoing, Recover after destruction
	Phnom Penh - Snuol			2020	FS, New line to connect with VN
	Sisophon - Phnom Penh			2030	Planned, New line construction
	Sihanoukville - Phnom Penh			2030	Planned, Rehabilitation
4. Port	Sihanoukville		72	2017	Ongoing, Construction of 2 new terminal
	Phnom Penh			2017	Planned, Construction of new terminal
5.Air	Sihanoukville		200	2016	Planned, New terminal
	Siem Reap		100	2020	Ongoing, New terminal to attract tourist
	Phnom Penh			2020	Ongoing, New terminal
6. SEZ	Poipet			2015	Ongoing, New construction of auto hub

Source: ADB, JICA, Infrastructure and Regional Integration Technical Working Group, DI interview with ADB, JICA, JETRO and MPWT

A-3. Lao

Type	Name	Detail	Total Amount (Mil USD)	Donor	Completion	Status
1. Road	NR1A	Upgrade and 29 bridges rehibilitation	91.5	GoC and GoL	05/2018	43% done (01/2015)
	NR1C (Pakmong - PhuLao)	Upgrade	22	China	2016	FS aleady done but not yet started construction
	NR1C (PhuLao - Kham)	Upgrade	N/A	N/A	2016	Under planning phrase
	NR1E	Upgrade	39	BT	04/2015	80% done (10/2014)
	NR1F	Upgrade	808	N/A	N/A	6km done (01/2015) and F/S for the rest part
	NR1G	Upgrade to 2 layers of Asphalt	117	BT	04/2017	10.27% done (09/2014)
	NR1J	Upgrade	36	N/A	N/A	F/S
	NR2E	Rehabilitation	56	China	N/A	Just focus of rehabilitation, not yet upgraded (just detailed plan).
	NR4A (Hongsa - Ngeun)	Upgrade	N/A	Thailand	2014	Done
	NR4A+NR4B (Hongsa - Xiengmen)	Upgrade	55	Thailand	11/2014	Done upgrade, plan to build Mekong bridge in Chomphet
	NR5	Rehabilitation	44	N/A	2016	Done rehabilitation Sysomboun
	NR5 (Sysomboun - M.Pek)	New construction	37	GoL	02/2016	Under F/S
	NR6	Upgrade	N/A	Funding source (from WB)	2020	Under planning phrase
	NR6A (Dan - Sopbao)	Upgrade	6.1	WB	04/2014	Done upgrade
	NR6A (Dan - Sopbao)	Bridge construction	0.5	N/A	N/A	Under planning phrase
	NR6A (Hanglong - Sopbao) + 6B	Expand from 4m to 6m	42	ADB, OPEC	03/2017	In progress
	NR8	Upgrade to Asean standard	80	KOICA	2018	Under planning phrase, KOICA shall do F/S
	NR9	Rehabilitation	N/A	GoL	N/A	Under rehabilitation
	NR10 (Doneun - Thangon)	Expand	56	BT	01/2016	28% done (11/2014)
	NR11 (Thatthong - Nam Song)	Expand	20	NEDA, GoT	08/2014	On progress
	NR11 (Nam Song - Mekong bridge)	Upgrade	N/A	N/A	N/A	NEDA is supporting detailed planning
	NR12 (A part of E-W Corridor)	Upgrade	N/A	N/A	N/A	N/A
	NR13N (Xai - Pakmong)	Upgrade	82	China's grant	01/2017	38% done (01/2015)
	NR13N (Pakmong - Louangprabang)	Upgrade	70	NEDA (under negotiation)	N/A	F/S currently but not sure who
	NR13N Bypass (KokNgiew - Phnonxai)	Upgrade	22	BT	2015	On progress
	NR13N (Vangvieng - Ban Sikuet)	Upgrade	N/A	PPP	2020	Done F/S
	NR13S (Lak21 - Paksan)	Upgrade	N/A	PPP	2020	Done F/S
	NR14A (Mounlapamok - Pakselamphao)	Upgrade to Asphalt	58	BT	2016	On progress
	NR14B (B.Angkham - B.Nongga)	Upgrade	34	N/A	N/A	Under planning phrase
	NR14C (Mounlapamok - Pakwai)	Upgrade	51	BT	2016	10% done (01/2015)
	NR15A	Upgrade	68	BT	04/2014	Done
	NR15B	Upgrade	77	BT	11/2015	Done
	NR16 (Vangtao - Pakse)	Upgrade	31	BOT	2014	Done
	NR16 (Pakse - Sekong)	Upgrade	N/A	N/A	N/A	Done rehabilitation in 2015 (5 mil.USD) but not yet upgraded
	NR16A	Upgrade	45	BT	N/A	84.4% done (08/2014)
	NR16B	Upgrade	44	BT	N/A	60% done (01/2015)
	NR7A	Rehabilitation	48	China	N/A	F/S done, rehabilitation currently
	NR17	Upgrade	50	China	N/A	F/S done for friendship bridge
	NR18A	Upgrade	76	BT	N/A	Progress is stopped
	NR3612	Upgrade	22	NEDA	N/A	On progress
	NRB.Fuak - M.Kop - B.Kontun	Upgrade	38	NEDA	11/2016	6% done (01/2015)
	NRPhuThipfuang - Na son	Upgrade	N/A	Vietnam	N/A	TEID VN is doing detailed planning
	NRXamtai - Thalao	Upgrade to 2 layers	48	BIDV VN	01/2018	TEID VN is doing detailed planning
2. Rail	Boten-Vientiane	New construction	7,000	The Import-Export bank of China	2023	Construction will be started on 02/12/15 after few times spending
	Vientiane-Thakhet	New construction	N/A	KOICA	N/A	Under F/S
	Savannakhet - Densavan	New construction	N/A	Giant consolidated Ltd (Malaysian)	N/A	Under planning phrase by MOU
	Khammouan-Vangtao	New construction	N/A	N/A	N/A	Korean company conducted F/S in 2012 but currently stop
3. Bridge	Pakbeng	New construction	30	The Import-Export bank of China	08/2015	Done
	Laos - Myanmar friendship	New construction	26	GoL, GoM	08/2015	Done (additional project: to upgrade 12km in Xiengkok)
	Laos - Thailand friendship	New construction	45	GoT, GoC	12/2013	
	Laos - Thailand friendship	New construction	101	GoT, GoL	N/A	Under planning phrase
	Laos - Thailand friendship	New construction	N/A	N/A	N/A	Under planning phrase
	Laos - Thailand friendship	New construction	23	BOT	N/A	61% done (01/2015)
	Dongkhong Mekong	New construction	34	The Import-Export of China, GoL	11/2014	Done
	Luan Prabang-Chomphet Mekong	New construction	N/A	N/A	2020	
	Muang Kao-Pak Kagnung	New construction	168	BOT	01/2015	Done
	Sekong	New construction	22	JICA	12/2018	On Progress
	Selamphao	New construction	30	GoL, GoC	2020	Under planning phrase
4. Riverport	Xiengkok	New construction	15	N/A	2017	Under planning phrase, for trading with Thailand and tourism
	Ban Mom	New construction	12	N/A	2017	Under planning phrase, mainly for trading between Thailand and China
	Houaxay	New construction	13	N/A	2018	Under planning phrase, for tourism
	Pakbeng	New construction	15	N/A	2018	Under planning phrase, for tourism
	Luang Prabang	New construction	15	N/A	2018	Under planning phrase, for tourism
5. Airport	Luang Prabang	New construction	86	China	2014	Mainly for tourism
	Thongphung	New construction	500	BT	2016	Under planning: Contract signed in 2012
	Thonghaihin	Upgrade	81	China	2015	No progress yet
	Xeno	New construction	100	China		Still under-investigation phrase
	Attapeu	New construction	36	HAGL-VN (BT)	2015	Done but no demands so far
	Nongkhang	New construction	74	HAGL-VN (BT)	2017	16% done (end of 2014)
	Oudomxai	Rehabilitation	6	Not yet defined	-	Already rehabilitation (1.2 mil USD) by GoC), not yet upgraded
	Xayaburi	New construction	N/A	Not yet defined	-	Under planning: Thailand and GoL are doing F/S
	Pakse	Upgrade	5.1	NEDA	2014	Done

Source：ADB, JICA, JETRO (Infrastructure Map), DI interview with JICA and ADB

A-4. Myanmar

Type	Name	Detail	Total Amount (Mil USD)	Donor	Completion	Status
1. Road	Eindu - Kawkareik Road	66.4km road upgrade	120	ADB & AIF	2020	Commited
	Maubin-Phyapon Road	54.5 km road rehabilitation	80	ADB	2018	Commited
	Thanbyuzayat – Dawei – Myeik – Kawthong Road	Upgrade and connect missing link		N/A		N/A
	Yangon - Hanthawaddy airport Xpress highway	Overpass express highway	620	Yooshin (Korea), Lotte E&C (Korea), Hara (Korea) and Capital Diamond Star Group (CDSG) (Myanmar)		Proposal
	Minbu-Ann	156.1 km Road upgrade		Korea Expressway Co.		Committed
	Taunggyi-Kyaington	452 km part of AH2		Korea Expressway Co.		Committed
	Kawkrate-Mudon	102 km Road upgrade		Korea Expressway Co.		Committed
	Paletwa-Setpyit Pyin-Myeikwa	129.1 km Road upgrade	120	India		Committed
	Teetein-Reid	50.9 km Road upgrade	60	India		Committed
	Improvement of Yangon-Mandalay Expressway	upgrade from 4 to 8 lanes	600	-	2016	Still bidding
	Kyaukpyu-Ruili Road		2000	China		Still bidding
	Monwya-Pale-Gangaw road	180.2 km part of AH 1 is to be upgraded		KOICA		Still bidding
	Tavoy-Funarum road	132 Km		Thailand		Still bidding
	Three bridges on Hlaing bwe-Paing Kyone road	in Karen State to be built.		Japan		Still bidding
	Run-down Thakayta bridge	in Yangon Region to be rebuilt		Japan		Still bidding
	Roads in Karen state and Boothi Taung-Maung Taw road in Rakhine State	are being upgraded and maintained.		Japan		Still bidding
	Thilawa-East Dagon Road					FS
	East Dagon- NR1 Road					Planned
	Phann-Thaton-Payagyi Road					Planned
	Loilem-Kyainton Road					Still bidding
	Kyainton-Monglar Road					Still bidding
2. Rail	Yangon-Mandalay Railway	Railway upgrade	164	JICA	2021	Commited
	Yangon circular railway lines	Rehabilitation	204	JICA	2020	Commited
	Yangon-Pyay Railway	259 Km upgrade	15.15			Looking for funding
	Mandalay – Myitkyina Railway	Upgrade	30	Korea EximBank	2017	Still bidding
	Bago-Mottama-Mawlamyine-Yay Railway		100	ADB	2020	Still bidding
3. Port	Dawei	deep-sea port with a capacity to hold 250 million tons of cargo		Thailand & Japan (50-50)		Committed
4. Bridge	Yangon-Thilawa bridge (Thaketa. Bridge)	New bridge Yangon - Thilawa SEZ	42	JICA	2021	Committed
	Myanmar-Thai Friendship Bridge No. 2	Improve traffic at Myawaddy border		Thailand		FS completed
	Korea-Myanmar Friendship Bridge (Dala)	New bridge btw Yangon - Dala	183	Korea EximBank	2020	Under construction
	Bago River Bridge	New Bridge in Yangon City		JICA		FS
	Ayeyarwaddy Bridge (Hinthada township)	Replace the old damaged by flood	308	JICA		FS completed
	Gyaing Kawkareik, Attaran, and Gyaing Zathabyin Bridges	East-West Economic Corridor Improvement Project	278	JICA	2023	Commited
5. Airport	Hanthawaddy Airport	New International Airport	1500	JGC, Changi	2022	Committed
	Mandalay International Airport	Upgrade to Intl' airport	14	Mitsubishi, JALUX, Yoma holdings		Under planning
	Yangon International Airport	Upgrade terminal to cater 6 million pax.	199.5	Asia World Group	2015	Under construction
6. SEZ	Thilawa Area SEZ Phase II	Widen access road to SEZ	38	JICA	2015	Completed
	Thilawa Area SEZ Phase II	Port terminal development	121	JICA	2017	Under construction
7. River way	Ayeyarwaddy River	Sinkham Port, Mandalay Port, Pokokku Port, Magway Port	60	JICA		FS
	Chindwin river	Monywa Port, Kalewa Port		JICA		FS
8. Tunnel	Pontaung Ponnyar Tunnel					Ongoing
	Watelone Mountain Tunnel					Completed

Source: ADB, JICA, The survey program for the national transport development plan in the Republic of the Union of Myanmar, Project for comprehensive urban transport plan of the greater Yangon, DI interview with ADB and JICA

A-5. Vietnam

Type		Name	Detail	Total Amount (Mil USD)	Donor	Completion	Status
1. Road	Express Highway	Cau Gie - Ninh Binh	● Length: 50km; 4 lanes ● Max speed 100km/h	399	Gov bond: 91% Private: 9%	2012	Completed since 2012
		Ninh Binh - Thanh Hoa	● Length: 121km; 6 lanes ● Max speed 100-120km/h	151	P1: ODA 30%, OCR 40%, Private 30% P2: ODA 50%, Private 50%	2020	Proposed investment plan
		Thanh Hoa - Ha Tinh	● Length: 98km; 4-6 lanes ● Max speed 100-120km/h	1,627	Operator, Private, ODA : 56% Gov: 44%	2018	Waiting for approval ● Fecon, Cienco, Cotec plan to invest
		Da Nang - Quang Ngai	● Length: 131km; 4-6 lanes ● Max speed 100km/h ● 26 big bridges, 106 tunnels	1,243	WB, ODA: 89% Gov: 11%	2017	Under-construction
		Quang Ngai - Quy Nhon	● Length: 156km; 4 lanes ● Max speed 120km/h	1,556	WB, ODA: 89% Gov: 11%	2020	No progress ● Investment plan approved ● But, not yet in Master plan
		Nha Trang - Phan Thiet	● Length: 235km; P1 4lanes, P2 6 lanes ● Max speed 120km/h	3,422	Gov, private	2017	No progress ● Submit plan in 2012 ● No progess after cost estimation
		Dau Giay - Phan Thiet	● Length: 98km; P1 4lanes, P2 6 lanes ● Max speed 120km/h	957 (P1 757, P2 200)	Gov, WB	2018	Planning ● Plan to started in Sep '15 ● Delay due to not enough funding
		HCM - Long Thanh - Dau Giay	● Length: 98km; P1 4lanes, P2 6 lanes ● Max speed 120km/h	980 (P1 only)	ODA: 65% ADB (OCR) : 28% Gov: 7%	2015	Completed Feb '15
		Ben Luc - Long Thanh	● Length: 57km; 4 lanes ● Max speed 100km/h ● 2 bridges	1,600 (P1 only)	ADB: 40% JICA: 40% Gov: 20%	2018	Under-construction
		HCM - Trung Luong	● Length: 62km; 8lanes, ● Max speed 120km/h	439	● Gov : 100%	2011	Completed Feb '11
		Trung Luong - My Thuan - Can Tho	● Length: 82km; 6 lanes	1,146	Korean Bank (KDB) : 83% Private (CIPM): 16% Korean EDCF: 1%	-	Attracting investors ● BIDV failed, KDB take over to finance ● ADB considering to fund $630 mil
		Ha Noi - Thai Nguyen	● Length: 61km; P1 4 lanes, P2 6 lanes ● Max speed 100km/h	457	JICA : 68% Gov: 32%	2014	Completed Jan '14
		Ha Noi - Hai Phong	● Length: 105km; 6 lanes ● Max speed 120km/h	222	Operator, VDB, VCB, others	2015	Completed
		Lang - Hoa Lac	● Length: 29km; 6 lanes ● Max speed 70-120km/h	335	HN PPC: 76% Gov : 24%	2010	Completed '10 ● Speed limit at 80km/h, not high as plan
		Noi Bai - Nhat Tan	● Length: 12km; 6 lanes ● Max speed 80km/h	300	JICA : 66% Gov :34%	2014	Completed
		Bien Hoa - Vung Tau	● Length: 68km; 4 - 6 lanes ● Max speed 120km/h	1,111	JICA : 80% BVEC : 20%	2017	Stop FS ● Proposing to reduce scale, divide to 2 phases
		Dau Giay - Da Lat (1) Lien Khuong - Da Lat (2) Dau Giay - Lien Khuong	● Length: 208km, 4 lanes ● Max speed 80km/h	1,415	Korea ODA : 83% Lam Dong PPC + others: 17%	2020	(1) Completed (2) MOT submitted Gov to decrease: to 2 lanes, reduce 60-80km/h speed, reduce investment
		My Phuoc - Tan Van	● Length: 30km, 6 lanes ● Max speed 80 - 100km/h	1,415	Becamex : 51% Binh Duong PPC: 49%	2014	Under-construction
		Ha Long - Mong Cai	● Length: 149km; 6 lanes, ● Max speed 80-120km/h	2,200	Private	-	Land clearance for P1 (Ha Long - Van Don)
		Ha Noi - Lang Son	● Length: 154km; P1 4lanes, P2 6 lanes ● Max speed 120km/h	1,400	ADB : 36%, China : 21%, Gov, Others: 43%	2016	Land acquisition process
		Noi Bai - Lao Cai	● Length: 264km; 2-4 lanes, ● Max speed 80 - 100km/h	1,249 (P1 only)	ADB : 87% Gov bond : 13%	2014	Completed Oct '14
		Ha Noi - Vientiane	● Length 760 km, 4 lanes ● Width > 22.5m	2,500 (P1 1,500, P2 1,000)	-	2020 onward	Discussing to conduct FS
		Can Tho - Phnom Penh	● Only VN side ● Length 250 km ● Max speed 120km/h	4,400 (P1 1,800, P2 2,600)	-	-	Looking for new investor ● Initially ITD signed MOU with Can Tho PPC ● ITD withdraw due to no money
	National road	South Coastal Corridor	● Length 950 km	508 (P1 398, P2 110)	ADB, Aus granted, Korea ODA Gov (land acquisition) -> P1	2014	Completed Phase 1, prepare to start phase 2
	Ring road	Ha Noi Ringroad No. 2	● Nhat Tan - Cau Giay ● Length: 6km, max speed 80km/h	305	WB: 51% HN PPC: 46% GEF: 3%	2015	Under construction ● Expect to completed in Jan '16 ● Delay vs. initial plan Jun '15
		Ha Noi Ringroad No. 3	● Mai Dich - Tu Liem ● Length: 19km, max speed 100km/h	247	JICA 100%	2012	Completed
		Ha Noi Ringroad No. 4	● Ha Noi - Bac Ninh ● Length: 98km, max speed 100km/h	2,959	ODA, Gov, Gov Bond, HN PPC, Others	2020	PM approved to Master plan ● Not yet started
		Ha Noi Ringroad No. 5	● Son Tay - Thai Nguyen ● Length: 331km	3,803	-	-	PM approved to Master plan ● In funding process
		HCM Ringroad No. 2	● Thu Duc - Binh Chanh - D9 ● Length: 70km	114	-	2015	Completed some sections (Delaying) ● Others in funding process
		HCM Ringroad No. 3	● HCM - DN - LA - BD ● Length: 89km	2,480	ODA, Gov, Gov Bond, HCM PPC, Others	2020	Plan to start in Jan '16
		HCM Ringroad No. 4	● BRVT - DN - BD - LA-HCM ● Length: 198km	4,379	ODA, Gov, Gov Bond, HCM PPC, Others	2025	Funding process
	Others	HN Bus transit (BRT)	● Kim Ma to Yen Nghia ● Length: 15km	50	WB	2016	Under-construction
		HCM Bus transit (BRT)	● Vo Van Kiet to Mai Chi Tho	152	WB	2018	Planning process
		SG bridge (Thu Thiem)		438	JICA 550 mil	2011	Completed

Type		Name	Detail	Total Amount (Mil USD)	Donor	Completion	Status
2. Port	Long distance	Lach Huyen	● Depth: 14m	1,121	P1: JICA (21 Billion JPY) P2: JICA (38 Billion JPY) P3: JICA (55 Billion JPY)	2018	Under-construction ● Plan to operate in 2018 (delay vs. plan)
		CMTV	● Depth: 12 - 14m	573	JICA, Gov	2013	Completed
	Short distance	Van Phong	-	4,000	-	2020	Change: transhipment -> normal ● No investor, no progress after submission
		Da Nang	● Son Tra: build new port ● Tien Sa: expanding	42	Son Tra: Operator, investors Tien Sa: Private investors	-	● Son Tra: Completed ● Tien Sa: plan to start end '15 (Refused JICA fund in Apr '15)
		Vung Ang	● Important port to Lao im/ex ● JV with Lao Gov	2,168	Phonsawan 'PSW' (consider $1.2 bil)	-	Developing 3rd wharf ● PSW + V-L Port Co. ● PSW plan to develop 7,9th wharf
3.Inland water way		Cho Gao Canal	● Key riverway from P.Penh/ MK Delta to HCM/- CMTV ● Increase depth to 3,1m, width to 55m	100	Gov	2017	Under-construction P1 ● Expected to complete in 2015 ● P2 will start in 2016
		Soai rap river to Hiep Phuoc port	● Increase depth to 11,5 m (50,000 dwt)	500 (P1 120, P2 380)	P1: Belgium ODA P2: Seeking another ODA	2020	Completed P2 in 2015 ● Seeking funding for P3
		Canal to CMTV port	● Increase depth of Thi Vai cannel to 15,5m (80,000 - 160,000 dwt)	61	-	2018	Prepare prososal to Gov
4.Rail	National rail	North - South	Upgrade existing rail, 2 sections: ● HN - Vinh: upgrade tracks, sleepers ● Sai Gon - Nha Trang	170	Gov	2020	Proposing ● Plan to start in 2016
		Yen Vien - Lao Cai	● Length: 285 km	279	ADB, AFD, DG Tresor, Gov	2015	Under-construction (Delaying)
		Yen Vien - Cai Lan port (QN)	● Length: 131 km	340	Gov bond	2020	Temporary stop construction since Sep '15 ● Over budget and expected more ● Low potential demand
		HCM - Can Tho	● Length: 134 km	1,450	-	2025	FS on progress
		North - South highspeed way	● P1: HN - Vinh (2020) ● P2: Vinh - Nha Trang (2030) ● P3: HN - HCM (2035)	56	JICA : 80% Gov + private: 20%	-	Planning phase JICA preparing proposal
	Lao connection	Vung Ang - Vientiane	● Vietiane - Thakket - V.Ang ● Length: 500 km	-	KOICA	2018	FS on progress
	Urban rail	Ha Noi Urban railway Line1 (P1)	● Yen Vien - Ngoc Hoi ● Length : 39 km	865	JICA : 71% Gov : 29%	2020	Contracted, but temporary stop
		Ha Noi Urban railway Line2 (P1)	● Nam Th.Long - Thuong Dinh ● Length : 28 km	869	JICA : 84% Gov : 16%	-	Land clearance, but delay ● Changed investment to USD 2,3 bil in 2013 ● MPI is revaluating the adjusted investment
		Ha Noi Urban railway Line2A	● Cat Linh - Ba La ● Length : 13 km	533	China ODA : 76% Gov : 24%	2015	Under-construction (Delaying) ● Delay and investment increase USD 300 mil ● Plan to complete in mid 2016
		Ha Noi Urban railway Line3	● Nhon - HN - Hoang Mai ● Length : 21 km	1,357	P1: France ODA, AFD, ADB, EIB, Gov P2: ADB, Gov	2018	Under-construction ● P1: Completion plan 2018, but maybe delay ● P2: ADB signed loan contract ($59M) to HN PPC
		Ha Noi Urban railway Line4	● Dong Anh - Me Linh ● Length : 53 km	-	-	-	Similar BRT route Start after BRT
		Ha Noi Urban railway Line5	● Nam Tay Ho - Hoa Lac ● Length : 41 km	6,100 - 7,500 (Estimating)	JP ODA	2030	JICA is doing FS
		Ha Noi Urban railway Line6	● Noi Bai - Ngoc Hoi ● Length : 48 km	-	-	-	HN PPC proposed investment plan Wait MOT approve, FS stage
		Ha Noi Urban railway Line7				-	Undevplanning
		Ha Noi Urban railway Line8				-	Under planning
		HCM Urban railway Line1	● Ben Thanh - Suoi Tien ● Length : 20 km	2,103	JICA : 89% Gov : 12%	2018	Under-construction
		HCM Urban railway Line2	● Thu Thiem - An Suong ● Length : 20 km	1,374	ADB : 36% Private : 23% Others (Germany, EIB, KFW) : 41%	2017	Planning + bidding process
		HCM Urban railway Line3A, 3B	● Ben Thanh - Tan Kieng	3,300	-	-	3A: JICA Preparatory Survey (1/2016-11/2016)
		HCM Urban railway Line4	● Ben Cat - Nguyen Van Linh ● Length: 33 km	2,500	-	-	Looking for investors
		HCM Urban railway Line5	● Can Giuoc - SG ● Length: 26 km	2,300	ADB : 22% Others (EIB, Spain) : 17% Gov : 61%	2025	Looking for investors
		HCM Urban railway Line6	● Tan Phu - Phu Lam ● Length: 7 km	1,300	-	-	Looking for investors
5. Bridge		Overpass Mai Dich - Nam Th.Long	● Part of Ring Rd No. 3	276	Domestic fund	2018	Bidding process
6. Airport		Noi Bai	● Build Terminal 2	900	Gov (94%) , JICA (6%)	2014	Completed
		Da Nang	● Build new airport	60	Gov 100%	2011	Completed
		Long Thanh (phase 1)	● Build new airport	7,800	ACV	2025	Preparation of F/S

Source: ADB, JICA, JETRO (Infrastructure Map), DI Interview with JICA and ADB


JICA