CHAPTER-9 CORRIDOR BASED LOGISTICS INFRASTRUCTURE DEVELOPMENT PLAN

9.1 Profile of Logistics Corridors

9.1.1 Proposed Links for the Logistics Corridors

(1) General

The logistics corridors are determined based on the visions and logistics development strategy as well as the development approach discussed in preceding sections, the logistics development corridor taking into account of the transport corridor plan and the cargo flow pattern projected in Chapter-6 Cargo Demand Forecast. The transport links delineated from the current and future cargo O-D pattern the skeleton diagram is prepared as illustrated in **Figure-9.1.1** and **Figure-9.1.2** is the map showing the transport corridors identified within the National Transport Master Plan (NTMP). **Figure-9.1.3** indicates the logistics corridors formulated.

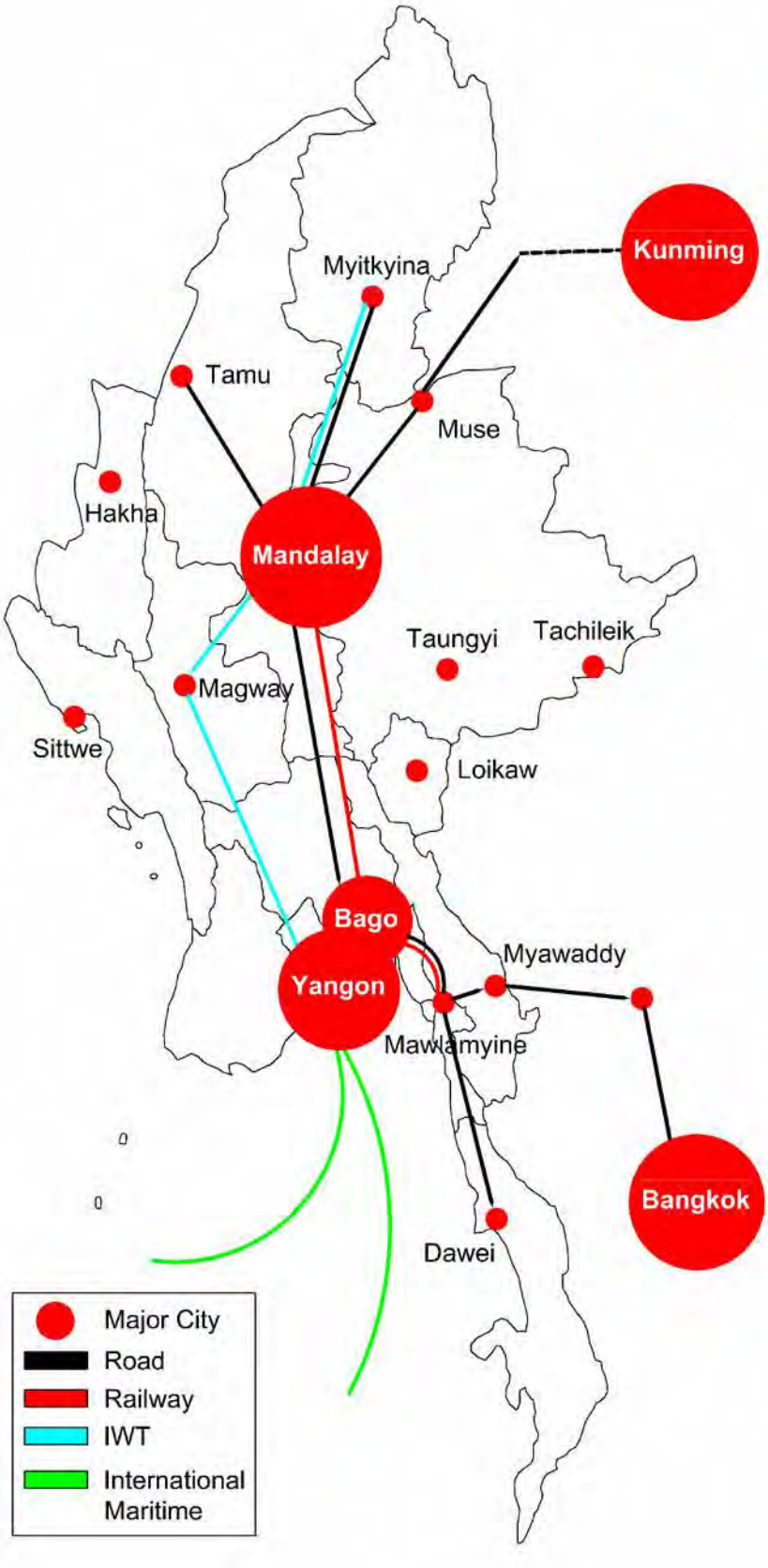
Each logistics corridor is named to present the location and function of each corridor, as indicated in **Table-9.1.1**. The roles and functions of each logistics corridor are presented in **Table-9.1.2** by order of geological location from the north.

Table-9.1.1 Names of Identified Logistics Corridors

Logistics Corridor (LC)		Name of Corridor	Major Node	MYT-Plan	Major Transport Mode			
				Ref. Code	Road	Railway	IWT	Ship
	LC-NS	North-South Corridor	Muse-Mandalay-Bago-Yangon	A1-3	◉	●		
	LC-SE	South East Corridor	Yangon-Bago-Thai Border	B1-2	◉	●		
	LC-MR	Main River Corridor	Yangon-Magway-Mandalay-Myitkyina	K1-2	●	●	◉	
	LC-CM	Coastal Marine Corridor	Whole Coastline (Sittwe - Kawthaung)	J1-3	●			◉
	LC-TM	Trans Myanmar Corridor	Kyaukpyu-Magway-Tachilek	E1	◉	●	●	
	LC-MI	Myanmar - India Corridor	Mandalay-Monywa-Tamu	D	◉	●	●	

Legends: ◉ Primary Transport Mode ● Secondary Transport Mode

Source: Study Team

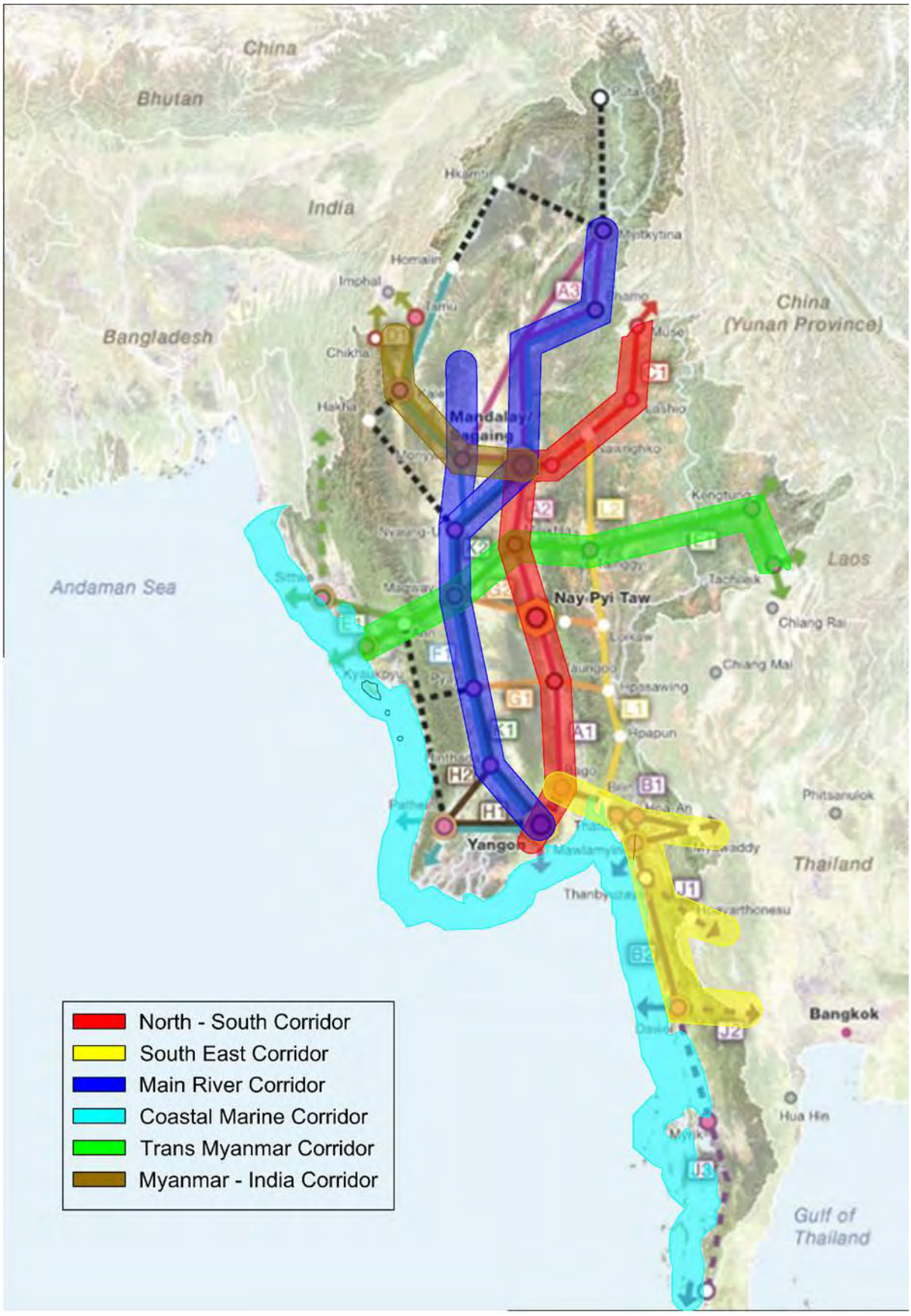


Source: Study Team

Figure-9.1.1 Skelton Diagram of Freight Transit

Source: National Transport Master Plan 2014

Figure-9.1.2 Transport Corridor Formulated



Source: Study Team

Figure-9.1.3 Logistics Corridor Formulated

Table-9.1.2 Major Role and Function of Each Logistics Corridor

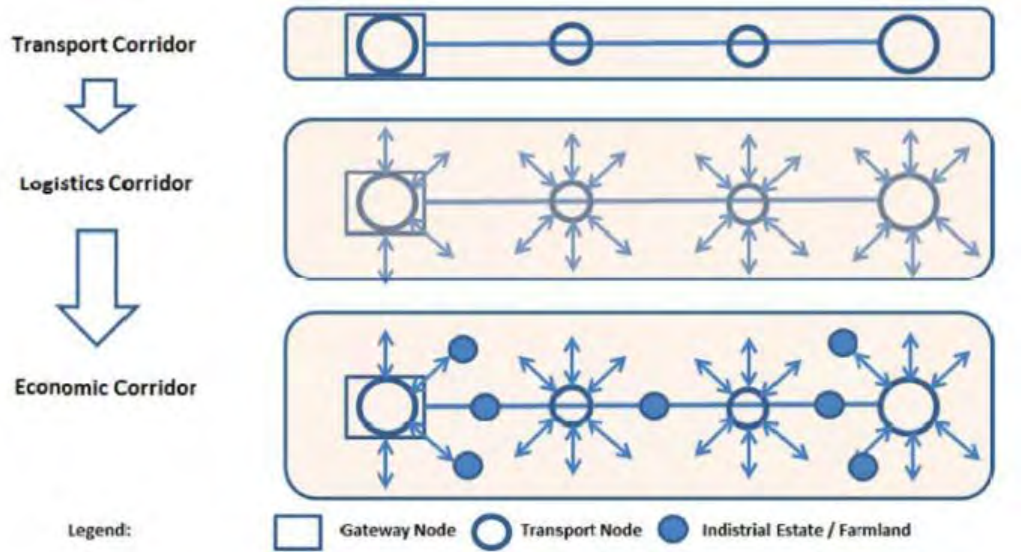
Logistics Corridor Code	Name of Corridor	Role and Function
LC-MI	Myanmar-India Logistics Corridor	● Linking Mandalay with India through the border town of Tamu ● Facilitation of trade with India ● Supporting the rural areas in the north western part of Myanmar for the trade with India ● Major transport modes are road, railway and inland water transport modes. ● This corridor is a part of regional corridor linking Thailand
LC-NS	North-South Logistics Corridor	● Major transport axis linking north and south of Myanmar (Yangon-Mandalay via Bago) ● Main stay for industrial development at and surrounding areas of major cities i.e. Yangon, Mandalay, Bago Major transport modes are road, railway, and inland waterway
LC-SE	South-East Logistics Corridor	● Regional links with Thailand ● Provision of diversified cargo transport routes ● Major transport modes are road and railway. ● Firstly the road link to be developed and secondary the railway link will be developed. ● Another transport link is expected to be developed connecting Bangkok and Dawei in straight line by highway and railway.
LC-AC	Main River Logistics Corridor	● Major logistics corridor along the Ayeyarwaddy and Chindwin River served mainly by inland water transport but linked closely with railway and road for transporting bulky cargoes such as rice, fuel and building materials through the rural and farming areas ● Major transport modes are inland waterway, railway and road. ● Multimodal transport hubs planned to be created at each major ports for inland water transportation. ● Support regional development along rivers by low cost transport by IWT
LC-TM	Trans Myanmar Logistics Corridor	● Logistics corridor linking the western coastal area along the Indian Ocean and the eastern mountainous area via plain central areas (i.e. Kyaukpyu – Magway – Lao PDR, Northern Thailand and China through Shan), enhancing the timely transportation of such special local products like vegetables. ● Major transport mode is road transport. ● At the gateway terminal node, the international port is planned to be provided together with the industrial zone or SEZ in Kyaukpyu..
LC-CM	Coastal Marine Logistics Corridor	● Major logistics corridor served by coastal shipping services for transporting bulky cargoes such as rice, fuel, building materials, along the coastal cities and rural areas. ● Major transport mode is the coastal shipping that links with road network.

Source: Study Team

(2) Influential Zone along the Logistics Corridor

The logistics corridors have been determined as discussed in preceding sections aiming at maximizing the effects of investment for transport / logistics infrastructure and creation of administrative and logistics service systems along the major and strategic cargo transportation links.

Figure-9.1.4 illustrates how transport corridors will be evolved as economic corridors. As shown in this figure, the influential zone under economic impact will be expanded through the evolution of the development level of the corridor. The wider zone of influence is more equitable for people residing and operating businesses along the designated transport link as the logistics corridor. The expansion of the zone of influence depends on the development of feeder roads and the cargo transport network centering the truck terminals or cargo collection and distribution points and industrial zones or farmland where the industrial and economic activities are supported by the logistics system efficiently.

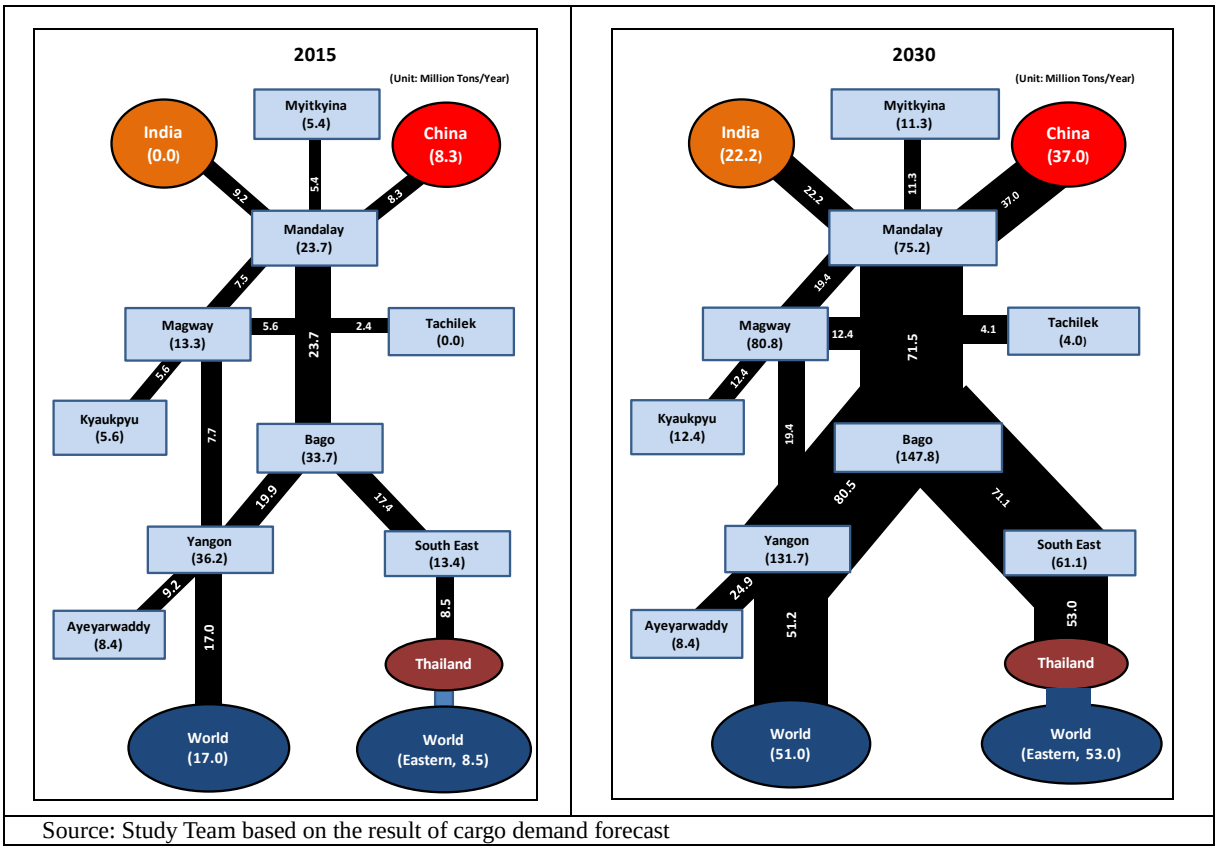


Source: Study Team

Figure-9.1.4 Concept of Evolution of Transport Corridor to Economic Corridors

9.1.2 Cargo Demand Forecast by Logistics Corridor

The results of the cargo demand forecast are presented in **Chapter-2. Figure-9.1.5** shows the cargo demand projected for major links forming the skeleton diagram of the present cargo transit system in Myanmar and also for the future up to 2030 and beyond. The cargo demand volume forecast is split into cargo transport demand by transport mode. **Table-9.1.3** shows the cargo demand by logistics corridor and by transport mode in 2030. The unit of figure shown by link is million tonnes per year.



Source: Study Team based on the result of cargo demand forecast

Figure-9.1.5 Cargo Demand Forecast on Skelton Diagram

Table-9.1.3 Cargo Demand Forecast by Logistics Corridor and by Transport Mode

Logistics Corridor	Major Link / Terminal	Year	Total	Road	Railway	IWT	Local Port	Air
Myanmar-India Logistics Corridor	Mandalay-Tamu	2015	500	500				
		2030	4,400	4,400				
Myanmar-India Logistics Corridor	Mandalay-Monywa	2015	3,300			3,300		
		2030	8,000			8,000		
Norrth-South Logistics Corridor	Mandalay-Muse	2015	8,300	8,300				
		2030	37,000	37,000				
	Bago-Mandalay	2015	12,900	8,400	4,500			
		2030	55,300	37,000	18,300			
	Yangon-Bago	2015	19,900	14,100	5,800			
		2030	80,500	53,200	27,300			
Main River Logistics Corridor	Yangon-Mandalay	2015	7,700			7,700		
		2030	19,600			19,600		
Trans Myanmar Logistics Corridor	Kyauphhyu-Magway	2015	7,000	7,000				
		2030	10,800	10,800				
	Magway-Mon Lah	2015	2,400	2,400				
		2030	4,100	4,100				
South East Logistics Corridor	Bago-Mawlamyaing	2015	13,800	10,300	3,500			
		2030	67,300	58,000	9,300			
	Mawlamyaing-Myawaddy	2015	8,500	8,500				
		2030	21,000	21,000				
	Mawlamyaing-Thanbyuzayat	2015	4,900	2,800	2,100			
		2030	37,100	21,100	16,000			
	Thanbyuzayat-Dawei	2015	4,000	2,900	1,100			
		2030	18,100	13,000	5,100			
Coastal Marine Logistics Corridor	Sittwe-Yangon	2015	4,200				4,200	
		2030	12,000				12,000	
Aviation	Total Air Cargo	2015	50					50
		2030	250					250
Total		2015	97,450	65,200	17,000	11,000	4,200	50
		2030	375,450	259,600	76,000	27,600	12,000	250
	Change in Times	2030/2015	3.9	4.0	4.5	2.5	2.9	5.0
	CAGR	2015-2030	9.4%	9.6%	10.5%	6.3%	7.2%	11.3%
Change of Share by Mode	%	2015	100.0%	66.9%	17.4%	11.3%	4.3%	0.1%
		2030	100.0%	69.1%	20.2%	7.4%	3.2%	0.1%

Source: Study Team

9.2 Logistics Corridor Analysis

(1) Logistics Corridors Influence Area (Zone of Influence)

The profile for each logistic corridor, describing the name, approximate length (km), projected Annual Cargo Transport Volume in 2030, and population of the influence area is summarized in **Table-9.2.1**.

Table-9.2.1 Profile of Each Logistics Corridor

Name of Logistics Corridor	Approx. Length (km)	Projected Annual Cargo Transport Volume (Million Tonnes per Year in 2030)				Population Influenced ('000)
		Road		Railway	Waterway	
		Low Segment	High Segment			
1) Myanmar-India	400	14.2			8.0	8.300
2) North-South	990	32.0	54.0			11,600
3) South-East	290	13.0	26.0	0.7		4,500
4) Main River	1,230	0.6	3.3	1.4	20	10,000
5) Trans Myanmar	960	0.4	0.6			3,900
6) Coastal Marine	1,885				9.1	5,000

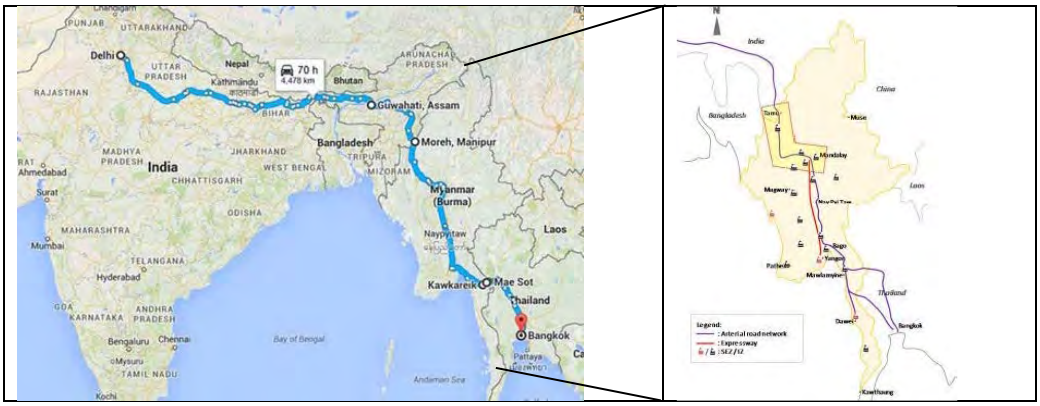
Source: Study Team

Myanmar-India Logistics Corridor (A part of the Logistics Corridor Linking India, Myanmar and Thailand that Obliquely Cross the Country): When three logistics corridors namely Myanmar–India Logistics Corridor, North-South Logistics Corridor, and South-East Logistics Corridor are joined together, this corridor can serve as an important regional link that connects Myanmar and India, China and Thailand by traversing Myanmar. The conclusion of the trilateral treaty between India-Myanmar-Thailand (IMT) making way for the IMT Highway provides seamless vehicular movement between SAARC and ASEAN Nations, enhancing trade, business, health, education and tourism between India, Myanmar and Thailand.

Figure-9.2.1 illustrates the India-Myanmar-Thailand (IMT) Highway the total length of which is 1,360 kilometers. The IMT Highway will link Moreh in India with Mae Sot in Thailand via Myanmar. The road's construction began in 2012,. In the road section between Tamu and Mandalay in Sagaing, obsolete and impassable weak and narrow old bridges have been under a renewal process with assistance from the Government of India.

The total influenced population in Myanmar is estimated at around 25 million persons, about half the total population. The formation of this corridor has been agreed as the regional corridor by trilateral treaty agreed by the Governments of Myanmar, India and Thailand in 2016. Once the Tamu – Mandalay section via Sagaing will be passable by heavily loaded vehicles, trade between the North Eastern region of India and various regions directly attached to the Myanmar – India Logistics Corridor will be enhanced. Major commodities traded between both regions of the two countries will be studied further, however, there will be crude oil, petroleum products exported from the North Eastern region of India (Nagaland, Assam) to

Myanmar and various agricultural products such as pulses, beans and rice exported from Sagaing, Magway, Mandalay regions of Myanmar to the North Eastern region of India, whose population is estimated around 47.5 million persons.

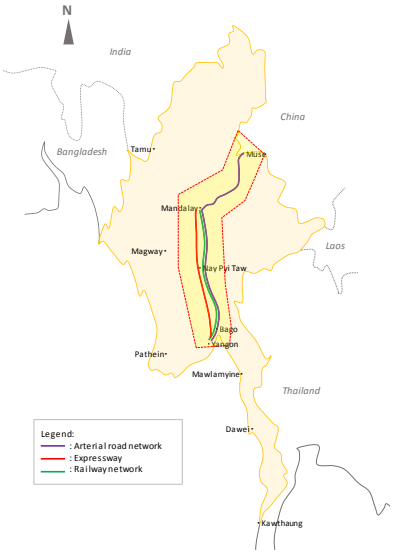


Source: Lt Gen Prakash Katoch June 28, 2016

Figure-9.2.1 India-Myanmar-Thailand (IMT) Highway

North-South Logistics Corridor (Main Logistics Corridor Linking Landlocked Provinces of China (Kunming) and Myanmar, as well as Thailand):

Figure-9.2.2 illustrates the route of the North-South Logistics Corridor. This corridor is the main logistics corridor of Myanmar that forms an axis linking two economic growth poles in Myanmar namely; Mandalay and Yangon where the major industrial zones and the international gateway port exists. This route includes the three different transport modes: highway, expressway and railway.



Source: Study Team

Figure-9.2.2 Skelton Diagram of North-South Logistics Corridor

A shipper of commodities chooses the most appropriate and suitable mode of cargo transport to maximize benefits, such as transport of low-value but bulky products, high-value products without the need of timely transportation and products with size by inland waterways (which includes containers), transport of high value and containerized cargo by container block trains, or use of trucking on expressways, depending on the importance of the punctual delivery of goods in a seamless transport system, at the lowest cost possible. This link serves not only the domestic and international cargo of Myanmar but also serves international cargo transiting through Myanmar to and from China, India and Thailand. The international gateway port of this logistics corridor is the Port of Yangon, including Thilawa terminals. **Figure-9.2.2** illustrates the logistics corridor zone and major transport infrastructure concerned.

Main River Logistics Corridor: Ayeyarwaddy River has been the most important river system of Myanmar, running 2,170 km running through the country, from north to south. Its river basin area is almost 411,000 km^2 and benefits some 40 % of the total population. Chindwin River is a branch river of Ayeyarwaddy River and plays an important role for the transport of cargo to mountainous and remote areas along this river. Before the railway and road were constructed during the colonial time, Ayeyarwaddy River was called the “Road to Mandalay”. Ayeyarwaddy Delta is the country’s major grain production area. Rice has been one of the most important export commodities and foreign exchange earners of Myanmar, after hydrocarbon resources. Rice these days is exported to China and the major transport method used for exporting rice to China is inland waterway transport, using Ayeyarwaddy River.

Figure-9.2.3 illustrates the profile of the Main River Logistics Corridor.

Source: Study Team

Figure-9.2.3 Skelton Diagram of Main River Logistics Corridor

Inland water transport along Ayeyarwaddy River plays an important role in sustaining the life of the main part of population engaged in agricultural activities. Almost one third of the total population of the State and Region where Ayeyarwaddy River passes through - such as Kachin, Sagaing, Mandalay, Magway, Bago, Yangon and Ayeyarwaddy – is estimated at around 10 million.

Inland waterway transport is suitable for the transport of bulky and low-value commodities such as agricultural products, feed crops, fertilizer, construction materials, and fuels. If such bulky and low-value products are transported over long distances, such as between Yangon and Mandalay, by truck instead of by the inland waterway transport system (using the Ayeyarwaddy River as the main navigation channel), the transport cost would be prohibitively high and would overload the road system. The carbon dioxide emissions per ton-km of cargo transported by inland water transport is much less compared to the emissions through transportation by road carrying the same volume, thus inland waterway transport is considered as an environmental friendly transport mode. Therefore, utilization of inland waterway transport - especially along the Ayeyarwaddy River - has to be emphasized.

As shown in the above figure, although the major transport mode along this logistics corridor is the inland waterway transport mode, the railway line and highway are part and parcel of this logistics corridor. River ports are planned to be turned into multimodal transport hubs that are designated as transport nodes composed also of road and railway transport modes. The roads will function as feeders and the railway will function as the mode for transport of cargoes and passengers in a range of around 100 km each side of the railway alignment. The inland waterway transport functions as the transport mode for bulky cargoes and container vessels plying between Yangon and Mandalay for long distance transport at least cost.

Trans Myanmar Logistics Corridor: As illustrated in **Figure-9.2.4,** this logistics corridor links Kyaukpyu Port or SEZ facing the Andaman Sea with the Chinese border to the east and the border with northern Thailand or Tachileik via Magway, Meiktila, Taunggyi, Heho in Shan State horizontally in the central part of Myanmar. The landlocked western part of China (Yunnan Province of China: population: 50 million) has been looking for a deep sea port for their trade and assisted Myanmar to create the Kyaukpyu Port, which is possible to accommodate VLCC (Very large crude oil carriers of up to 320,000 DWT) for import of crude oil shipped from Middle East and Africa and onwards transit to Kunming, via the Trans-Myanmar Crude Oil Pipeline (Sino-Myanmar Pipeline), whose crude oil transmission capacity is around 25 million tonnes per year. The crude oil lifting facility was built at Maday Island, which has a water depth is more than 20 meters near the commercial port of Kyaukpyu.

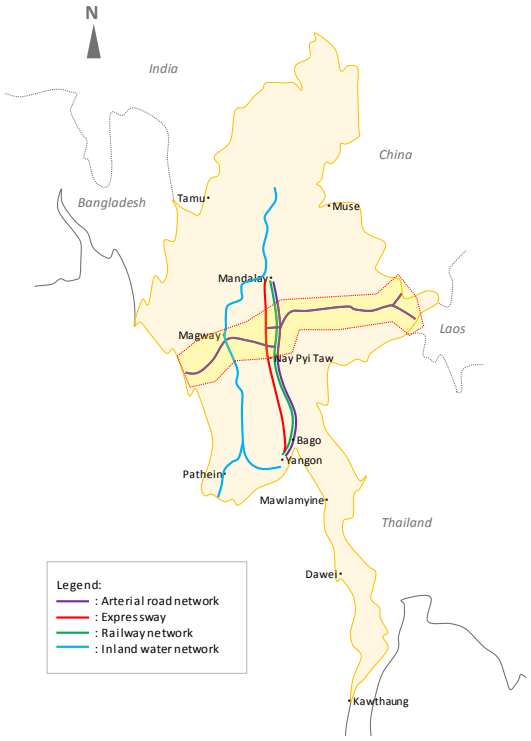
Figure-9.2.5 illustrates the alignment of the oil and gas pipeline that stretches from Kyaukpyu via Magway to Muse. As shown in this figure, the Trans Myanmar Logistics Corridor does not run along the same alignment as the Trans Myanmar oil and gas pipeline that stretches to Muse the Chinese border at the north but stretches to the Chinese border at the East or Mon Lah and the Thai border at the north of Thailand or Tachileik.

The most important intersection node of the Trans Myanmar Logistics Corridor is Magway, which is situated along Ayeyarwaddy River. Magway has been an important city in the middle of Myanmar since the beginning of 20th century, as it is located at the on-shore crude oil production field. There are several refineries, although their production capacities have been fallen to a low level, because of crude oil production has been continuously reducing.

However Magway still has a substantial potential to revive as an active city for oil production or become a center of petroleum-related industries and logistics, because of its geographical advantages. Once the Kyaukpyu SEZ has been fully developed, Magway will play an important role for logistics services, as the city is located at the intersection nodes of various transport modes, such as inland waterway transport, railway and highway that compose the Main River Logistics Corridor and regional linkages with China and Thailand by highway running through Shan State. In addition to these, this logistics corridor is regarded as an alternative route for trade with China if and when any closure happens on the Muse or

Mandalay, Lashio and Muse routes, due to natural calamities, traffic accidents and internal conflicts that may occur along the border with China.

Trans Myanmar Logistics Corridor should be particularly noted as it may serve to the future of Myanmar through the development of Kyaukpyu SEZ, provision of timely transportation of the local vegetables from Shan Hills, and possibly bringing order to Golden Triangle area.



Source: Study Team

Figure-9.2.4 Skelton Diagram of Trans Myanmar Logistics Corridor

Source: Study Team based on the map of pipeline network prepared by the Ministry of Energy.

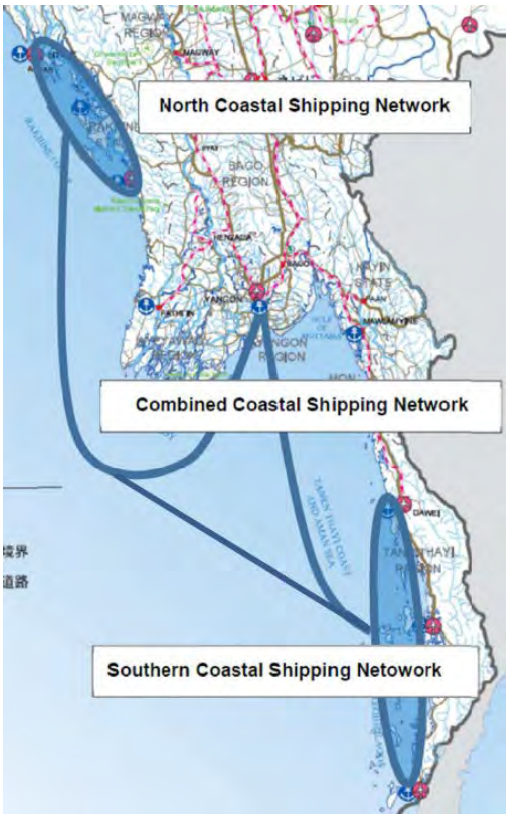
Figure-9.2.5 Trans-Myanmar Oil and Gas Pipeline

Coastal Marine Logistics Corridor: This corridor is a maritime logistics corridor linking local sea ports along the entire coast of Myanmar. The total length of the corridor along the coast is around 1,700 km, stretching from the border with Bangladesh to the west and the border with Thailand at the south eastern end of Myanmar. The eight (8) major local ports located within this corridor are; Sittwe, Kyaukpyu, Thandwe, Pathein, Mawlamyine, Dawei, Myeik, Kawthaung and one (1) international / local port at Yangon. **Figure-9.2.6** illustrates the coastal shipping network plan and the location of the corridor.

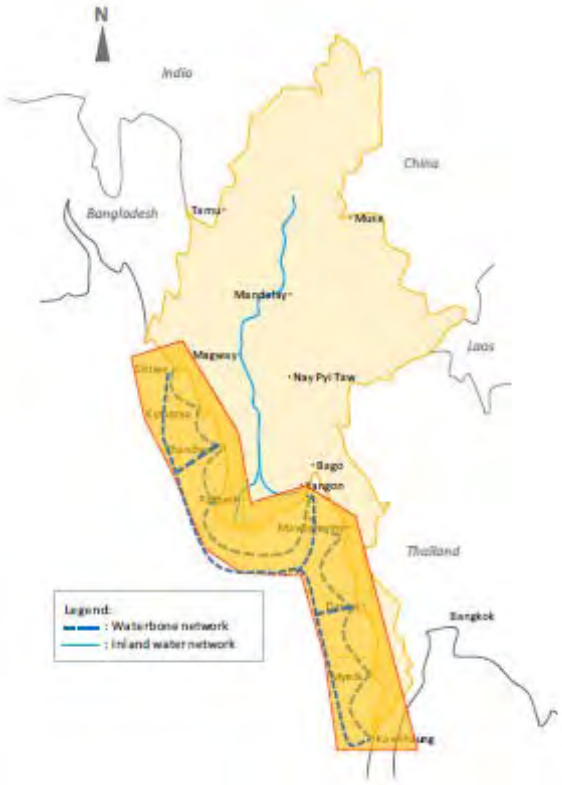
In Yangon, as the mother port for the coastal shipping network, the port specifically designated for the local shipping network will be developed or a part of the existing Yangon Port will be relocated to the most convenient location for such functions. The transport costs of coastal shipping are low compared with other transport modes, such as highways (trucking) or railways and this mode is suitable for the transport of bulky commodities, such as construction

materials and grain, including rice, at a lower cost than land transport. At the rural areas along the coast of Myanmar, the economic level of the population lags behind the average for Myanmar and land transport access is poor, therefore coastal shipping for daily consumables is quite important for the population spread along the coast. However most existing port facilities are poor and old, and therefore port productivity is quite low at present.

Coastal Logistics Corridor should play vital role through connecting industrial areas (ex. SEZs) and Yangon. Further, the development of roads in coastal areas is still underway and that, given the distance between Yangon and southern area of the country through land route, development of harbor facilities to accommodate container feeders and ferries should be considered as urgent matter of importance.



Coastal Shipping Network



Coastal Marine Logistics Corridor

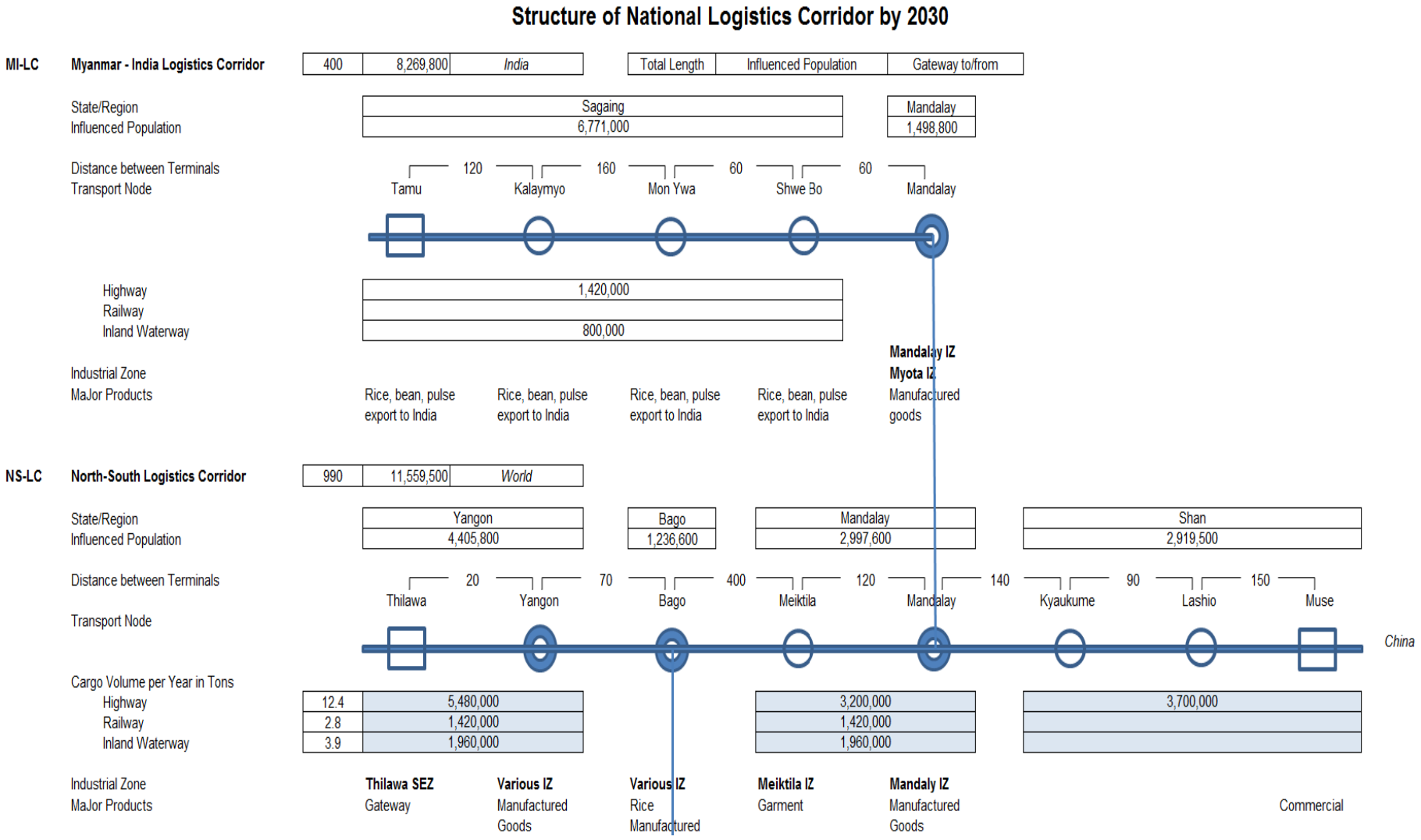
Source: Study Team

Figure-9.2.6 Profile of Coastal Logistics Corridor

Most of the local ports are old-fashioned and there is a lack of cargo handling areas for speedy cargo loading and loading. Unless the local port facilities are improved, land transport will need to undertake the transport of bulky and low-value cargoes over long distance. This would push up the total transport costs of cargo transport substantially. Therefore, the refurbishment or improvement of local ports and navigation aids, as well as vessels themselves, is imperative. The population that relies on coastal shipping can be estimated at around 5 million persons, or 10% of the total population.

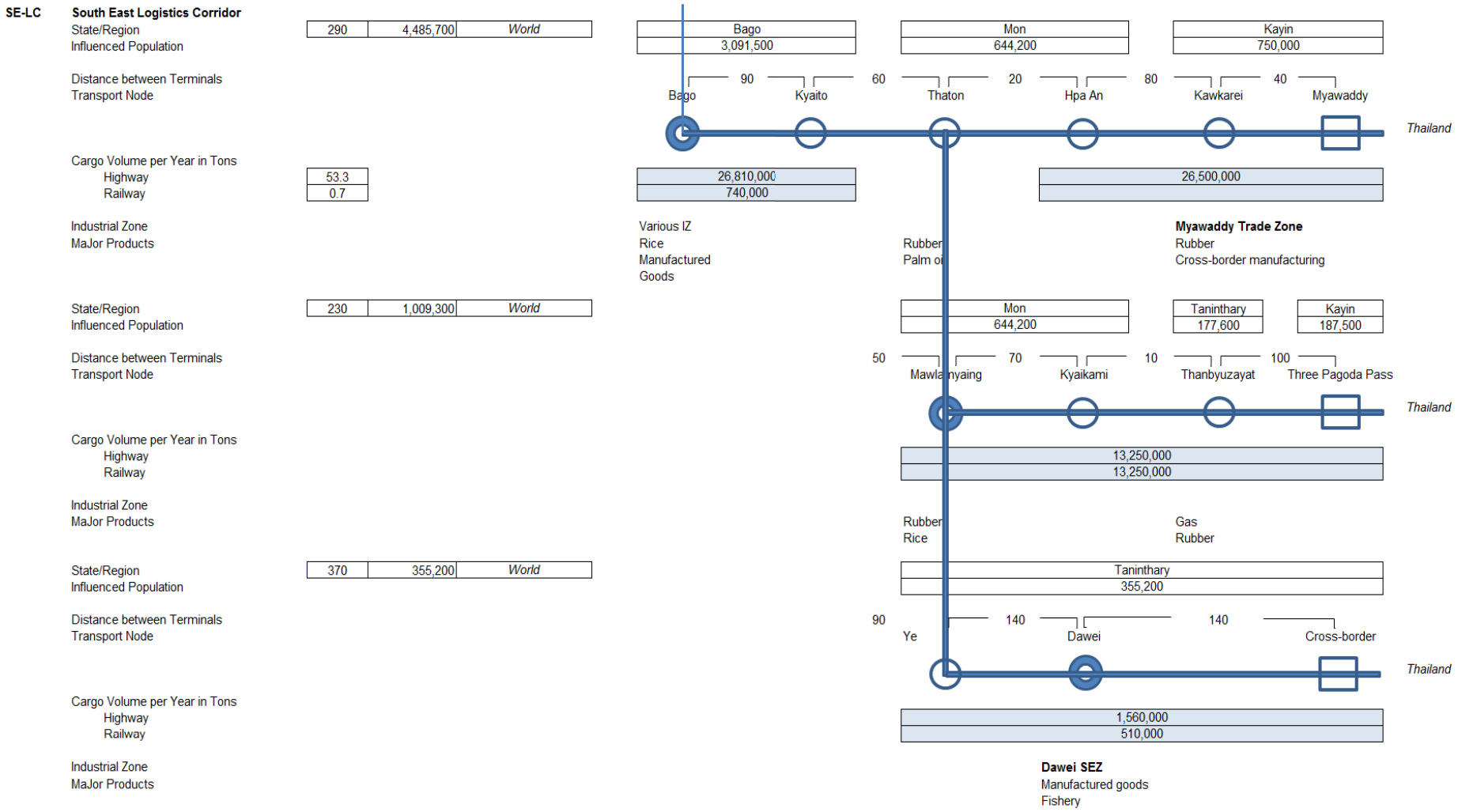
(2) Key Data for Each Logistics Corridor

Figure-9.2.7, 9.2.8, 9.2.9 and 9,2,10 illustrates the profile of respective logistics corridors including the structure (terminal cities, nodes and cross-border points), distance between nodes, cargo transport volume forecast for 2030, directly related state and division, population within the influence area, major commodities by segment, etc.



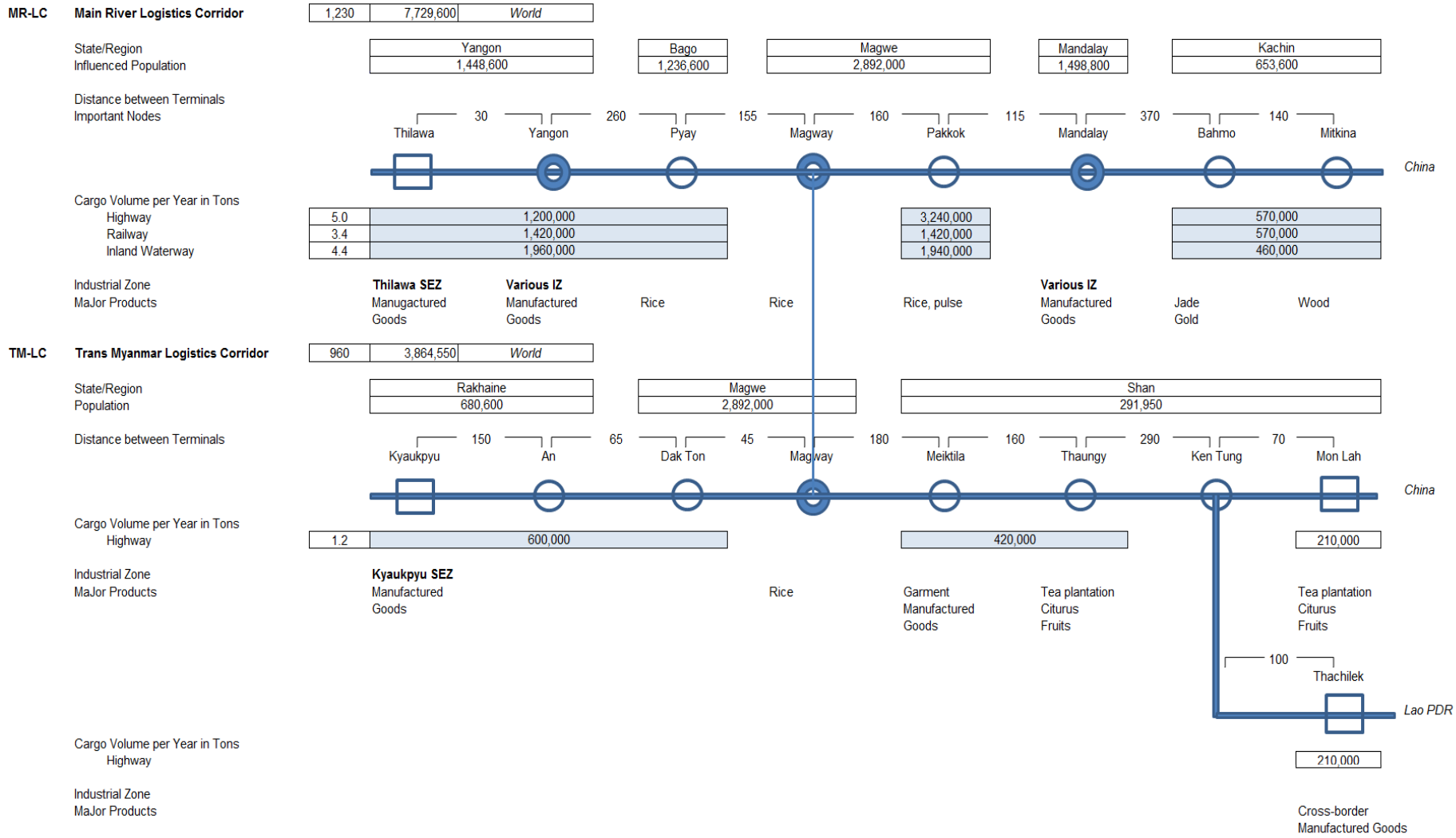
Source: Study Team

Figure-9.2.7 Structure and Key Data of Logistics Corridor (Myanmar-India, North-South Logistics Corridor)



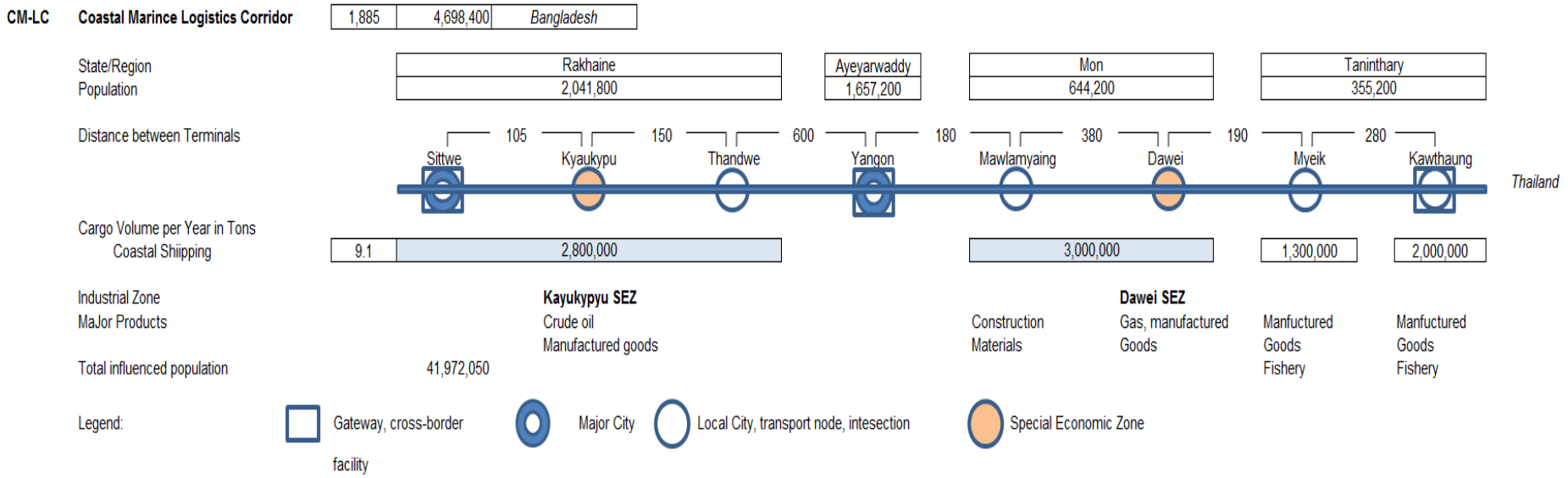
Source: Study Team

Figure-9.2.8 Structure and Key Data of Logistics Corridor (South East Logistics Corridor)



Source: Study Team

Figure-9.2.9 Structure and Key Data of Logistics Corridor (Main River and Trans-Myanmar Logistics Corridor)



Source: Study Team

Figure-9.2.10 Structure and Key Data of Logistics Corridor (Coastal Marine Logistics Corridor)

CHAPTER-10 PROPOSED PROJECTS

10.1 Approach and Planning Considerations

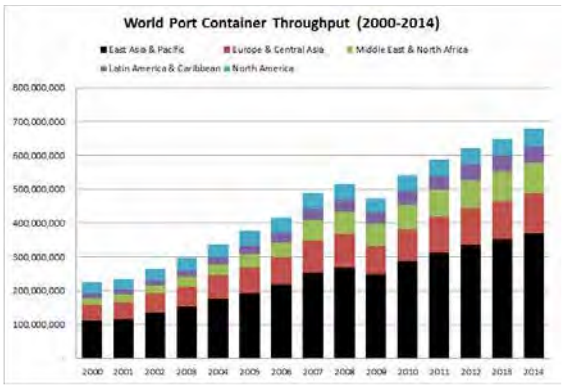
10.1.1 Sector Development Plan Directions

The priority directions to be taken into consideration for the formulation and preparation of the National Logistics Development Master Plan for 2030 (13 years from the time of writing): attention is drawn to the perspective of the logistics situation in the global context as a first step, followed by the regional context as the second step, and inclusion of the domestic context into the global context as the following step. The outline of each stepwise context is as follows:

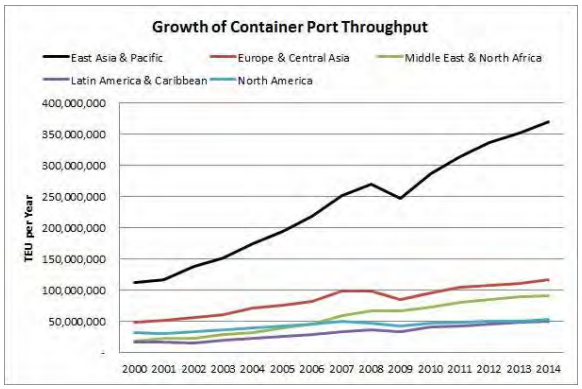
(1) Global and Regional Context

1) Global Context

The total volume of port container throughput in the world in 2000 was 224 million TEU and it increased to 670 million TEU in 2014, at an average annual growth rate (AAGR) of 7.8%. Meanwhile, the total port container throughput of East Asia and the Pacific region increased from 111 million TEU to 370 million TEU in the same period, at an AAGR of 8.6%. The share of East Asia and the Pacific region in the world total port container throughput in 2000 was 41% and this increased to 55%in 2014. East Asia and the Pacific region is the largest and leading region in the world, in terms of port container throughput. **Figure-10.1.1** shows changes in port container throughput of the world over time.



World Port Container Throughput



Growth of Port Container Throughput

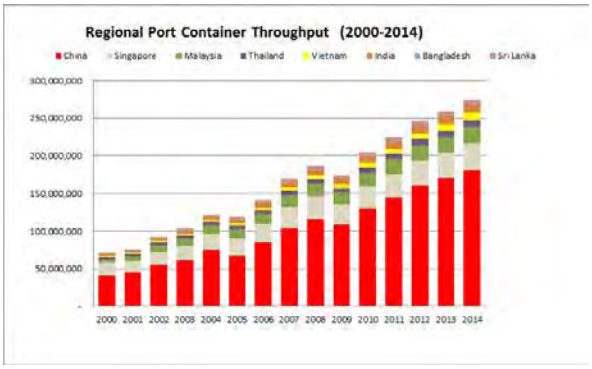
Source: Study Team based on the data available from the World Bank Data

Figure-10.1.1 Changes of Port Container Throughput in the World

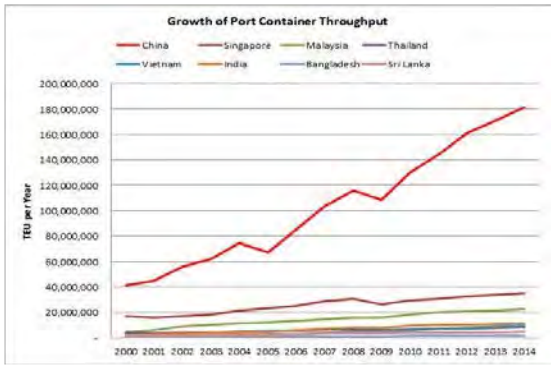
These figures indicate that world container traffic volume has increased constantly, and the East Asia and Pacific region container volume has increased considerably over this time period. This is because of a constant and stable world economic growth in general and the rapid economic growth of the East Asia and the Pacific region in particular. The progress of containerization might also lead to increase of container traffic volume.

2) Regional Context

The total volume of port container throughput of East Asia in 2000 was 71 million TEU. This increased to 275 million TEU in 2014, at an average annual growth rate (AAGR) of 10.7%. The share of the East Asia region in the world total port container throughput in 2000 was 32%, and this increased to 40% in 2014. **Figure-10.1.2** shows the changes in port container port throughput of the East Asia region.



Change of Port Container Throughput in East Asia

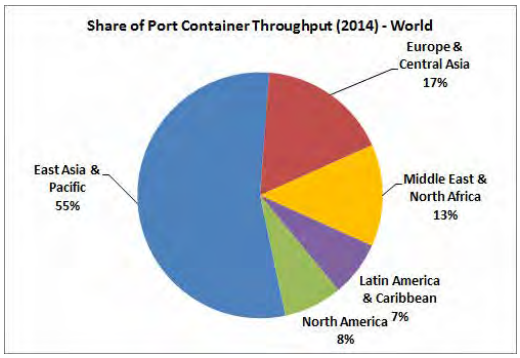


Growth of Port Container Throughput

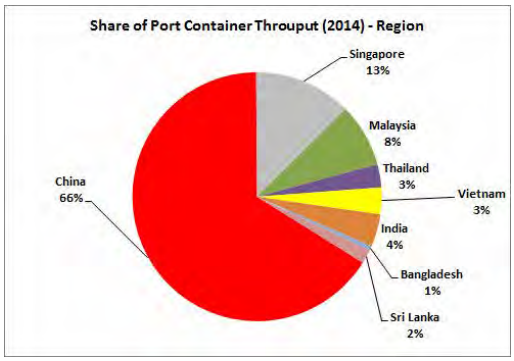
Source: Study Team based on the data available from the World Bank Data

Figure-10.1.2 Changes of Port Container Throughput in East Asia Region

The port container throughput of China accounts for almost 67% of the total port container throughput of the East Asia region on average over the past 15 years, followed by Singapore (at 16.7%) and Malaysia (at 8.8%) respectively. Thailand accounts for around 3.7% followed by Vietnam at 2.5%. The share of port container throughput in the world and the East Asia region in 2014 is shown in **Figure-10.1.1.3.**



Share of Port Container Throughput



Share of Port Container Throughput

Source: Study Team based on the data available from the World Bank Data

Figure-10.1.3 Share of Port Container Throughput in the World and the East Asia Region

3) Country Context

China and Thailand are neighboring countries to Myanmar and their influence on container traffic volume in Myanmar is thought to be considerable. Both container traffic to and from Myanmar and Thailand; and China and Thailand through Myanmar as a transit country are expected to increase, in parallel with improvement of the cross-border facilities along Myanmar's border with China to the North and with Thailand to the East. **Table-10.1.1** shows the present (2015) and future (2030) production, export and import volume of commodities by group of commodity estimated through cargo demand forecast.

Table-10.1.1 Present and Future Production, Export and Import Volume of Commodities

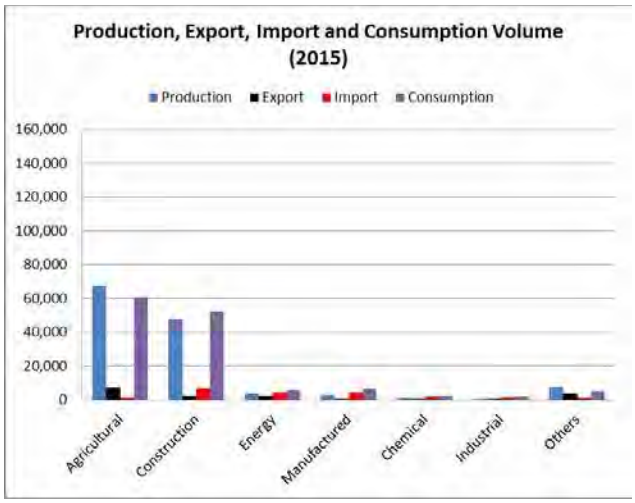
(Unit: '000 tons/year)

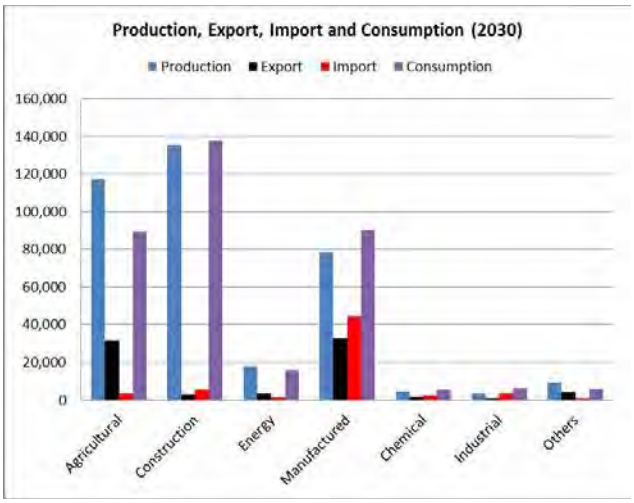
2015	Production	Export	Import	Consumption	Trade
Agricultural	67,350	7,395	843	60,798	8,238
Construction	47,606	2,327	6,873	52,152	9,201
Energy	3,705	2,249	4,143	5,600	6,392
Manufactured	2,658	523	4,113	6,249	4,636
Chemical	733	30	1,613	2,316	1,642
Industrial	661	223	1,437	1,875	1,660
Others	7,529	3,407	802	4,925	4,209
Total	130,242	16,154	19,825	133,914	35,979
2030	Production	Export	Import	Consumption	Trade
Agricultural	117,239	31,360	3,395	89,274	34,755
Construction	135,035	2,946	5,426	137,516	8,372
Energy	17,651	3,166	1,262	15,747	4,427
Manufactured	114,380	48,513	64,439	130,306	112,952
Chemical	4,320	1,445	2,394	5,270	3,839
Industrial	3,175	678	3,447	5,944	4,125
Others	9,123	4,162	802	5,762	4,964
Total	400,923	92,269	81,165	389,819	173,435

Source: Study Team

Figure-10.1.4 illustrates the production, export and import volumes of commodities in 2015 and 2030 by commodity groups. As shown in this figure, it is clear that the engine of the economic growth of Myanmar up to 2030 is the manufacturing sector. The total annual consumption volume commodities is projected to increase around 2.9 times in 2030 from the volume recorded in 2015, while the total trade volume of commodities excluding oil and gas will increase around 4.5 times -chiefly due to increase of import and export of manufactured goods, which will increase drastically.

The growth of the manufacturing sector will be high since the volume of manufacturing commodity group in 2015 is quite small. The import volume in 2015 was around 20 million tonnes whilst the total consumption volume was 134 million tonnes; thus it accounted for around 15% of the total consumption volume. The import volume in 2030 is projected to increase to around 81 million tonnes, whilst the consumption volume will increase to around 390 million tonnes, thus it will account for around 21% of the total consumption volume. As the total consumption volume of commodities is a basic indicator of the cargo transport volume in Myanmar, a rapid increase in trade volume should draw attention at the highest levels as how to transport such rapid growth in volume in efficient manner.





Source: Study Team

Figure-10.1.4 Present and Future Consumption, Export, Import and Consumption Volume by Commodity Group

As shown in the above figures, the consumption and trade volume will increase sharply in general and the trade volume of manufactured goods will increase drastically in particular toward the future. Most of the transport of trade cargo of manufactured goods will be done by international standard maritime containers. Therefore, Myanmar is to prepare for transportation and distribution of containerized goods in the shortest possible time or at least prior to the commissioning of the New Thilawa International Container Terminal that is under the detailed design stage for its construction and expected to be commissioned by 2023.

The production volume of construction materials (almost 3 times) and agricultural products (almost twice as much) will grow substantially following the growth of production volume of manufactured goods. The character of cargoes of these two major commodity groups is bulky and low-value and these are mostly for domestic consumption. Therefore, Myanmar is to prepare for transportation of these two major commodity groups at least cost and in optimum way. The long-distance haulage of these commodity groups is to be undertaken by least cost transportation means i.e. inland waterway transport, coastal shipping and railway but not by most expensive transportation mean such as trucking.

4) Myanmar Opens Up to the World Market:

As the regional road network within the framework of ASEAN Economic Community (AEC) is going to be completed by 2018, international freight traffic is expected to increase at a fairly rapid pace. Major goods being transported to Myanmar are manufactured goods, fuels and consumable goods. Goods being transported from Myanmar to the world market, especially to neighboring countries, are mainly agriculture products. A gradual increase of freight volume of transit cargo to and from China and Thailand, as well as to and from neighboring countries, is foreseen. The position of Myanmar will change gradually as the crossroads of surrounding large countries in terms of population, economy and GDP per

capita such as China, Thailand and India when the trade and movement of goods and person will become freer and smoother toward the future especially from 2018 when Myanmar will be integrated in the regional economic system (i.e. AEC). The potentiality of expanded trade of Myanmar with the member countries of AEC in the regional context and the world market as the global context is considered as strong and large once substantial FDI inflows toward Myanmar commence in the manufacturing sector in the future, if Myanmar will succeed to provide better logistics infrastructure and appropriate laws and regulations.

5) Integrated Development of All Relevant Components Constituting the Transport and Logistics Sector:

Upgrading will be needed not only for transport infrastructure but also for logistics and transport services, in an integrated manner. In addition there will be a substantial change of road transport patterns when the regional road networks connecting China, Thailand and India via Myanmar (East-West Corridor and India-Myanmar-Thailand Corridor) will be completed. Furthermore, the operational mode of railway freight transport will change substantially, from the present conventional railway freight transport system to a container block train system. The railway system can enhance the agricultural and industrial development in strategic areas of Myanmar to create a strong foundation for economic development.

The world's largest consuming country of gas, crude oil, iron ore, etc. (and the largest trading partner of Myanmar now and future), China, is a neighboring country. A substantial change in transport patterns of goods and freight is taken into account in the preparation of the logistics sector development master plan for Myanmar. Taking into account the substantial changes in trade, international and regional transport patterns and the rapidly increasing freight transport volumes, the strategy needs to be prepared in an integrated manner, focusing on the creation of a foundation for the sustainable and robust economic development of Myanmar.

10.1.2 Methods of Computation of Economic Benefits

(1) Introduction

As discussed in Chapter-7 of this report, the low efficiency of cargo transport and the high cargo transport cost are one of the major issues identified. Following surveys were conducted through the study period to understand current situation of cargo transport and logistics efficiency.

1) Truck drivers interview survey
2) Waterborne transport operation survey
3) Truck terminal survey
4) Truck terminal operation survey
5) Value chain survey

In order to understand the effectiveness and scale of economic benefits potentially derived from the various investment projects, the following various preliminary examination of the economic benefits was computed. The results of above surveys are utilized for the computation of the economic benefits.

1) Shortening truck turnaround time by increasing the running speed of trucks and reduction of truck dwell times at the truck terminals for the Yangon-Mandalay section;
2) Shifting mode from road haulage to railway container block trains for the Yangon-Mandalay section;
3) Shifting mode from road haulage to inland waterways transport for the Yangon-Mandalay section; and
4) Shifting from road transport mode to coastal shipping mode

(2) Evaluation of Cargo Transport Efficiency and Economic Benefits

1) Quantification of Transport Cost Saving

Some of the identified priority projects were evaluated in general and in preliminary way to grasp approximate value of economic benefits derived from project investment costs in quantitative way. Although, the detailed economic evaluations for respective projects is difficult to conduct at the stage of master plan preparation, approximate economic benefits were roughly estimated, to assist in the identification of priority Projects. The major sources of economic benefits derived from project investments are described below.

The basic estimation of economic benefits for transport infrastructure development (i.e. roads, ports, railways, etc.) is fundamentally the same for the estimation of the economic benefits for logistics development projects.

(i) Running speed of transport equipment in use:
(The higher the speed, the lower the transport operations cost, through better efficiency.)
(ii) Transport equipment operation cost (TEOC) by transport mode;
(The larger the payload per unit of equipment, the lower the cost because of scale merits)
(iii) Transport equipment operation cost in time
(The shorter the dwell time of transport equipment, the lower the transport cost because of minimization of the depreciation cost of equipment and the optimization of labor costs).

2) Saving of Transport Cost by Shifting Transport Mode

The economic evaluation benefits due to the project aimed at improving transport or logistics systems can be computed by use of the Transport Equipment Operation Cost (TOEC, similar to Vehicle Operation Cost - VOC) per Unit of transport equipment such as

vehicles, trains, vessels, etc. However, cargo transport costs are measured in ton-km for each transport mode. The transport costs of cargo in terms of ton-km can be computed by assuming an average payload of transport equipment per unit and a load factor. The load factor shows the efficiency of transporting cargo by unit of transport equipment. The load factor 1.0 means that the cargo load is full at any time or the transport equipment return to the origin place with full load of cargo. In other words the transport equipment does not have an empty backhaul. **Table-10.1.2** shows the Transport Equipment Operation Costs by transport speed per hour in each 10-kph interval in Myanmar. The average vehicle body cost, average life, annual operation distance, fuel consumption per 1,000 km run, maintenance cost, repair cost, crew cost, interest rate, import duty, etc. were studied and calculated for large trucks, trailer trucks, IWT vessels, coastal vessels, etc. based on collected data and information. The total transport cost by transport mode can be computed by multiplying the TOEC by the annual cargo volume transported. Then the total cargo transport costs can be compared with other transport modes, to understand the difference in annual transport costs of cargo volumes. Differences are considered as economic benefits, due to a shift in transport mode.

Figure-10.1.5 illustrates the difference of operational costs for various types of transport equipment and the speed of each type of transport equipment, as well as the transport cost of cargo per ton-km.

Table-10.1.2 Transport Operation Cost by Mode and by Speed in Use

VOC subject to Use (US$/1000Km)

	Speed	Small	Big	Trailer	IWT	Railway	Coastal
	(Km/hour)	Truck	Truck	Truck	Ship		Ship
Ave. Cargo Volume		(2ton)	(6ton)	(15ton)	(1000ton)	(3000ton)	(1000ton)
Financial Cost	5.0	480.0	822.4	996.4	7,901.9	23,159.5	16,446.6
	10.0	330.1	571.3	708.1	5,945.8	21,363.8	15,286.2
	20.0	250.2	436.3	547.3	4,679.9	18,129.5	12,273.0
	30.0	214.6	297.0	430.5	3,613.3	14,650.1	9,549.4
	40.0	204.6	303.2	386.2	3,077.7	12,241.8	8,036.9
	50.0	201.4	295.2	378.7	2,933.2	11,895.3	7,679.9
	60.0	205.0	296.4	383.5	3,006.7	14,068.2	8,041.9
	70.0	210.4	310.1	403.0	3,223.8	14,293.1	8,775.3
	80.0	224.6	339.6	443.3	3,566.0	16,323.2	9,884.5
	90.0	243.1	379.1	496.0	3,945.2	18,252.0	11,010.6
Economic Cost	5.0	404.8	695.1	840.8	6,751.6	23,159.5	14,143.4
	10.0	278.7	483.0	597.6	5,089.9	21,363.8	13,148.5
	20.0	211.5	368.9	461.9	4,010.2	18,129.5	10,565.2
	30.0	181.5	250.5	362.7	3,097.7	14,650.1	8,224.2
	40.0	173.0	255.6	324.9	2,638.0	12,241.8	6,920.4
	50.0	170.3	248.5	318.1	2,514.8	11,895.3	6,614.4
	60.0	173.5	249.6	322.2	2,579.5	13,882.5	6,930.0
	70.0	178.2	261.3	338.9	2,767.1	14,293.1	7,564.9
	80.0	190.3	286.3	372.9	3,062.3	16,323.2	8,524.1
	90.0	206.1	319.6	417.3	3,388.8	18,252.0	9,496.5

Source: Study Team

Table-10.1.3 Transport Operation Cost by Mode and by Speed in Time

VOC subject to Time (US$/Hour)

Number of Passenger / Cargo	Small Truck (2ton)	Big Truck (6ton)	Trailer Truck (15ton)	IWT Ship (1000ton)	Railway (3000ton)	Coastal Ship (1000ton)
Financial Cost						
Depreciation	0.29	0.36	0.36	5.65	31.17	2.72
Capital Opportunity Cost	1.03	1.16	1.18	17.78	161.33	11.28
Crew and Overhead Cost	5.74	1.54	1.75	3.52	3.56	1.87
Total	7.06	3.06	3.29	26.96	196.06	15.88
Economic Cost						
Depreciation	0.25	0.31	0.31	4.89	31.17	2.36
Capital Opportunity Cost	0.89	1.00	1.01	15.39	161.33	9.78
Crew and Overhead Cost	0.68	1.52	1.72	3.47	3.54	1.86
Total	1.82	2.83	3.04	23.75	196.04	14.00

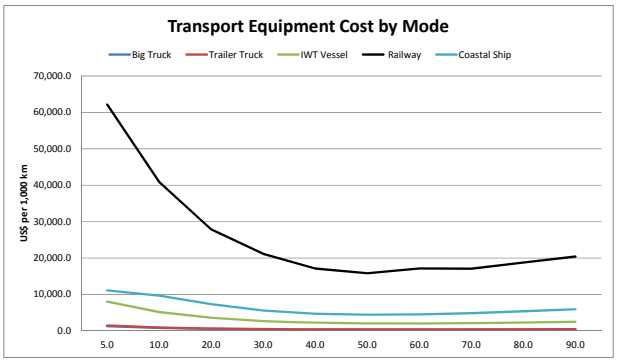
Source: Study Team

Table-10.1.4 Transport Operation Cost by Mode and by Speed in Ton-kilometer

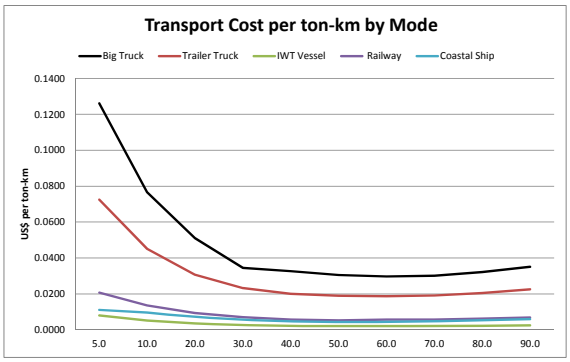
VOC Total (US$/1000km)

Number of Pax	Speed (Km/hour)	Small Truck 2.0	Big Truck 10.0	Trailer Truck 20.0	IWT Vessel 1,000.0	Railway Freight Train 1,000.0	Coastal Ship 1,000.0
Financial Cost	5.0	1,892.6	1,434.7	1,654.7	13,293.1	62,371.1	19,622.3
	10.0	1,036.4	877.5	1,037.2	8,641.4	40,969.6	16,874.1
	20.0	603.4	589.3	711.8	6,027.7	27,932.4	13,066.9
	30.0	450.1	399.1	540.2	4,511.8	21,185.3	10,078.7
	40.0	381.2	379.7	468.5	3,751.6	17,143.2	8,433.9
	50.0	342.7	356.4	444.5	3,472.3	15,816.4	7,997.4
	60.0	322.7	347.5	438.3	3,455.9	17,335.9	8,306.5
	70.0	311.3	353.9	450.0	3,608.8	17,093.9	9,002.1
	80.0	312.9	377.8	484.4	3,902.9	18,774.0	10,083.0
	90.0	321.6	413.1	532.5	4,244.7	20,430.4	11,187.0
Economic Cost	5.0	768.7	1,261.1	1,449.3	11,501.2	62,366.6	16,942.4
US$ per 1,000 km	10.0	460.7	766.1	901.9	7,464.7	40,967.4	14,548.0
	20.0	302.5	510.4	614.0	5,197.6	27,931.3	11,264.9
	30.0	242.1	344.9	464.1	3,889.3	21,184.6	8,690.7
	40.0	218.5	326.3	400.9	3,231.7	17,142.7	7,270.3
	50.0	206.7	305.1	379.0	2,989.8	15,816.0	6,894.3
	60.0	203.8	296.8	372.9	2,975.3	17,149.7	7,163.2
	70.0	204.2	301.8	382.3	3,106.4	17,093.6	7,764.9
	80.0	213.1	321.7	411.0	3,359.2	18,773.7	8,699.0
	90.0	226.4	351.1	451.1	3,652.6	20,430.2	9,652.0
Economic Cost	5.0	0.3844	0.1261	0.0725	0.0115	0.0624	0.0169
US$ per ton-km	10.0	0.2303	0.0766	0.0451	0.0075	0.0410	0.0145
	20.0	0.1512	0.0510	0.0307	0.0052	0.0279	0.0113
	30.0	0.1211	0.0345	0.0232	0.0039	0.0212	0.0087
	40.0	0.1092	0.0326	0.0200	0.0032	0.0171	0.0073
	50.0	0.1034	0.0305	0.0189	0.0030	0.0158	0.0069
	60.0	0.1019	0.0297	0.0186	0.0030	0.0171	0.0072
	70.0	0.1021	0.0302	0.0191	0.0031	0.0171	0.0078
	80.0	0.1065	0.0322	0.0205	0.0034	0.0188	0.0087
	90.0	0.1132	0.0351	0.0226	0.0037	0.0204	0.0097

Source: Study Team



TEOC per Unit by Speed



TEOC per Ton-km by Speed

Source: Study Team

Figure-10.1.5 Difference of Transport Equipment Operation Cost by Mode and Speed

3) Computation of the Economic Benefits / Transport Cost Saving in Quantitative Way

The "Economic Benefits" is a synonym of "Freight Transport Efficiency" in the field of logistics. The quicker the freight transport and shorter the dwell times of cargo and equipment, the lower the transport / logistics costs and the higher the competitiveness. It is worthwhile to know how much are the economic benefits and how high the transport efficiency in a quantitative way.

The annual economic benefits derived from the transport cost saving due to increased speed, shortened dwell times of transport vessels/vehicles, shifting of transport mode, etc. can be computed in the following way;

(i) Compute the total economic transport cost to carry the projected volume of cargo under a without-project case in terms of running speed;

(ii) Compute the total economic transport cost to carry the same volume of cargo under a with-project case in terms of running speed;

(iii) Compare the total annual transport cost under the without-project case and the with-project case;

(iv) Subtract the total transport cost under the with-project case from the total transport cost under without-project case;

(v) The balance (saving) in transport cost is considered as the economic benefit of the project.

(vi) Total economic benefit of the project is the total of all of the annual balances computed over the project life. (See **Table-10.1.5** below as an example.)

(vii) In a similar way, the difference in emissions can be computed to determine the total emission reduction volume over the project life.

(viii) Comparing the benefit in-flow and cost out-flow over the project life, the Net Present Value, B/C and EIRR can be obtained, where the economic costs of initial capital investment costs and operations / maintenance costs are available.

4) Change from Highway to Expressway for Trucking between Yangon and Mandalay Section

The cargo transport volume between Yangon and Mandalay was estimated at around 23.7 million tonnes in 2015 and forecast at some 68.5 million tonnes per year in 2030. Around 9.5 million tonnes was transported by trucks in 2015, and around 33.0 million tonnes will be transported by trucks in 2030. At present the expressway is not allowed for cargo transport use, such as by heavily loaded vehicles. Thus, most of the trucking operation between the two major cities uses the highway (in large trucks). Once the expressway is opened for cargo transport by heavily loaded vehicles, especially by trailer trucks carrying containers, the transport cost for transporting the same volume of cargo between the two cities can be reduced substantially. This is because transport costs reduce when average running speeds become higher and the type of truck changes to larger vehicles. **Table-10.1.5** shows the table showing average economic benefits in US$ million due to the transport costs saved by means of changing the route for trucking between Yangon and Mandalay, as well as the estimate of emissions reduction of CO_2 t from 2020 to 2030.

Table-10.1.6 shows the result of the computation to estimate transport cost savings through use of the expressway instead of highway, and assumptions for the computation of both savings in transport cost and emissions reduction due to this. As shown in this table, the savings in transport cost through use of the Expressway and by use of trailer trucks will be US$ 3,470 million in total, spread over a twelve-year period. Thus, the average annual saving of transport cost by shifting the road to use from highway to expressway can be US$ 290 million per year, which is enormous.

In addition to this, a possible transport cost saving due to shortening of the truck dwell time at truck terminals for arrangement truck cargoes using the Expressway between Yangon and Mandalay was computed. If the truck dwell time at truck terminals located at each end of the Yangon to Mandalay Expressway are reduced from the current 44 hours to 7 hours in future, due to the implementation of a truck terminal modernization project, in combination with support to logistics providers, transport cost could be reduced further, as shown in **Table-10.1.7.**

As shown in **Table-10.1.8** below, the transport cost saving through shifting from highway to expressway and shortening of truck dwell time at truck terminals will be US$ 1,740 million in total over a twelve year period. Thus the average annual saving of transport cost could be US$ 144 million per year, which is substantial. The average annual emissions reduction is estimated to be 117 million CO_2-ton.

Table-10.1.5 Computation Table for Estimation of Economic Benefits and Emission Reduction (Use of Expressway instead of Highway between Yangon and Mandalay by Trucks)

Calendar Year	Cargo Volume	Vehicle Operation Cost			Dwelling Cost of Trucks			Total Transportation Cost			CO2 Emission		
		Without Project	With Projcet	Balance	Without Project	With Projcet	Balance	Without Project	With Projcet	Balance	Without Project	With Projcet	Balance
	000 ton/year	US$ million	US$ million	US$ million	US$ million	US$ million	US$ million	US$ million	US$ million	US$ million	000 CO_2 ton/year	000 CO_2 ton/year	000 CO_2 ton/year
2019	13,700	280,807	145,412	135,395	89,204	16,231	72,972	370,011	161,643	208,368	802,102	746,975	55,126
2020	15,483	317,338	164,329	153,009	100,808	18,343	82,465	418,146	182,672	235,475	906,449	844,151	62,298
2021	17,497	358,621	185,707	172,915	113,923	20,729	93,193	472,544	206,436	266,108	1,024,370	953,968	70,402
2022	19,773	405,275	209,866	195,409	128,743	23,426	105,317	534,018	233,292	300,726	1,157,633	1,078,072	79,561
2023	22,345	457,998	237,168	220,831	145,491	26,473	119,018	603,489	263,641	339,848	1,308,231	1,218,320	89,911
2024	25,252	517,580	268,021	249,559	164,419	29,917	134,501	681,999	297,939	384,060	1,478,421	1,376,813	101,608
2025	28,538	584,913	302,889	282,024	185,808	33,809	151,999	770,721	336,698	434,023	1,670,752	1,555,926	114,826
2026	32,250	661,005	342,292	318,713	209,980	38,208	171,772	870,986	380,500	490,486	1,888,103	1,758,339	129,764
2027	36,446	746,997	386,821	360,176	237,297	43,178	194,119	984,294	430,000	554,294	2,133,730	1,987,085	146,646
2028	41,187	844,175	437,144	407,031	268,167	48,795	219,372	1,112,342	485,939	626,403	2,411,312	2,245,588	165,723
2029	46,545	953,995	494,012	459,983	303,054	55,143	247,910	1,257,049	549,156	707,893	2,725,004	2,537,721	187,282
2030	52,600	1,078,102	558,279	519,823	342,479	62,317	280,162	1,420,581	620,596	799,985	3,079,505	2,867,858	211,646
Total	351,616	7,206,808	3,731,939	3,474,869	2,289,372	416,571	1,872,801	9,496,180	4,148,510	5,347,670	20,585,612	19,170,816	1,414,795
Average		600,567	310,995	289,572	190,781	34,714	156,067	791,348	345,709	445,639	1,715,468	1,597,568	117,900

Source: Study Team

Table-10.1.6 Summary of Transport Cost Saving and Emissions Reduction Volume by Change of Route

(US$ '000)

Cost	Unit	Do Nothing	Change	Balance	Average
Cost in Use	000 US$	7,206,808	3,731,939	3,474,869	289,572
Cost in Dwelling Time	000 US$	2,289,372	416,571	1,872,801	156,067
Overall Cost	000 US$	9,496,180	4,148,510	5,347,670	445,639
Emission Volume	000 CO2-t	20,585,612	19,170,816	1,414,795	117,900

Source: Study Team

Table-10.1.7 Presumption for Computation of Transport Cost Saving (Yangon–Mandalay)

Item	Value	Note
Transport Volume – 2017	13.0 million tonnes	10.5 million tonnes in 2015
Transport Volume – 2030	32.0 million tonnes	Forecast by this study
CASE-A Use only NH1		
Big trucks' share in total	80%	Assumption
that use highway	95%	Assumption
that use expressway	5%	Assumption
Trailer trucks' share in total	20%	Assumption
that use highway	95%	Assumption
that use expressway	5%	Assumption
Dwell time at truck terminal	44 hours	Result of truck terminal survey
Dwell time of trailer truck	10 hours	Enter/Exist to and from terminal
VOC of big truck	US$305/1,000 km	Average speed: 50 kph, Load: 10 t
VOC of trailer truck	US$379/1,000 km	Average speed: 50 kph, Load: 20 t
Estimated Total Transport Cost	US$ 7,290 million	Accumulated in total of 12 years
CASE-B Using mainly expressway		
Big trucks' share in total	40%	Assumption
that use highway	10%	Assumption
that use expressway	90%	Assumption
Trailer trucks' share in total	60%	Assumption
that use highway	10%	Assumption
that use expressway	90%	Assumption
Dwell time at truck terminal	28 hours	Result of truck terminal survey
Dwell time of trailer truck	10 hours	Enter/Exist to and from terminal
VOC of big truck	US$302/1,000 km	Average speed: 70 kph, Load: 10 t
VOC of trailer truck	US$382/1,000 km	Average speed: 70 kph, Load: 20 t
Estimated Total Transport Cost	US$3,730 million	Accumulated in total of 12 years
Saving of Operation Cost	US$3,470 million	Case-A minus Case-B
Saving of Operation Cost per Year	US$290 million	Average of 12-years operation

Source: Study Team

Note:

1. Transport volume is based on the result of cargo demand forecast.
2. The assumption of current share of large trucks in the total traffic volume along Yangon-Mandalay Road is based on the result of truck interview survey conducted for the cargo demand forecast.
3. The assumption of dwell time is based on the result of truck terminal survey in Yangon Truck Terminal.

Table-10.1.8 Transport Cost Saving due to Shortening of Truck Dwell Time

Item	Value	Note
CASE-A Use only NH1		
Big trucks' share in total	80%	Assumption
that use highway	95%	Assumption
that use expressway	5%	Assumption
Trailer trucks' share in total	20%	Assumption
that use highway	95%	Assumption
that use expressway	5%	Assumption
Dwell time at truck terminal	44 hours	Result of truck terminal survey
Estimated Total Transport Cost	US$ 2,290 million	Including waiting time
CASE-B Using mainly expressway		
Big trucks' share in total	40%	Assumption
that use highway	10%	Assumption
that use expressway	100%	Assumption
Trailer trucks' share in total	60%	Assumption
that use highway	10%	Assumption
that use expressway	100%	Assumption
Dwell time at truck terminal	7 hours	Result of truck terminal survey
Estimated Total Transport Cost	US$ 550 million	Including waiting time
Saving of Cost	US$ 1,740 million	Case-A minus Case-B
Saving of Operation Cost per Year	US$ 144 million	Average of 12-years operation

Source: Study Team
Note: The assumption of current share of large trucks in the total traffic volume along Yangon-Mandalay Road is based on the result of truck interview survey conducted for the cargo demand forecast.

5) Shifting Mode from Road Haulage to Railway Container Block Train for Yangon – Mandalay Section

The cargo transport volume between Yangon and Mandalay by container block train is projected to be 600,000 TEU in 2030. The minimum container handling volumes agreed between Myanmar Rail and the Concessionaire who would develop and operate the Inland Container Depot (ICD) at both Yangon and Mandalay, is a minimum of 300,000 TEU per year at the beginning of operation in 2018. It is assumed that the container block train employed is a diesel locomotive, tracking 25 container wagons that carry two 20-footer containers per wagon. The volume of cargo to be transported between Yangon and Mandalay by container block trains is assumed to be 4.3 million tonnes per year in 2022 and this will increase to 6.8 million tonnes or 400,000 TEU in 2015 and to 600,000 TEU in 2030. It is assumed that the container block train service will begin in 2022, as the time of completion of track improvement is expected to be completed by then. The difference in the total transport cost between the case where total cargo is transported by container block train and the second case where the total cargo is transported by trailer truck plying between Yangon and Mandalay on the expressway is considered as the economic benefit.

Table-10.1.9 shows the result of the computation of the transport costs for each case, as well as average annual emissions reduction volume.

Table-10.1.9 Computation Table for Estimation of Economic Benefits and Emissions Reduction (Use of Container Block Train between Yangon and Mandalay instead of Trucks)

Volume per Year	Transport Cost by Railway			Cargo Handling	Total	Trailer Truck by Expressway		Save
	100%		With Project	20	Cost	100%	Without Project	
Calendar	000 tons/year	000 t-km/year	000 US$/year	000 US$/year	000 US$/year	000 t-km/year	000 US$	000 US$
2015	1,095	640,575	2,495	1,460	3,955	629,625	22,504	-18,549
2016	1,095	640,575	2,495	1,460	3,955	629,625	22,504	-18,549
2017	1,369	800,719	3,119	1,825	4,944	787,031	28,130	-23,186
2018	2,190	1,281,150	4,990	2,920	7,910	1,259,250	45,008	-37,097
2019	2,190	1,281,150	4,990	2,920	7,910	1,259,250	45,008	-37,097
2020	2,190	1,281,150	4,990	2,920	7,910	1,259,250	45,008	-37,097
2021	2,190	1,281,150	4,990	2,920	7,910	1,259,250	45,008	-37,097
2022	4,380	2,562,300	9,981	5,840	15,821	2,518,500	90,015	-74,194
2023	4,380	2,562,300	9,981	5,840	15,821	2,518,500	90,015	-74,194
2024	4,380	2,562,300	9,981	5,840	15,821	2,518,500	90,015	-74,194
2025	4,380	2,562,300	9,981	5,840	15,821	2,518,500	90,015	-74,194
2026	4,380	2,562,300	9,981	5,840	15,821	2,518,500	90,015	-74,194
2027	6,844	4,003,594	15,595	9,125	24,720	3,935,156	140,649	-115,928
2028	6,844	4,003,594	15,595	9,125	24,720	3,935,156	140,649	-115,928
2029	6,844	4,003,594	15,595	9,125	24,720	3,935,156	140,649	-115,928
2030	6,844	4,003,594	15,595	9,125	24,720	3,935,156	140,649	-115,928
			127,257	74,460	201,717		1,147,694	-945,976
							Average	-78,831

As shown in this table, transport cost savings through use of container block trains instead of trucks will be US$ 835 million over twelve years, or in on average US$ 93 million p.a. The average emissions reduction volume is estimated at 144 million CO_2-ton. Judging from these substantial transport cost savings, the operation of the container block train system is to be given priority.

6) Shifting Mode from Road to Inland Water Transport for Yangon – Mandalay Section

The cargo transport volume between Yangon and Mandalay was estimated at around 23.7 million tonnes per year in 2015 and forecast as some 68.5 million tonnes per year by 2030. Of this, the cargo transport volume transported by inland waterways is around 7.7 million tonnes in 2015 and forecast for some 110.6 million transported by inland waterways in 2030. At present the annual cargo volume transported by inland waterway transport is estimated to be around 4.7 million tonnes in total. It is estimated that the share of the cargo transport volume handled by inland waterway transport is around 20% at present. However, if the share of cargo transport volume handled by inland waterway transport is assumed to increase to 30%, cargo transport cost savings amounting to US$ 2.30 billion can be made over 2018-2030 (for twelve years) or around US$ 194 million per year on average. **Table-10.1.10** summarizes the assumptions and results of the computation of economic benefits due to the shifting of transport mode from trucks to inland waterway transport mode. In addition to this, a possible transport cost saving due to shortening of ship waiting time at the inland water ports for cargo loading and unloading operations, as well as to secure return cargoes was computed. If the waiting time of inland water vessels at inland water ports is reduced from the current 336 hours (14 days) to 84 hours in future (3.5 days, or on quarter) due to the implementation of inland waterway transport and port modernization projects in combination with the fostering of logistics providers, it is possible to reduce transport costs further, as shown in **Table-10.1.11.**

Table-10.1.10 Summary of Transport Cost Saving (Yangon–Mandalay) by Use of IWT

Item	Value	Note
Transport Volume - 2017	3.1 million tonnes	2.4 million in 2015
Transport Volume - 2030	6.6 million tonnes	
CASE-A (As usual case)		
Road	60%	Assumption
Railway	20%	Assumption
Inland Water Transport	20%	Assumption
Waiting time at port	336 hours per trip per ship	Waterway Survey
Total Transport Cost (A)	US$ 13,380 million	By all mode
CASE-B (Share of IWT increased)		
Road	50%	Assumption
Railway	20%	Assumption
Inland Water Transport	30%	Assumption
Total Transport Cost (B)	US$ 11,050 million	By all mode
Saved Transport Cost	US$ 2,330 million	By increased share of IWT

Source: Study Team
Note: The assumptions of current modal share and future modal share are based on the cargo demand forecast along the Main River Corridor (along Ayeyarwaddy River).

As shown in this table, the transport cost savings through shortening the waiting time of inland water transport vessels at inland waterway ports to one quarter [h] of the current waiting time, the accumulated cost savings will be US$ 1,790 million over twelve years, or on an average US$ 148 million p.a. This means that the benefits accrued through increased modal share are around US$ 194 million p.a. and the same accruing through shorter waiting time at ports is around US$ 148 million. Thus, when these are combined, the average saving in overall transport cost will be US$ 343 million p.a. judging from these considerable savings in transport cost, the improvement of navigation channels and inland water transport ports are to be given priority.

Table-10.1.11 Saving of Transport Cost in IWT Due to Shorter Waiting Time at Ports

Item	Value	Note
Transport Volume - 20110	3.1 million tonnes	
Transport Volume - 2030	6.6 million tonnes	
CASE-A (As usual case)		
Road	70%	Assumption
Railway	20%	Assumption
Inland Water Transport	10%	Assumption
Waiting time at port	336 hours per trip per ship	Waterway Survey
Total Transport Cost (A)	US$ 5,880 million	Including waiting time
CASE-B (Share of IWT increased)		
Road	50%	Assumption
Railway	20%	Assumption
Inland Water Transport	30%	Assumption
Waiting time at port	84 hours	Targeted
Total Transport Cost (B)	US$ 4,00 million	Including waiting time
Saved Transport Cost	US$ 1,790 million	Due to shorten waiting time
Average Saving per Year	US$ 148 million	

Source: Study Team
Note: The assumptions of current modal share and future modal share are based on the cargo demand forecast along the Main River Corridor (along Ayeyarwaddy River).

In addition to these economic benefits, the emissions reduction volume due to an increased share of inland water transport is estimated at around 2.10 billion CO_2-ton over 12 years, or about 246 million CO_2-tonnes per year on average. When the cargo transport volume undertaken by inland water transport will increase substantially, then the cargo volumes transported by the trucks will decrease substantially. This shifting of transport mode will enhance the reduction of fuel consumption by transport equipment in total, thus the CO_2 emissions decrease remarkably as a result. The weight of CO_2 per one liter of diesel fuel is assumed to be 2,660 grams, as approved by the UNFCCC. From the viewpoint of GHG emission reduction for environment conservation, the priority is given to projects envisaging an expansion of inland water transport operations. **Table-10.1.12** shows the transportation cost savings in total due to a shift in cargo transport between Yangon and Mandalay from trucks to inland waterway transport mode in total over twelve years and the average transport cost saving per year during this period. The average transport cost saving by undertaking such a project is computed at US$ 334 million per year on average. The average emission reduction volume is estimated at 86.5 million CO_2-ton.

Table-10.1.12 Summary of Transport Cost Saving and
Emission Reduction Volume by shifting to Inland Water Transport Mode

Cost	Unit	Do Nothing	Change	Balance	Average
Cost in Use	000 US$	13,375,120	11,045,475	-2,329,645	-194,137
Cost in Dwelling Time	000 US$	5,876,281	4,089,678	-1,786,603	-148,884
Overall Cost	000 US$	19,251,401	15,135,153	-4,116,248	-343,021
Emission Volume	000 CO2-t	21,870,102	19,982,373	-1,887,729	-157,311

Source: Study Team

7) Shifting Mode from Road to Coastal Shipping

The cargo transport volume of coastal shipping in total was estimated at around 1.27 billion ton-km in 2015. If the same cargo is transported by large trucks in same pattern of transport, the total cargo transport volume can be calculated as 1.34 billion ton-km. Assuming the cargo transport volume will increase by three times in 2030, the accumulated cargo transport cost savings over 12 years (for the period of 2019 – 2030) due to the utilization of coastal ships can be estimated at around US$ 416 million or US$ 34.7 million per year on average. **Table-10.1.13** shows the calculation of such transport cost savings.

Table-10.1.13 Estimation of Transport Cost Savings by Utilization of Coastal Shipping

Project Year	Calendar Year	By Big Truck		By Coastal Ship		Saving
		Q mill t-km	US$ Million	Q mill t-km	US$ Million	US$ Million
	2015	1,337	82	1,272	65	16.7
	2016	1,439	88	1,369	70	18.0
	2017	1,548	95	1,473	76	19.4
	2018	1,666	102	1,584	82	20.9
1	2019	1,793	110	1,705	88	22.4
2	2020	1,929	119	1,834	94	24.2
3	2021	2,075	128	1,974	102	26.0
4	2022	2,233	137	2,124	109	28.0
5	2023	2,403	148	2,285	118	30.1
6	2024	2,586	159	2,459	127	32.4
7	2025	2,782	171	2,646	136	34.8
8	2026	2,993	184	2,847	147	37.5
9	2027	3,221	198	3,063	158	40.3
10	2028	3,466	213	3,296	170	43.4
11	2029	3,729	229	3,546	183	46.7
12	2030	4,012	247	3,816	196	50.2
	Total					416.0
	Average					34.7

Source: Study Team

10.1.3 Feasible Measures to Address Issues Properly

The issues are identified (Chapter-7) and the development strategies are formulated in general and by sub-sector in particular (Chapter-8) and the corridor based development strategy is discussed (Chapter-9). Taking into account the perspective of Myanmar's economy and the development direction of the logistics sector, the projects are to be identified and proposed so as to structure the National Logistics Development Master Plan. In this section of the report, the feasible measures against each issue identified are sorted out and proposed by sub-sector as tabulated in **Table-10.1.14.** It is to be noted the issue of sub-sector is listed in order of importance in view of development, improvement and modernization of logistics system as well as logistics sector.

Table-10.1.14 Issues and Feasible Measures to be adopted by Transport Mode

(1) Issues of Logistics Facilities and Regulations	
ISSUES	**FEASIBLE MEASURES**
A. Trade and Transit Cargo	**A. Trade and Transit Cargo**
1. Required time for trade cargo clearance at seaport, cross-border points, and airports is very long.	1. Development of regulations to simplify customs clearance procedures and organization relevant international logistics services
2. Although the preparation for the operation of ASEAN Single Windows (ASW) has been progressing, the development of laws and regulation and necessary infrastructure are necessary.	2. Promotion of use of electronic customs clearance system (MACCS) among all concerned parties for trade cargo transport and logistics providers.
3. Processing and handling capacity of cross-border trade facilities at strategic cross-border posts is limited /low	3. Expansion and development of cross-border trade infrastructure at strategic cross-border points in line with the promotion of MACCS for customs clearance
4. Cargo trans-loading is necessary for trade cargoes at the port and the cross-border facilities.	4. Development of laws and regulations concerned with bonded transport especially for containerized cargoes.
5. Number of administration staff for customs clearance and logistics services as well as the number of skilled staff in private logistics providers is lacking	5. Capacity building of officers in charge of customs clearance and quarantine and private business entities performing logistics services
6. Weak telecommunication systems linking concerned agencies and offices	6. Utilization of ITC as much as possible

B. Domestic Cargo	**B. Domestic Cargo**
1. Truck terminals are not sufficiently developed.	1. Development of joint truck distribution terminals. Development of local distribution centers taking into account the transport links and networks.
2. Because the distribution business is not developed well, most of goods are transported in one-way with empty back haul; therefore average load factor are low.	2. Development of public truck terminal multi-modal logistics parks (combination of port, railway, road, airport)
3. The storage facilities for agricultural products is necessary for the stabilization of the market because the production of agriculture products is concentrated in the harvesting period in view of food security, however, the storage facilities are obsolete.	3. Development and locate grain warehouses / terminals in strategic way to be promoted. Grain terminals meeting with increasing demand for the export and import of grains to be developed.
4. Containerization and palletization is slow	4. Introduce small-size containers that can be used not only for transport but also for storing goods (to prevent rain damage and other harmful conditions especially for perishable goods). Establish the system of the shared use of containers and pallets
5. No strategically planned and developed container depots exist in inland regions of the country.	5. Dissemination of container consolidation business and transport
6. Lack of areas to store empty containers.	6. Develop off-dock facilities at immediate back yard of container terminals at gateway ports
C. Common Issues	**C. Common Measures**
1. Relatively high transport and logistics cost.	1. Provision of well-designed modern truck terminals and management systems would reduce truck turn-round time, thereby reducing cost. 2. Logistics management capacity is to be increased.
(2) Issues of Road Cargo Transport	
ISSUES	**FEASIBLE MEASURES**
A. Trade and Transit Cargo	**A. Trade and Transit Cargo**
1. The roads and bridges of international routes (especially the link connecting between Myanmar and Bangkok or the East West Corridor of the GMS) do not comply with the requirements of international cargo traffic volume, which are forecast to increase rapidly (in terms of width, number of lanes, specifications of surface treatment, permissible axle weight loading, etc.) <Note: the replacements of bridges have been ongoing prior to the road improvement project with the financial assistance of the Government of Japan. The road-widening project is planned to be financially assisted by the Asian Development Bank;	1 Implementation of road widening projects, increasing the number of road lanes, reinforcement of the road surface, replacement of bridges, etc. that meet with the requirements of the ASEAN standards; 2. Road surface, bridges and tunnels are to be upgraded for heavily loaded trucks, whose GVW is more than 40 tonnes, especially for transport axis and regional links; 3. Reinforcement of connectivity of international roads

B. Domestic Cargo	**B. Domestic Cargo**
1. Truck turn round time is lengthy, due to congestion and the lack of handling capacity of truck terminals, since existing truck terminals are narrow and their handling efficiency is low.	1. Development of modern truck terminals that comply with larger size trucks, handling of containerized cargoes, warehousing functions for larger stock volumes;
2. Some terminals are mixed use, comprising long-distance provincial buses and trucks;	2. Development of modern terminal facilities that separate the use of long-distance provincial buses and trucks;
3. Slow speed due to mixed traffic, poor transport safety	3. Improvements to road design that eliminate accident blackspots
4. In rural areas, provincial roads and farm to market roads are narrow and many road segments are inundated during rainy seasons. These arterial roads are unsuitable for the transportation of cargo by heavily loaded vehicles (HLV) and are used by small or medium sized trucks	4. Small steel containers (Max.10 tonnes per container) commonly used by road transport, railway transport, inland water transport, coastal shipping are recommended to be introduced for easy transport of goods in any weather condition and on roads unsuitable for HLV, but suitable for medium size trucks.
5. Lack of number of licensed / skilled truck drivers;	5. Establishment of laws and regulations to permit the operation of transport related foreign companies;
6. An increase in the number of traffic accidents is foreseen, due to increased traffic volumes especially of large-sized cargo trucks	6. Ensuring of road safety (human resources development, driving licensing mechanism, facility development for truck driver training)
7. Rate of loss / waste of farm products during storage and transport is quite high due to a lack of proper storage facilities and transport capabilities, especially in the rainy season when farm-to-market roads become impassable because of heavy mud	7. Provision of small-size containers for storage and safe transport to permit storage of farm goods, protect from rain and permit transport of farm exports by small sized trucks able to travel on narrow and muddy roads.
8. An increase in the number of tankers transporting dangerous liquid cargos such as petroleum products may lead to fatal traffic accidents.	8. Introduction and implementation of pipelines for the transmission of petroleum products from a tank farm or refinery.
C. Common Issues	**C. Common Measures**
1. High cost of road cargo transport	1. Shorten truck turn round times
2. Worn out transport equipment, lack of transport equipment and shortage of truck operators	2. Financial assistance for local SMEs engaged in transport services
3. Traffic congestion due to intrusion of large-sized cargo trucks into the urban areas	3. Development of urban by-pass roads
4. No diversified roads for trunk roads	4. Diversified road to be provided
5. Low containerization ratio	5. Introduction of containers for small trucks
(3) Issues of Railway Cargo Transport	
ISSUES	**FEASIBLE MEASURES**
A. Trade and Transit Cargo	**A. Trade and Transit Cargo**
1. A dramatic increase of container traffic volumes is foreseen but no strategic plan to deal with containerized cargoes has been prepared yet	1. Formulation of strategy for improvement of rail transport
2. No Inland Container Depot (ICD) is operative yet	2. An Inland Container Depot (ICD) is going to be operationalized, however, the expansion of ICD will soon be needed
3. No efficient link with newly developed the container terminal at the Thilawa area as a gateway of Myanmar exists as yet	3. Plan and develop a railway link between the main rail line and the Thilawa container terminal area
B. Domestic Cargo	**B. Domestic Cargo**
1. Mixed freight train system	1. Introduction of high-speed container block trains
2. Shortage of container handling equipment	2. Development of ICD for handling of containerized cargoes (Concession tenders have been held and private operators have been awarded concessions.)

C. Common Issues	C. Common Measures
1. Worn out track, locomotives, wagons and signals	1. Improvement of track (a track improvement project is ongoing)
2. Low freight transport capacity	2. Introduction of a high-speed container block train system with expansion of the ICD
3. Low operational efficiency, due to the mixture of passenger and freight traffics, does not enhance the rationalization of operation costs	3. Introduction of small-size containers for the rail cargo transport of containerize-able cargoes
4. Fare setting without consideration of the financial viability of investments	4. Reform of railway operational companies to utilize private sector investment
(4) Issues of IWT Cargo Transport	
ISSUES	**FEASIBLE MEASURES**
A. Trade and Transit Cargo	**A. Trade and Transit Cargo**
1. At present, no trade and transit cargoes are transported by inland waterway mode, however, trade cargoes may be handled in future to increase trade and transit container volumes.	1. An increase in the transport of trade cargoes and transit cargo volumes is foreseen. Strategy and development plans are to be prepared for provision of proper waterway port(s) and waterway transport fleet.
B. Domestic Cargo	**B. Domestic Cargo**
1. Depending on the transport distance involved, inland water transport is much more competitive than land cargo transport, especially for transporting bulky and low-value commodities such as agriculture products, sugarcane, sand, gravel, cement, forestry products, etc. however, such advantages of IWT cannot be utilized without the construction of proper waterway ports.	1. Modern and capable waterway port(s) should be developed together with properly designed inland water transport vessels. Development of landing facilities at strategic points that can be used even in the period of low-water levels during the dry season.
2. Most inland water transport vessels owned and operated by IWT are old and their high-energy consumption rate attributes to push up vessel operation costs.	2. Business development plans for IWT should be prepared taking into consideration operation of well-designed vessels for passenger transport of foreign tourists who enjoy river transport.
3. Most present brges specialized for cargo transport are small and worn out. Most such small inland water transport vessels are owned by SME's whose low financial capability prevents renewal of the inland water transport vessel fleet.	3. Palletization and containerization using small-sized containers will be promoted and cargo-handling equipment introduced to increase the transport efficiency of IWT operations.
4. Most cargo handling at loading / unloading points along the rivers is done manually, which leads to low cargo handling efficiency.	4. Using small-sized containers for inland water transport will increase the cargo handling efficiency of the inland water transport system.
5. Most IWT operators are SMEs and are not rationalized. Most of cargo handling is done manually.	5. The modernization of IWT vessels may be possible by concluding long-term contracts between IWT operators and users supported by funding arrangements.
6. As the volume of demand to transport dangerous liquid cargoes is foreseen and risk of fatal accident is anticipated.	6. Construction of tank farms along riverbanks for unloading petroleum products is imperative. Or alternatively introduction and implementation of pipelines for the transmission of petroleum products from tank farms or refineries may be implemented.
C. Common Issues	**C. Common Measures**
1. The water level of rivers such as the River Ayeyarwaddy fluctuates more than 10m a year between rainy season and dry season thus it is not easy to operate IWT vessels constantly throughout the year.	1. Improvement of navigation channels by provision of navigation buoys, VTS, dredging works, etc. to permit IWT operations throughout the day, thereby increasing the transport efficiency and utilization efficiency of IWT operations.
2. It is not possible to navigate in the nighttime as no lighting buoys are provided. This lengthens the transport operation period.	2. Provision of navigation aids along the main waterways

3. The financial capability of inland waterway transport operators is limited thus improvement of fleet is not possible 4. There is no proper means to transport containerized cargoes	3. The institutional financing system should be developed, so as to vitalize SME's involved in inland waterways transport 4. Introduction of small-sized containers not only for inland waterways transport but for all cargo transport modes for transport of domestic cargoes
(5) Issues of Coastal Maritime Cargo Transport	
ISSUES	**FEASIBLE MEASURES**
A. Trade and Transit Cargo	**A. Trade and Transit Cargo**
1. The transport efficiency of coastal shipping is relatively low, due to insufficient cargo handling space at both gateway ports and coastal ports 2. Low-value and bulk and/or break-bulk trade cargoes (i.e. cement, construction machines etc.) are transshipped at Yangon or gateway ports.	1. Gateway ports shall be properly designed for the transshipment of trade cargoes by coastal shipping 2. Regulations should be reviewed and new regulations established to enable bonded cargo transport. In such cases, customs clearance will take place at the port of destination within Myanmar.
B. Domestic Cargo	**B. Domestic Cargo**
1. Transport efficiency of coastal shipping is relatively low due to insufficient cargo handling space at all coastal ports 2. Coastal shipping does not transport containerized cargoes	1. Coastal ports are to be modernized in view of cargo handling operation with sufficient space for marshalling yards and warehouses, as well as port access roads. 2. Introduction of small-sized containers which can be handled by the ship's gear of coastal shipping vessels
C. Common Issues	**C. Common Measures**
1. The transport capacity of coastal shipping is considered low because of a lack of port facilities and worn out ships. Mechanization of cargo handling systems at ports has not progressed and cargoes are handled mostly by laborers therefore port cargo-handling efficiency is very low. 2. The port backyard areas are very narrow because most coastal shipping ports are located quite close to cities. Therefore, the cargo handling capacity of ports is low, as truck parking areas and spaces for cargo storage are limited and warehouse areas insufficient. 3. No containerized cargoes are transported by coastal shipping as the weight of containers does not match the capacity of the ship gears of commonly used coastal shipping vessels 4. The coordination between coastal shipping and inland waterways transport is insufficient.	1. There are abundant human resources for maritime transport in Myanmar. Such abundant human resources should be fully utilized to increase the efficiency of the maritime transport of domestic cargoes through the provision of good ports and cargo handling equipment at ports. 2. The development of ports and the provision of cargo handling equipment are to be promoted, aimed at the promotion of coastal shipping, especially for the transport of bulky (low-value) cargoes in areas where land transport is difficult. 3. The utilization of small-sized containers is to be promoted. Containers can protect and keep dry cargoes such as rice, grain, cement, etc. 4. Promote the development of barges that can be used even in the dry season, when the water depth becomes shallow (to -2.5 m) to increase the linkages between coastal shipping and inland waterways transport.
(6) Issues of International Maritime Cargo Transport	
ISSUES	**FEASIBLE MEASURES**
A. Trade and Transit Cargo	**A. Trade and Transit Cargo**
1. The water depth of the Yangon Port Group including the port of Thilawa is shallow at -9 m thus large-sized vessels sailing international trunk lines cannot call the port. 2. As a large-size vessel cannot call the port, the major international maritime transport relies chiefly on feeder vessels plying to and from Singapore, thus maritime transport costs are comparatively high.	1. The future situation of Myanmar: with large population and strong economic growth is foreseen but only one port for international trade and shipping exists. 2. The development of deep-water seaports at Mawlamyine, Dawei, and Kyaikkami, etc. is recommended, to expand the maritime transport network and to increase transport efficiency.

3. A development plan exists for a deep-water port, which is integrated with the development of the huge SEZ at Dawei in the south of Myanmar. A land transport link between this planned port and the border with Thailand (to connect the port with Bangkok) is essential, however, the cost of both port and road developments is enormously high.	3. As Myanmar faces the Bay of Bengal, the navigation distance connecting ASEAN countries located in the Indochina Peninsula and India, Middle East, Africa and Europe could be shortened through development of deep-water seaports, thereby increasing maritime transport efficiency. International maritime routes should be developed based on the geopolitical advantages of Myanmar.
4. Infrastructure investment (including a port to define this point as the gateway located at the western end of the logistic corridor (the East West Economic Corridor) serving the cargo transport needs of the Indochina Peninsula under the AEC regime has not been developed.	4. The development of large-scale deep-water seaports at Dawei and Mawlamyine, in connection with the development of the Southern Economic Corridor and the East West Corridor; as well as Chaikami port is recommended.
5. The export of rice and other bulky agricultural products is enhanced by the government, however, there are no ports that have sufficient depth for the calling of bulk-carriers suitable for the transport of such types of cargo, either on global basis or at competitive price.	5. Grain terminals complying with the use of relatively large bulk carriers (handy max – 35,000 DWT, draft -12.5m) to meet the increasing demand for export and import of grains. (Export of rice and beans, import of wheat and maize) are to be developed at appropriate locations in Myanmar.
B. Domestic Cargo	**B. Domestic Cargo**
1. Linkages between international maritime transport and coastal shipping are weak.	1. Develop a sufficient area for the transshipment of trade cargoes carried from international maritime shipping to coastal shipping at gateway ports.
C. Common Issues	**C. Common Measures**
1. The policies for waterway area management, laws and regulations, basic direction of port development and port development plans have not been formulated in a harmonious way or in the national interest viewpoint, but independently by each entity and agency concerned, without proper control.	1. The national port development plan, based on the national law for port development and operations is to be formulated. Doing this, the classification and hierarchy of each port shall be carried out: i.e. gateway ports, regional ports, local ports, inland waterway ports, etc. aimed at realizing efficient investments in terms of priority.
(7) Issues of Air Cargo Transport	
ISSUES	**FEASIBLE MEASURES**
A. Trade and Transit Cargo	**A. Trade and Transit Cargo**
1. The international airport of Yangon is becoming cramped, thus the allocation of land necessary for construction of air cargo handling facilities is becoming difficult.	1. The airfreight logistics policy, taking into account the future development of Yangon International Airport and Hantawadi New International Airport, is to be formulated.
2. No genuine air cargo terminal exists.	2. Based on the cargo demand forecast and understanding of existing conditions, the air cargo terminal is to be provided at the selected airport, from a strategic viewpoint.
3. The cargo transport volume is mere 0.01% of the total cargo volume of Myanmar, however, it is expected to increase to meet with the demand of perishable products such as high value marine products, cut flowers, seasonal fashion products, precision manufactured goods, etc. These goods are preferably transported by air.	3. The number of flights needs to be increased to provide sufficient space for air cargo transport until specialized air cargo transports enter the market. The network of international airports in Myanmar is to be increased. This can be realized in line with tourism development at strategic locations such as at Bagan, Mawlamyine, Dawei, etc.
4. In order to attain competitiveness of air cargo transport the consolidation of cargo is necessary.	4. Provision of air cargo terminals at each airport selected for the export promotion of goods manufactured in Myanmar.

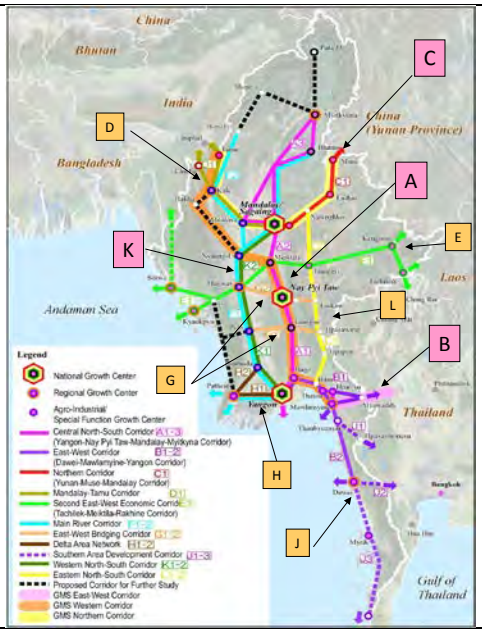
B. Domestic Cargo	**B. Domestic Cargo**
1. No facility exists for the air transport of domestic cargo at local airports because of limited demand.	1. Air cargo handling areas and storage facilities should be provided. This will induce industries that prefer to transport their products by air such as cut flowers, fresh crabs, fresh shrimps, etc. (those having high value not only in the domestic market but also in the international market) so that air cargo can be transported to destination within 24 hours after leaving the airport.
2. The frequency of flights is low thus insufficient cargo space for air cargo transport exists	2. Promote tourism in areas where many tourism products are available but are not properly developed yet. When the flight carrying capacity of tourists increases, extra space for air cargo will become available.
3. The access to airports is inadequate.	3. The access routes linking local airports and trunk road are to be developed in rural regions.
C. Common Issues	**C. Common Measures**
1. Airports are not used effectively for transport of high value products, as no strategic plan to utilize air cargo transport has been prepared or implemented.	1 The preparation of the multi-modal logistics system plan should include the perspective of air cargo handling as much as possible.
(8) Cross Cutting Issues of All Sectors	
ISSUES	**FEASIBLE MEASURES**
A. Trade and Transit Cargo	**A. Trade and Transit Cargo**
1. No seamless container transport is available. All trade cargo is discharged at the terminal and reloaded to conventional trucks for onward transport. This increases the transport cost substantially. The loading / unloading operations take place at least twice, wasting travel time.	1. Bonded container transport by land is to be allowed and regulated.
2. Customs clearance procedures have become simpler compared with several years ago. However, clearance still requires a long time.	2. E-customs clearance should be introduced widely at all international gateways, i.e. at sea ports, cross-border points and airports.
3. Connectivity with neighboring countries has been improving, however, more efforts is needed to open up new links.	3. Shortcomings of connectivity are to be rectified i.e. replacement of bridges, elimination of dangerous road curves, resurfacing of roads, etc. and provision of upgraded roads to link with India.
4. Most of the designated road links forming the logistics corridors are not adequate enough for cargo transport by Heavy Loaded Vehicles (HLV).	4. Road resurfacing, widening and upgrading is necessary.
5. Dependency on feeder services from Singapore dominates the international maritime transport market, with freight charges being substantially high.	5. Development of a deep-sea port is necessary
B. Domestic Cargo	**B. Domestic Cargo**
1. Agriculture is one of the major and important economic activities of Myanmar, however, the agricultural products are mostly vulnerable to rain damage and are perishable. No proper storage facilities and transport means protective against rain is available in most of rural areas where agriculture is a sole economic activity and income source of people.	1. The introduction of small-sized steel container boxes for the transport of agriculture products (maximum loading weight should not exceed 10 tonnes) to be designed specifically to meet the local transport requirements in Myanmar is to be tested.
2. Most of farm to market roads in the rural areas are narrow and not all-weather roads, therefore, transport of products by large and heavy truck is not suitable.	2. Farm to market roads are to be improved and surfaced, as all-weather roads that can be constructed by manual labor or villagers by themselves. This will generate jobs for the betterment of infrastructure in rural areas.
3. Truck terminals are not used efficiently for cargo transport.	3. The modernization of truck terminals meeting requirements to handle containerized cargoes is to be implemented.

Source: Study Team

10.1.4 Current Transport Infrastructure Development Project Components

The total number of projects within the National Transport Master Plan for the period of 2014–2025 (15 years) was 100. The implementation of some of the projects identified is ongoing. **Table-10.1.15** shows the number of identified key projects by sub-sector and by transport corridor, indicated in alphabetic order. **Figure-10.1.6** provides a map showing the network of transport corridors identified indicated by their reference number, from A to K.

The major infrastructure components to be developed or improved for the development of the logistics system in Myanmar are concerned mainly with transport of cargoes. Therefore some of the projects identified as necessary for the improvement / development of the logistics system in this study overlap with the projects prioritized and selected for implementation in the National Transport Master Plan, over the period of 2014 – 2025. Some of those prioritized projects have been under implementation or the funding arrangements are ongoing. Projects identified and proposed are to be implemented in harmonious manner with the transport projects listed in the NTMP, to attain the optimum impact of investment and efforts.



Source: National Transport Master Plan 2014

Figure-10.1.6 Transport Corridor

Corridor	Road	Railway	Seaport	IWT	Airport	Total
A1	2	1	3			6
A1, A2		1			1	2
A2	1				1	2
A3		2			3	5
B1	4	1				5
B1, B2			1		2	3
B2	2				1	3
B2, J3	1					1
C1					3	3
D1					4	4
E1	2		1		1	4
F1				4		4
F2				3		3
F3				2		2
G1					1	1
G2					1	1
H1			1	6	1	8
H2	1					1
J1	1		1		1	3
J2			1		3	4
J3					2	2
K1		2			1	3
K2					1	1
Total	14	7	8	15	27	71

Source: Study Team

Table-10.1.15 Number of Projects Identified in the NTMP 2014

The projects prioritized and selected taking into account the results of the priority evaluations by rating, as discussed above, are listed in the table presented in the next section. In this table, some of the projects identified, prioritized and selected for the development of the logistics system overlap with the projects identified in the National Transport Master Plan.

10.1.5 Key Menus for Improvement of Logistics Performance

The objectives of logistics system development are to move the goods at the right place, at the right time, in the right condition, and at the right price so as to raise and to maintain competitiveness of producers or country. In order to attain the optimum effects of a logistic system development a holistic development approach is essential. A harmonized and stepwise development is needed otherwise the effect of investment will not flourish. (See Chapter-7 Logistics Performance Improvement)

Based on discussions in the preceding sections with regard to the development and improvement of the logistics system of Myanmar such as Myanmar's current outlook, economic development perspectives, development policies of the government, regional cooperation framework, cargo demand forecasts, sector issues, adoptable strategies, logistics corridors development plan directions, etc., the effective and applicable menus that would be possible to improve the logistics performance of Myanmar can be summarized as tabulated in **Table-10.1.16**.

Table-10.1.16 Major Menus to Improve the Current Logistics Performance

Menu	Factor	Key Words
Reinforcement and improvement of **Regional and International Connectivity**	**Transport Capacity**: Links and nodes forming the logistics corridor should have sufficient freight transport capacity. **Punctuality**: The expansion of trade especially the exports of high-value manufactured goods is recognized as an engine to achieve sustainable economic growth in Myanmar. The foundation of an expansion of trade is recognized as a strong and sophisticated logistics system that is linked with regional and international markets. The most important factor to ensure the expansion of trade is the punctuality of the delivery of goods (inputs and outputs). The punctual delivery of goods can only be achieved by the development of the freight transport infrastructure and logistics protocols that ensures smooth, safe and seamless freight movement. **Promotion of FDI**: The higher the logistics performance, the greater the attraction of FDI inflows, especially for the manufacturing sector leading to a higher competitiveness of the products manufactured.	■ Global supply chain ■ Diversification of routes ■ Removal of bottlenecks ■ Stimulation of FDI inflows
Reinforcement and Improvement of **Domestic Connectivity**	**Cargo Transport Network**: Linkages of logistics corridors should be formed with feeder roads. Feeder roads are to form a network aimed at an expansion of goods collection and delivery zones along links. Feeder roads are to link with the nodes of the corridor's terminal and feeder system. Linkage between Urban and Rural Areas: **Truck Terminals**: The core facility of such nodes is the truck terminal, where goods are collected and transferred in an efficient manner at least cost. Truck terminals are considered as hubs for the domestic cargo transportation system. **Urban and Rural Synergy**: The industrial zones in and around urban areas are to be strongly linked with rural areas by means of feeder road systems, that are connected at truck terminals located at strategic location in both urban and rural areas, aimed at stimulating synergy effects.	■ Reinforcement of cargo transport links by development of feeder network ■ Truck terminals as hubs ■ Urban and rural synergy

Menu	Factor	Key Words
Development of Logistics Infrastructure to **Ensure Substantial Economic Benefit**	**Saving of transport cost:** The higher the running speed of transport equipment, the greater the savings in transport cost. **Dwell Time**: The shorter the dwell time of transport equipment or the shorter turnaround time of transport equipment (trucks, vessels, etc.) the greater the savings in transport cost. **Load Factor**: The higher the load factors of transport equipment, the lower the cargo transport cost. **Multimodal Transport**: Cargo transport can be rationalized if the one transport mode is shifted to the proper transport mode, which can be selected and combined to make cargo transport possible at the *least transport cost*, subject to the attainment of smooth and least cost cargo transfers from one transport mode to another transport mode.	■ Turnaround time ■ Optimum transport cost ■ Multimodal transport
Development of Logistics Corridor to **Narrow Economic Disparity**	**Logistics Corridor**: Logistics corridors are designed throughout Myanmar, including rural areas. The logistics corridor is formed by a combination of links and two terminal nodes at both ends of a corridor. Narrowing regional disparity can be realized by the creation of a stronger cargo transport zone along each link of a corridor, supporting the economic development in rural areas as well as in border areas.	■ Corridor Development

The projects selected and formulated are structured in this logistics development master plan and are designed to take into consideration at least one or all of the factors mentioned above.

10.1.6 Project Components of Logistics Corridors

The logistics corridor development approach is adopted as a development direction for development of logistics system of Myanmar and improvement of logistics performance since the corridor development can be thought as a mean to attain the best investment efficiency by concentration of the investment to the important components structuring the selected corridors. In general, the logistics corridor is composed of following components:

1) Transport link (road, railway, waterway, airways) connecting two terminals at the end of both link – Component: road, railway, sea port, inland waterway port, truck terminal;

2) The terminals are either gateway node and commercial or industrial node – Component: sea port, inland waterway port, truck terminal, logistics hub;

3) Along the link where another link crosses the link forms an intersection node(s). Such intersection nodes are meeting point of different kind of transport modes such as road, railway, seaport, inland waterway port, airport, etc. A multimodal logistics hub can be developed at such intersection node – Component: Multimodal logistics hub

The projects identified in the master plan for physical infrastructure development needed for creation of logistics corridors are those components mentioned above.

10.2 Proposed Projects and Rank of Priority

10.2.1 Evaluation Criteria Adopted for Prioritization of Projects

(1) Evaluation Fields and Criteria

The vision, policy and strategies for the development of the logistics system are elaborated as discussed and presented in Chapter 8. The criteria for prioritization of the projects identified and the weight of each element to evaluate the priority of projects including the projects listed in the NTMP for transport corridor development by ranking are set out simply by the level of relevance within each field of evaluation, as shown in **Table-10.2.1.** The number of evaluation fields is simplified and limited to four taking into account the context of vision and strategies formulated for the logistics development of Myanmar and the major menu for development, improvement and maintenance of the logistics system as follows.

1) Regional connectivity
2) Domestic connectivity
3) Economic benefit due to increased cargo transport efficiency
4) Consistency with the National Economic Policy

Table-10.2.1 Priority Evaluation Criteria

Field of Evaluation	Level	Definition	Note
Regional Connectivity	High	Project is concerned directly with the logistics corridor development strategy for the reinforcement of regional connectivity.	Logistics corridors that form cargo transport links with neighboring countries or with global supply chains, namely: South-East Logistics Corridor, North-South Logistics Corridor, Myanmar-India Logistics Corridor and Trans Myanmar Logistics Corridor.
	Medium	Project is concerned indirectly with the logistics corridor development strategy for the reinforcement of regional connectivity partly.	
	Low	Project is not concerned with the logistics corridor development strategy for the reinforcement of regional connectivity but is required for the improvement of cargo transport.	
Domestic Connectivity	High	Project is concerned directly with the strengthening of connectivity within Myanmar particularly between growth poles/centers and rural areas by reinforcing the multimodal functions at various transport nodes.	The road network in the rural areas is weak and in some areas not passable in rainy season. Transport modes that can provide lower cost cargo transport for bulky cargoes are not efficiently utilized due to a lack of infrastructure and proper services that are beneficial to the rural population mostly farmers. The development of cargo transit nodes are none or insufficient.
	Medium	Project is concerned indirectly with the strengthening of connectivity within Myanmar.	
	Low	Project is not concerned with the logistics corridor development strategy but is required for an improvement of the cargo transport system mainly for domestic cargo transportation.	

Field of Evaluation	Level	Definition	
Economic Benefit due to increased cargo transport efficiency	High	Savings in transport cost due to the implementation of the project are significant. Large cargo traffic volumes will be influenced by the investment.	Economic benefits means the savings in transport cost derived from higher speeds, shortened dwell times, proper choice of transport mode.
	Medium	Savings in transport cost due to the implementation of the project can be achieved.	
	Low	Savings in transport cost due to the implementation of the project is not significant but is required for an improvement of the cargo transport system.	
Consistency with the national development policies	High	Project is concerned directly with the proper resources mobilization throughout the country especially where the economy lags behind the growth pole area thereby contributes to the poverty alleviation.	Project contributes directly to an equitable development and inclusive economic growth of the country that can be realized by creation of stronger cargo transport links.
	Medium	Project is concerned indirectly with the rural development that will enhance the poverty alleviation.	
	Low	Project is not concerned with the improvement of cargo transport links for cargo transport in rural areas.	

Source: Study Team

(2) Scoring Method

Method prioritizing by scoring is adopted and the method of scoring is simplified as well. As a precise quantitative ranking of a project's priority is difficult, therefore projects have been prioritized and grouped in Group-A, B, C and D. In such a way the order of priority is expressed. The Group-A, B, C and D can be expressed in other way as First Ranked Group, Second Ranked Group, Third Ranked Group and Fourth Ranked Group.

An example of calculation of scores obtained for one project is shown in the following steps:

Step-1: If the regional connectivity of project is evaluated as "High", domestic connectivity is evaluated "Medium", economic benefit is evaluated as "High" and narrowing disparity is evaluated "Low", the project's score is composed of two "High", one "Medium" and one "Low".

Step-2: The score given to level of evaluation for each criterion is set at 3 for High, 2 for Medium and 1 for Low.

Step-3: Then the total score of the project can be calculated as 10. (Two High: 6 + One Medium: 2 + One Low: 1 or 6 + 2 + 1 = 9)

Step-4: The range of score is set as Group-A: 11～12, Group-B: 9～10, Group-C: 7～8 and Group-D: 5～6. Therefore the project evaluated belongs to Group-B.

This ranking system can be used as one of the tools for the prioritization of projects identified as those forming the logistics system development, at national level. At the same time, the projects listed in the National Transport Master Plan – NTMP will also be evaluated using this method, to combine transport development projects and logistics development projects and thereby attain optimum impact of investments.

10.2.2 All Projects Listed for NTMP and the Study for Logistics Development System

The projects have been defined and identified through discussions between the Consultants and respective ministries and agencies concerned with transport as well as logistics system development. 167 projects have been agreed to be listed for inclusion in the short and medium term development plan by the ministries, agencies and organizations composing the Joint Coordination Committee. The profile of each project is to be referred with the Appendix-1 Project Profiles.

Table-10.2.2 summarizes the number of projects identified for all projects including the projects identified in the NTMP and the additional projects identified through this Study respectively as well as the number of projects proposed to be implemented in the short-term period. The estimated total cost under each category is shown in US$ million and in MMK billion to understand the magnitude of required fund for execution of the projects under each category.

Table-10.2.2 Summary of Number of Proposed Projects and Estimated Costs

	All Projects	NTMP	Logistics (Additional)	Short Term Project
				All Sector
Nos of Project	167	108	59	83
US$ Million	41,138	16,181	24,956	11,565
MMK Billion	56,275	22,138	34,137	15,813

Note: Excluding technical projects (soft components)
Source: Study Team

It is to be noted that each project identified and proposed bears the identification number composed of capital letters starting from L and supplement capital letter showing relevant sub-sector then two digits of figures. Those projects that are listed already in the NTMP 2014 bear the project ID Code in same way but with a different code composed of capital letter(s) and three digit figures. However, the projects identified in view of logistics development and improvement bear a capital L at the beginning of such ID code and two digits figures. The ID code used for the study is classified by sub-sector, as shown in **Table-10.2.3.**

Table-10.2.3 Project ID Code for the Study for Logistics Development System

Project ID Code	Code Name Used in the NTMP	Feature of Project
LGP	None	Legislation of laws and regulations, studies on a large scale development projects, capacity building of administrative personnel, training of experts for various trades, creation of logistics databank, sharing of logistics information, etc. as the Soft Components needed for the master plan implementation.
LRP	R	Logistics-related road cargo transport projects including road safety
LFP	RW	Logistics-related railway freight projects including ICD
LWP	PT	Logistics-related port and maritime cargo transport projects such as the development or improvement of ports, vessels, etc.
LIP	IW	Logistics-related inland waterway cargo transport projects including improvement of navigation channels and navigational aid systems.
LAP	A	Logistics-related air cargo transport projects including the safety-related systems
LLP	None	Directly related logistics facility development projects such as truck terminals, logistic-hubs, logistic-parks, warehouses, off-dock systems, cargo trans-loading systems, customs clearance systems, cross-border trade infrastructure development, etc.

Source: Study Team

Table-10.2.4 shows all 167 projects listed under the Hard Components in both this the Study for logistics development system and NTMP combined in priority evaluated by Group-A, Group-B, Group-C and Group-D with indicative development timeframe in short-term and middle / long term with relevant cost estimated in total in MMK billion and US$ million.

The terms scheduled for each projects are set out as follows:

Short Term : 2018～2024 including the preparatory period; and
Mid-/long-term : 2025～2030

It is to be noted that the execution schedule of each project is indicative and the schedule is not rigid but flexible. The execution schedule of each project is to be managed and controlled so as to attain the optimum investment effects by individual project as well as by combination of other projects that are closely related.

10.2.3 Projects and Programs for the Study for Logistics Development System (Soft Components)

Table-10.2.4 shows 22 soft components projects / programs including the establishment of laws and regulations for transport and logistics, legislation of laws and regulations concerned, technical and managerial trainings, enhancement of safety, capacity building program, human resources development, etc. These projects and programs are to be executed at the beginning of the implementation of priority projects listed in subsequent tables.

Table-10.2.4 Lists of Projects and Programs for the Study for Logistics Development System (Soft Components)

Sector	Logistics Project ID	Title of Project
Logistics	LGP-01	Improvement of Laws and Regulations for Logistics -Truck Transport-
	LGP-02	Improvement of Laws and Regulations for Logistics (Foreign cargo handling, other than MACCS (Myanmar Automated Customs Clearance System)
	LGP-03	Capacity Building Program for Logistics System Management
	LGP-04	Training for Trainers of MOTC Aiming at Guiding Private Sector to Improve the Performance of the Logistics Industry
	LGP-05	Promotion of FDI / Domestic Investments for Integration and Modernization of Logistics Service Sector
	LGP-06	Enhancement of the Containerization and Palletization
Road	LGP-07	Improvement of Road Safety Program (TA + Pilot Projects)
Railway	LGP-08	Study on Legal System for Accessibility Improvement in Freight Railway Services
	LGP-09	Study on Myanmar – Thailand Railway Link
	LGP-10	Study on Mandalay – Muse New Railway Line Development Project
	LGP-11	Study on Mandalay – Tamu New Railway Line Development Project
	LGP-12	Study on High Speed Railway Linking Between Yangon and Hanthawaddy
Waterborne	LGP-13	Legislation of Port Laws
	LGP-14	Study on Dawei SEZ Port Development Project
Inland Waterway	LGP-15	National Inland Waterway Master Plan Study (incl. Pilot Project))
	LGP-16	Vessel Safety Improvement and TA (incl. Law)
	LGP-17	Strengthening Organization of IWT
	LGP-18	Enhancement of University (Human Resource Development, incl. Equipment Installation)
	LGP-19	Improvement of Statistics (Data Collection)
	LGP-20	Enhancement of Ship Registration and Categorization
	LGP-21	Enhancement of Captains and Helmsmen Education System
	LGP-22	Improvement of Bonded Transport

Note: The outline of the projects are described in relevant part of Project Profiles (Appendix-1)
Source: Study Team

10.2.4 Projects and Programs for the Study for Logistics Development System (Hard Components)

The projects identified and prioritized for the Hard Components under Group-A, B, C and D are as shown in the tables below. The profile of each project is to be referred to **Appendix-1 "Project Profile" in the Volume 2 of this report.**

Table-10.2.5 (A) Lists of All Projects of both NTMP and MYL-Plan Combined with Priority by Sub-sector (Group-A projects)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Logistics Facilities									
Logistics	NS	YGN	LLP-02	Establishment of New Yangon Truck Terminal at Ywatagyi	A			63	46
Logistics	NS	YGN	LLP-05	Establishment of Yangon Multi-modal Logistics Complex	A			89	65
Logistics	SE	KYN	LLP-03	Container Switching Station Development at Myawaddy Trade Zone	A			25	18
Logistics	NS	YGN	LLP-01	Expansion and Improvement of Existing Yangon Truck Terminal	A			23	17
Logistics	SE/MI	MON	LLP-04	Cross-border Trade Facility coupled with Container Switching Yard at Three Pagoda Pass	A			36	27
Logistics	NS/SE/TM/MI	BGO	LLP-06	City Truck Terminal Improvement Project (Bago)	A			10	7
Logistics	SE	MON	LLP-07	City Truck Terminal Improvement Project (Mawlamyaine)	A			10	7
Logistics	SE	TAN	LLP-08	City Truck Terminal Improvement Project (Dawei)	A			10	7
Logistics	MR	MAG	LLP-09	City Truck Terminal Improvement Project (Magway)	A			10	7
Logistics	MR	BGO	LLP-10	City Truck Terminal Improvement Project (Pyey)	A			10	7
Logistics	TM	SHN	LLP-11	City Truck Terminal Improvement Project (Taungyi)	A			10	7
Logistics	NS	AYD	LLP-12	City Truck Terminal Improveent Project (Pathein)	A			10	7
Logistics	NS	MDL	LLP-13	Establishment of Mandalay Multi-modal Logistics Complex	A			62	45
Logistics	NS/SE	BGO	LLP-14	Establishment of Bago Multi-modal Logistics Complex	A			89	65
Road									
Road	NS	YGN/MDL	LRP-01	Yangon-Nay Pyi Taw-Mandalay Expressway (Upgrading)	A			676	494
Road	SE	BGO	LRP-07	New Expressway between Bago-Kyaikhto	A			1,053	770
Road	SE	TAN	LRP-09	Three Pagoda Pass Road (Upgrading)	A			445	325
Road	SE	MON/KYN	LRP-08	Thaton Bypass Road	A			274	200
Road	SE	MON/KYN	LRP-15	Thaton – Eindu – Kawkareik – Myawaddy Road	A			192	140
Road	NS	MDL	LRP-03	Myotar-Tada U Road	A			126	92
Road	NS/SE	BGO	LRP-06	Hanthawaddy Airport Access Road	A			108	79
Road	NS	YGN	LRP-05	Yangon Outer Ring Road (YORR) East Section	A			780	570
Road	SE	KYN	LRP-16	Gyaing (Kawkareik) Bridge	A			105	77
Road	SE	KYN	LRP-16	Gyaing (Zarthapyin) Bridge	A			141	103
Road	MR	AYD	LRP-17	Yangon – Pathein Road	A			124	91
Road	SE	MON	LRP-16	Atran Bridge	A			95	69
Road	NS/SE	BGO	LRP-22	Yangon City - Hanthawaddy - Existing Expressway	A			388	284
Road	NS	YGN	LRP-04	Yangon Urban Expressway (YUEX)	A			2,382	1,741
Railway									
Railway	NS	YGN/MDL	LFP-01	Development of Freight Railway Station / ICD at Yangon and Mandalay	A			327	240
Railway	NS	YGN	LFP-02	Freight Station Development Project in Thilawa with Thilawa Line Improvement	A			2,069	1,517
Railway	Common	Common	LFP-03	Procurement of Locomotives and Container Freight Wagons	A			83	61
Railway	SE	KYN	LFP-09	Myaingkalay CFS Development Project	A			19	14
Railway	NS	YGN/MGL	LFP-16	Yangon - Mandalay Railway Track Improvement	A			1,755	1,283
Railway	MR	BGO	LFP-08	Yangon-Pyay Line Improvement (Pyay - Hmawbi)	A			430	314
Railway	NS	YGN	LFP-12	Thilawa - Bago New Line Development Project	A			1,197	875
Waterborne									
Waterborne	CM/NS	YGN	LWP-02	Yangon Port (Domestic Port) Improvement	A			127	93
Waterborne	CM/SE	YGN	LWP-01	Yangon Port (Thilawa Terminal) Development	A			451	330
Waterborne	CM/SE	MON	LWP-09	Kyaikami International Grain Terminal / Port Development	A			497	363
Waterborne	CM	AYD	LWP-07	Pathein Port Improvement	A			101	74
Waterborne	CM	TAN	LWP-12	Khawthaung Port Improvement	A			13	10
Waterborne	CM	RAK	LWP-05	Kyaukphyu Port Improvement	A			28	20
Inland Waterway									
IWT	MR/NS/MI	MDL	LIP-01	Mandalay Port Development	A			52	38
IWT	MR/NS	YGN/BGO /MGW/MDL	LIP-02	Yangon - Mandalay Navigation and Channel improvement	A			256	187
IWT	MR/CM	YGN	LIP-03	Yangon River Navigation Aid Improvement	A			20	15
IWT	MR/CM/NS	YGN	LIP-06	Improvement of Yangon River Water Transportation	A			93	68
IWT	MR/CM/NS	YGN	LIP-09	Yangon Port (Including Connectivity)	A			19	14
IWT	Common	Common	LIP-12	Container Vessel (Vessel Modernization)	A			34	25
IWT	MR/NS	SAG	LIP-14	Chindwin Wa-Monywa Navigation and Channel Improvement	A			50	37
IWT	CM	RAK	LIP-22	Rakhine Coastal Vessels	A			21	15
IWT	CM	RAK	LIP-08	Kaladan Multi-Modal Transit Transport Project (Vessels, Channel, Navigation)	A			160	117
IWT	Common	YGN	LIP-07	Dala Shipyard Modernization with TA	A			29	21
IWT	MR/CM	YGN	LIP-13	Connectivity of Oversea, Coastal and Inland Water Transportation	A			11	8
Aviation									
Aviation	NS/SE	YGN	LAP-01	Yangon International Airport (Air Cargo Handling Facilities)	A			137	100
Aviation	NS	MDL	LAP-02	Mandalay International Airport (Air Cargo Handling Facilities)	A			27	20
Aviation	NS	BGO	LAP-03	Hanthawaddy International Airport Development	A			1,368	1,000
Aviation	MR	MDL	LAP-04	Pakokku / Nyaung U Airport Development	A			42	31
Aviation	TM	SHN	LAP-05	Heho Airport Development	A			52	38

Note:
1) Projects listed of which cells are colored in light blue are the projects listed in the NTMP.
2) Projects listed of which cells are not colored are the projects identified for logistics development.
3) Projects listed of which cells are colored in dark blue are the projects under short-term timeframe.

Source: Study Team

Table-10.2.5 (B) Lists of All Projects of both NTMP and MYL-Plan Combined with Priority by Sub-sector (Group-B projects)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road									
Road	SE	MON	LRP-10	Mawlamyine Peripheral Road	B			11	8
Road	MI	SAG	LRP-13	Construction of Bridges on India-Myanmar-Thailand Trilateral Highway (Tamu-Kyigone-Kaleywa Road)	B			74	54
Road	NS/SE	YGN	LRP-18	Yangon (from toll gate) - Bago Road	B			115	84
Road	MI	SAG	LRP-11	Pong Taung-Pone Nyar Tunnel between Magway and Sagain	B			260	190
Road	TM	SHN/MDL	LRP-12	Fast Shan Plateau Access Road (Yin Mar Bin-Kalaw)	B			499	365
Road	MI	RAK	LRP-23	Yaw Chaung (Yepyar) Bridge	B			39	29
Road	MR	BGO	LRP-24	Yangon – Pyay - Mandalay Road	B			1,139	833
Road	NS	SHN/MDL	LRP-02	Alternative Route of Mandalay - Muse Road	B			908	664
Road	NS	SHN/MDL	LRP-25	Mandalay – Lashio – Muse Road	B			440	322
Road	SE	TAN	LRP-26	Dawei – Phunamron Road	B			1,127	824
Road	NS	BGO	LRP-27	Bago – Mandalay Road	B			880	643
Road	NS	SHN	LRP-28	New Goat Twin Viaduct	B			130	95
Railway									
Railway	NS	BGO	LFP-19	Bago-Hanthawaddy Line Improvement	B			29	21
Railway	Common	Common	LFP-04	Bulk Cargo Railway Freight Improvement	B			66	48
Railway	SE	BGO	LFP-17	Bago-Mawlamyine Line Improvement	B			366	268
Railway	SE	MON	LFP-10	Kyaikkhami Freight Terminal Development and Upgrading of Bridges between Mawlamyine and Thanbyuzayat	B			568	415
Railway	NS	SHN	LFP-13	Mandalay-Muse New Railway Line Development (Implementation)	B			6,840	5,000
Waterborne									
Waterborne	CM/SE	TAN	LWP-10	Dawei Local Port Improvement	B			85	62
Waterborne	CM/TM	RAK	LWP-03	Sittwe Port Improvement	B			48	35
Waterborne	CM	RAK	LWP-06	Thandwe Port Improvement	B			8	6
Waterborne	CM	TAN	LWP-11	Myeik Port Improvement	B			28	20
Waterborne	SE	TAN	LWP-04	Dawei SEZ Port Development (Implementation)	B			2,040	1,491
Waterborne	CM/SE	MON	LWP-08	Mawlamyaing Port Improvement	B			89	65
Inland Waterway									
IWT	MR	SAG	LIP-10	Monywa Port	B			10	7
IWT	MR/TM	MAG	LIP-11	Magway, Pakokku Inland Waterway Hub Port Development	B			14	10
IWT	MR	SAG	LIP-24	Mwaleik-Homalin Channel and Navigation Improvement	B			6	4
IWT	MR	SAG	LIP-25	Monywa - Upstream Channel and Navigation Improvement	B			36	26
IWT	MR/MI	KAC	LIP-26	Mandalay - Bhamo Channel and Navigation Improvement	B			75	55
IWT	Common	Common	LIP-04	Replacement of Wooden Vessel to FRP Vessel with TA	B			12	9
IWT	Common	Common	LIP-05	IWT Barge and Tugs (Replacement)	B			164	120
Aviation									
Aviation	SE	TAN	LAP-06	Dawei Airport Development	B			44	32
Aviation	TM	RAK	LAP-07	Kyaukphyu Airport Development	B			21	15
Aviation	TM	RAK	LAP-10	Sittwe Airport Development	B			25	18
Aviation	TM	SHN	LAP-08	Tachileik Airport Development	B			40	29
Aviation	SE	TAN	LAP-09	Myeik Airport Development	B			18	13
Aviation	MR	KAC	LAP-11	Myitkyina Airport Development	B			14	10
Aviation	TM	SHN	LAP-12	Kengtung Airport Development	B			4	3
Aviation	NS	SHN	LAP-13	Lashio Airport Development	B			27	20
Aviation	SE	TAN	LAP-14	Kawthaung Airport Development	B			11	8
Aviation	SE	MON	LAP-15	Mawlamyine Airport Improvement	B			3	2

Note:
1) Projects listed of which cells are colored in light blue are the projects listed in the NTMP.
2) Projects listed of which cells are not colored are the projects identified for logistics development.
3) Projects listed of which cells are colored in dark blue are the projects under short-term timeframe.

Source: Study Team

Table-10.2.5 (C) Lists of All Projects of both NTMP and MYL-Plan Combined with Priority by Sub-sector (Group-C Projects)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road									
Road	SE	MON	LRP-19	Payagyi – Mawlamyaine - Thanbuzayat Road	C			393	287
Road	CC	RAK	LRP-29	Minbu – Ann – Kyauktaw – Sittwe Road	C			463	338
Road	NS	MDL	LRP-30	Mandalay Circular Expressway	C			329	240
Road	TM	RAK	LRP-14	Ann-Kyaukpyu Road	C			629	460
Road	TM	MAG/KAY	LRP-31	Loikaw - Magway Road	C			363	265
Road	MR	BGO	LRP-32	Hapasawing - Pyay Road	C			283	207
Road	SE	TAN	LRP-33	Tanintharyi – Mawtaung Road	C			107	78
Road	SE	TAN	LRP-34	Thanbyuzayat – Dawei – Myeik – Kawthonng Road	C			907	663
Road	NS	SAG/KAC	LRP-35	Shwebo – Myitkyina Road	C			462	338
Railway									
Railway	NS	KAC	LFP-18	Myohaung-Myitkyina Railway Improvement	C			912	667
Railway	Common	Common	LFP-07	Intermediate Freight Station Improvement	C			33	24
Railway	NS	YGN	LFP-11	Improvement of Yangon CBD Freight Station	C			14	10
Railway	NS	YGN-BGO	LFP-15	High Speed Railway Linking Between Yangon and Hanthawaddy (Implementation)	C			2,005	1,466
Inland Waterway									
IWT	Common		LIP-15	Navigation Safety and Maintenace Improvement and TA	C			38	28
IWT	MR	AYD	LIP-17	Ayeyarwaddy Delta Channel and Navigation Improvement	C			53	39
IWT	MR	BGO	LIP-18	Pyay Port	C			13	10
IWT	MR	AYD	LIP-19	Hinthada Port	C			30	22
IWT	MR/CM	AYD	LIP-16	Pathein Port	C			11	8
Aviation									
Aviation	MR	MAG	LAP-16	Magway Airport Development	C			3	2
Aviation	MI	SAG	LAP-17	Kalay Airport Development	C			4	3
Aviation	MI	SAG	LAP-18	Homalin Airport Development	C			4	3
Aviation	TM	KAY	LAP-19	Loikaw Airport Development	C			4	3
Aviation	NS	KAC	LAP-20	Bhamo Airport Development	C			4	3
Aviation	TM	RAK	LAP-21	Ann Airport Development	C			4	3
Aviation	NS	SAG	LAP-22	Kamti Airport Development	C			4	3
Aviation	TM	SHN	LAP-23	Mong-Hsat Airport Development	C			3	2
Aviation	SE	TAN	LAP-24	Bokpyinn Airport Development	C			4	3
Aviation	MR	SAG	LAP-25	Monywa Airport Development	C			4	3
Aviation	MR	AYD	LAP-26	Pathein Airport Development	C			3	2

Note:
1) Projects listed of which cells are colored in light blue are the projects listed in the NTMP.
2) Projects listed of which cells are not colored are the projects identified for logistics development.
3) Projects listed of which cells are colored in dark blue are the projects under short-term timeframe.

Source: Study Team

Table-10.2.5 (D) Lists of All Projects of both NTMP and MYL-Plan Combined with Priority by Sub-sector (Group-D Projects)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road									
Road	NS	YGN	LRP-20	Watayar Bridge	D			238	174
Road	SE	TAN	LRP-21	Tha Mouk Bridge	D			14	10
Road	MI	SAG	LRP-36	Shwebo - Ye U - Kalaywa Road	D			283	207
Road	TM	SHN	LRP-37	Taunggyi – Loilim – Kyaington Road	D			658	481
Road	SE	MON	LRP-38	Don Tha Mi and Naung Lon Bridge	D			16	12
Road	SE	MON	LRP-39	Chaungnitkwa Bridge	D			14	10
Road	NS	MDL/KAC	LRP-40	Mandalay – Thabeikkyin – Tagaung – Bhamo Road	D			274	200
Road	MI	SAG	LRP-41	Monywa - Pale - Gangaw – Kalaymyo Road	D			302	221
Road	MI	SAG	LRP-42	Monywa – Yargyi – Kalewa Road	D			181	132
Road	MI	RAK	LRP-43	Yaw Chaung (Ohn Taw) Bridge	D			29	21
Road	MI	MON	LRP-44	Thanlwin(Tarsotpha) Bridge	D			12	9
Road	TM	SHN	LRP-45	Thibaw – Loilem Road	D			232	170
Road	TM	SHN	LRP-46	Taunggyi – Loikaw – Hpapun – Pha an Road	D			660	482
Road	NS	YGN	LRP-47	Hlaing River Bridge	D			58	42
Road	MR	AYD	LRP-48	Hinthada Bridge	D			276	202
Road	NS	AYD	LRP-49	Thetkal Thoung Bridge	D			29	21
Road	TM	SHN	LRP-50	Watalone Tunnel	D			137	97
Road	MR	AYD/MAG	LRP-51	Monywa – Pathein Road	D			700	512
Road	TM	SHN	LRP-52	Kyaington – Mongla Road	D			90	66
Road	MR	AYD	LRP-53	Ayeyarwaddy (Thayat-Aunglan) Bridge	D			157	115
Road	TM	SHN	LRP-54	Thanlwin (Kunlone) Bridge	D			20	15
Road	MR	AYD	LRP-55	Ayeyarwaddy (Kathar) Bridge	D			127	93
Road	MR	SAG	LRP-56	Chindwin (Phaungbyin) Bridge	D			34	25
Railway									
Railway	Common	Common	LFP-06	ICDs Development proposed by UNESCAP	D			164	120
Railway	MR	BGO	LFP-08	Yangon-Pyay Line Improvement (Pyay - Hmawbi)	D			430	314
Railway	TM	MDL	LFP-20	Nay Pyi Taw - Bagan Line Improvement	D			556	406
Railway	SE	YGN/AYD	LFP-21	Yangon-Pathein Line Improvement	D			239	175
Railway	TM	SAG	LFP-22	Myohaung-Monywa Line Improvement	D			128	94
Railway	TM	SAG	LFP-23	Pyawbwe-Shwenyaung Line Improvement	D			386	282
Railway	MR	YGN	LFP-24	New Railway Bridge Crossing the Hlaing River	D			29	21
Railway	NS	YGN	LFP-05	Yangon Outer Ring Freight Railway Development	D			1,546	1,130
Railway	TM	SAG	LFP-14	Mandalay – Tamu New Railway Line Development	D			7,934	5,800
Inland Waterway									
IWT	MR/MI	SAG	LIP-20	Kalewa Port	D			7	5
IWT	SE	KYN	LIP-21	Thanlwin River Channel and Navigation Improvement	D			137	100
IWT	MR	KAC	LIP-23	Bhamo Port	D			13	10
IWT	MR/MI	SAG	LIP-27	Chindwin River Vessels	D			5	4
IWT	SE	MON	LIP-28	Thanlwin River Vessels	D			5	4
IWT	MR	AYD	LIP-29	Ayeyarwady Delta Vessels	D			20	15
IWT	SE	MON	LIP-30	Improvement of Sittaung River and Bank Protection Project	D			30	22
IWT	MR/NS/MI	MDL	LIP-31	Mandalay - Upstream Vessels (Passenger Cargo)	D			12	9
IWT	MR/NS/MI	MDL	LIP-32	Mandalay Shipyard Modernization	D			26	19
IWT	MR/SE/MI	Common	LIP-33	Other 10 Ports Construction	D			143	105

Note:
1) Projects listed of which cells are colored in light blue are the projects listed in the NTMP.
2) Projects listed of which cells are not colored are the projects identified for logistics development.
3) Projects listed of which cells are colored in dark blue are the projects under short-term timeframe.

Source: Study Team

10.2.5 Priority Projects for Improvement of Logistics System of Myanmar by Sector

(1) Logistics Sector Sub-sector

Table-10.2.6 shows 14 project prioritized as Group-A. No project is proposed as Group-B projects.

Table-10.2.6 Logistics Facility Related Projects (Group-A)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Logistics	NS	YGN	LLP-02	Establishment of New Yangon Truck Terminal at Ywatagyi	A			63	46
Logistics	NS	YGN	LLP-05	Establishment of Yangon Multi-modal Logistics Complex	A			89	65
Logistics	SE	KYN	LLP-03	Container Switching Station Development at Myawaddy Trade Zone	A			25	18
Logistics	NS	YGN	LLP-01	Expansion and Improvement of Existing Yangon Truck Terminal	A			23	17
Logistics	SE/MI	MON	LLP-04	Cross-border Trade Facility coupled with Container Switching Yard at Three Pagoda Pass	A			36	27
Logistics	NS/SE/TM/MI	BGO	LLP-06	City Truck Terminal Improvement Project (Bago)	A			10	7
Logistics	SE	MON	LLP-07	City Truck Terminal Improvement Project (Mawlamyaine)	A			10	7
Logistics	SE	TAN	LLP-08	City Truck Terminal Improvement Project (Dawei)	A			10	7
Logistics	MR	MAG	LLP-09	City Truck Terminal Improvement Project (Magway)	A			10	7
Logistics	MR	BGO	LLP-10	City Truck Terminal Improvement Project (Pyey)	A			10	7
Logistics	TM	SHN	LLP-11	City Truck Terminal Improvement Project (Taungyi)	A			10	7
Logistics	NS	AYD	LLP-12	City Truck Terminal Improveent Project (Pathein)	A			10	7
Logistics	NS	MDL	LLP-13	Establishment of Mandalay Multi-modal Logistics Complex	A			62	45
Logistics	NS/SE	BGO	LLP-14	Establishment of Bago Multi-modal Logistics Complex	A			89	65
Total of 14 projects under Group-A (Billion MMK and Million US$)								453	332

Source: Study Team

(2) Road Sub-sector

The National Transport Master Plan (the so-called “NTMP”) was approved by the Cabinet. As described in the NTMP report, the projects listed in the NTMP 2014 are going to be updated and modified accordingly in view of logistics system development and improvement, taking into account the cargo demand forecast pattern.

The newly proposed development projects, as the project proposed for MYL-Plan, which are large-scale roads and bridges, require a long period for completion, therefore such projects are proposed to be on long-list - proposed to be executed in the mid- or long-term programs. The total number of road related projects is 55. The projects for a short-term time frame are selected and identified to eliminate and clear present bottlenecks on the important road network, to improve logistics performance. **Table-10.2.7** and **Table-10.2.8** tabulates 14 road projects prioritized as Group-A and 12 road projects prioritized as Group-B including those listed in the NTMP 2014. The project profiles of all projects are presented in **Appendix-1 Project Profiles**.

Table-10.2.7 Proposed Road Project (Group-A)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	NS	YGN/MDL	LRP-01	Yangon-Nay Pyi Taw-Mandalay Expressway (Upgrading)	A			676	494
Road	SE	BGO	LRP-07	New Expressway between Bago-Kyaikhto	A			1,053	770
Road	SE	TAN	LRP-09	Three Pagoda Pass Road (Upgrading)	A			445	325
Road	SE	MON/KYN	LRP-08	Thaton Bypass Road	A			274	200
Road	SE	MON/KYN	LRP-15	Thaton – Eindu – Kawkareik – Myawaddy Road	A			192	140
Road	NS	MDL	LRP-03	Myotar-Tada U Road	A			126	92
Road	NS/SE	BGO	LRP-06	Hanthawaddy Airport Access Road	A			108	79
Road	NS	YGN	LRP-05	Yangon Outer Ring Road (YORR) East Section	A			780	570
Road	SE	KYN	LRP-16	Gyaing (Kawkareik) Bridge	A			105	77
Road	SE	KYN	LRP-16	Gyaing (Zarthapyin) Bridge	A			141	103
Road	MR	AYD	LRP-17	Yangon – Pathein Road	A			124	91
Road	SE	MON	LRP-16	Atran Bridge	A			95	69
Road	NS/SE	BGO	LRP-22	Yangon City - Hanthawaddy - Existing Expressway	A			388	284
Road	NS	YGN	LRP-04	Yangon Urban Expressway (YUEX)	A			2,382	1,741
Total of 14 projects under Group-A (Billion MMK and Million US$)								6,888	5,035

Source: Study Team

Table-10.2.8 Proposed Road Project (Group-B)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	SE	MON	LRP-10	Mawlamyine Peripheral Road	B			11	8
Road	MI	SAG	LRP-13	Construction of Bridges on India-Myanmar-Thailand Trilateral Highway (Tamu-Kyigone-Kaleywa Road)	B			74	54
Road	NS/SE	YGN	LRP-18	Yangon (from toll gate) - Bago Road	B			115	84
Road	MI	SAG	LRP-11	Pong Taung-Pone Nyar Tunnel between Magway and Sagain	B			260	190
Road	TM	SHN/MDL	LRP-12	Fast Shan Plateau Access Road (Yin Mar Bin-Kalaw)	B			499	365
Road	MI	RAK	LRP-23	Yaw Chaung (Yepyar) Bridge	B			39	29
Road	MR	BGO	LRP-24	Yangon – Pyay - Mandalay Road	B			1,139	833
Road	NS	SHN/MDL	LRP-02	Alternative Route of Mandalay - Muse Road	B			908	664
Road	NS	SHN/MDL	LRP-25	Mandalay – Lashio – Muse Road	B			440	322
Road	SE	TAN	LRP-26	Dawei – Phunamron Road	B			1,127	824
Road	NS	BGO	LRP-27	Bago – Mandalay Road	B			880	643
Road	NS	SHN	LRP-28	New Goat Twin Viaduct	B			130	95
Total of 12 projects under Group-B (Billion MMK and Million US$)								5,623	4,110

(3) Railway Sub-sector

Table-10.2.9 and **Table-10.2.10** shows six projects prioritized as Group-A and five projects prioritized as Group-B, respectively.

Table-10.2.9 Proposed Railway Projects (Group-A)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Railway	NS	YGN/MDL	LFP-01	Development of Freight Railway Station / ICD at Yangon and Mandalay	A			327	240
Railway	NS	YGN	LFP-02	Freight Station Development Project in Thilawa with Thilawa Line Improvement	A			2,069	1,517
Railway	Common	Common	LFP-03	Procurement of Locomotives and Container Freight Wagons	A			83	61
Railway	SE	KYN	LFP-09	Myaingkalay CFS Development Project	A			19	14
Railway	NS	YGN/MGL	LFP-16	Yangon - Mandalay Railway Track Improvement	A			1,755	1,283
Railway	MR	BGO	LFP-08	Yangon-Pyay Line Improvement (Pyay - Hmawbi)	A			430	314
Railway	NS	YGN	LFP-12	Thilawa - Bago New Line Development Project	A			1,197	875
Total of 6 project under Group-A (Billion MMK and Million US$)								5,880	4,304

Table-10.2.10 Proposed Railway Projects (Group-B)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Railway	NS	BGO	LFP-19	Bago-Hanthawaddy Line Improvement	B			29	21
Railway	Common	Common	LFP-04	Bulk Cargo Railway Freight Improvement	B			66	48
Railway	SE	BGO	LFP-17	Bago-Mawlamyine Line Improvement	B			366	268
Railway	SE	MON	LFP-10	Kyaikkhami Freight Terminal Development and Upgrading of Bridges between Mawlamyine and Thanbyuzayat	B			568	415
Railway	NS	SHN	LFP-13	Mandalay-Muse New Railway Line Development (Implementation)	B			6,840	5,000
Total of 5 projects under Group-B (Billion MMK and Million US$)								7,868	5,752

(4) Port and Waterborne Transport Projects

Table-10.2.11 and **Table-10.2.12** shows six project prioritized as Group-A and six projects prioritized as Group-B, respectively.

Table-10.2.11 Port and Waterborne Transport Projects (Group-A)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Waterborne	CM/NS	YGN	LWP-02	Yangon Port (Domestic Port) Improvement	A			127	93
Waterborne	CM/SE	YGN	LWP-01	Yangon Port (Thilawa Terminal) Development	A			451	330
Waterborne	CM/SE	MON	LWP-09	Kyaikami International Grain Terminal / Port Development	A			497	363
Waterborne	CM	AYD	LWP-07	Pathein Port Improvement	A			101	74
Waterborne	CM	TAN	LWP-12	Khawthaung Port Improvement	A			13	10
Waterborne	CM	RAK	LWP-05	Kyaukphyu Port Improvement	A			28	20
Total of 6 project under Group-A (Billion MMK and Million US$)								1.217	890

Table-10.2.12 Port and Waterborne Transport Projects (Group-B)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Waterborne	CM/SE	TAN	LWP-10	Dawei Local Port Improvement	B			85	62
Waterborne	CM/TM	RAK	LWP-03	Sittwe Port Improvement	B			48	35
Waterborne	CM	RAK	LWP-06	Thandwe Port Improvement	B			8	6
Waterborne	CM	TAN	LWP-11	Myeik Port Improvement	B			28	20
Waterborne	SE	TAN	LWP-04	Dawei SEZ Port Development (Implementation)	B			2,040	1,491
Waterborne	CM/SE	MON	LWP-08	Mawlamyaing Port Improvement	B			89	65
Total of 6 projects under Group-B (Billion MMK and Million US$)								2,297	1,679

(5) Inland Water Transportation Sub-sector

Table-10.2.13 and **Table-10.2.14** shows 11 project prioritized as Group-A and seven projects prioritized as Group-B, respectively.

Table-10.2.13 Inland Water Transport Projects (Group-A)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
IWT	MR/NS/MI	MDL	LIP-01	Mandalay Port Development	A			52	38
IWT	MR/NS	YGN/BGO /MGW/MDL	LIP-02	Yangon - Mandalay Navigation and Channel improvement	A			256	187
IWT	MR/CM	YGN	LIP-03	Yangon River Navigation Aid Improvement	A			20	15
IWT	MR/CM/NS	YGN	LIP-06	Improvement of Yangon River Water Transportation	A			93	68
IWT	MR/CM/NS	YGN	LIP-09	Yangon Port (Including Connectivity)	A			19	14
IWT	Common	Common	LIP-12	Container Vessel (Vessel Modernization)	A			34	25
IWT	MR/NS	SAG	LIP-14	Chindwin Wa-Monywa Navigation and Channel Improvement	A			50	37
IWT	CM	RAK	LIP-22	Rakhine Coastal Vessels	A			21	15
IWT	CM	RAK	LIP-08	Kaladan Multi-Modal Transit Transport Project (Vessels, Channel, Navigation)	A			160	117
IWT	Common	YGN	LIP-07	Dala Shipyard Modernization with TA	A			29	21
IWT	MR/CM	YGN	LIP-13	Connectivity of Oversea, Coastal and Inland Water Transportation	A			11	8
Total of 11 projects under Group-A (Billion MMK and Million US$)								744	544

Table-10.2.14 Inland Water Transport Projects (Group-B)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
IWT	MR	SAG	LIP-10	Monywa Port	B			10	7
IWT	MR/TM	MAG	LIP-11	Magway, Pakokku Inland Waterway Hub Port Development	B			14	10
IWT	MR	SAG	LIP-24	Mwaleik-Homalin Channel and Navigation Improvement	B			6	4
IWT	MR	SAG	LIP-25	Monywa - Upstream Channel and Navigation Improvement	B			36	26
IWT	MR/MI	KAC	LIP-26	Mandalay - Bhamo Channel and Navigation Improvement	B			75	55
IWT	Common	Common	LIP-04	Replacement of Wooden Vessel to FRP Vessel with TA	B			12	9
IWT	Common	Common	LIP-05	IWT Barge and Tugs (Replacement)	B			164	120
Total of 7 projects under Group-B (Billion MMK and Million US$)								317	232

(6) Aviation Sub-sector

Table-10.2.15 and **Table-10.2.16** shows five projects prioritized as Group-A and 10 projects prioritized as Group-B, respectively.

Table-10.2.15 Aviation Related Projects (Group-A)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Aviation	NS/SE	YGN	LAP-01	Yangon International Airport (Air Cargo Handling Facilities)	A			137	100
Aviation	NS	MDL	LAP-02	Mandalay International Airport (Air Cargo Handling Facilities)	A			27	20
Aviation	NS	BGO	LAP-03	Hanthawaddy International Airport Development	A			1,368	1,000
Aviation	MR	MDL	LAP-04	Pakokku / Nyaung U Airport Development	A			42	31
Aviation	TM	SHN	LAP-05	Heho Airport Development	A			52	38
Total of 5 projects under Group-A (Billion MMK and Million US$)								1,627	1,189

Table-10.2.16 Aviation Related Projects (Group-B)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Aviation	SE	TAN	LAP-06	Dawei Airport Development	B			44	32
Aviation	TM	RAK	LAP-07	Kyaukphyu Airport Development	B			21	15
Aviation	TM	RAK	LAP-10	Sittwe Airport Development	B			25	18
Aviation	TM	SHN	LAP-08	Tachileik Airport Development	B			40	29
Aviation	SE	TAN	LAP-09	Myeik Airport Development	B			18	13
Aviation	MR	KAC	LAP-11	Myitkyina Airport Development	B			14	10
Aviation	TM	SHN	LAP-12	Kengtung Airport Development	B			4	3
Aviation	NS	SHN	LAP-13	Lashio Airport Development	B			27	20
Aviation	SE	TAN	LAP-14	Kawthaung Airport Development	B			11	8
Aviation	SE	MON	LAP-15	Mawlamyine Airport Improvement	B			3	2
Total of 10 projects under Group-A (Billion MMK and Million US$)								205	150

Source: Study Team

(7) Common Projects for the Sector

Table-10.2.17 shows nine projects as the common projects for the sector as a whole.

Table-10.2.17 Common Projects

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Railway	Common	Common	LFP-03	Procurement of Locomotives and Container Freight Wagons	A			83	61
IWT	Common	Common	LIP-12	Container Vessel (Vessel Modernization)	A			34	25
Railway	Common	Common	LFP-04	Bulk Cargo Railway Freight Improvement	B			66	48
IWT	Common		LIP-15	Navigation Safety and Maintenace Improvement and TA	C			38	28
Railway	Common	Common	LFP-07	Intermediate Freight Station Improvement	C			33	24
Railway	Common	Common	LFP-06	ICDs Development proposed by UNESCAP	D			164	120
IWT	Common	YGN	LIP-07	Dala Shipyard Modernization with TA	A			29	21
IWT	Common	Common	LIP-04	Replacement of Wooden Vessel to FRP Vessel with TA	B			12	9
IWT	Common	Common	LIP-05	IWT Barge and Tugs (Replacement)	B			164	120
Total of 10 projects under Group-A (Billion MMK and Million US$)								624	456

Source: Study Team

10.2.6 Prioritized Project by Development Timeframe

(1) Identified Projects by Logistics Corridor and Sub-sector

Following tables shows the list of projects considered in the Study for logistics development system and the National Transport Master Plan. The development timeframe for each project is shown in the short term (2018-2025 or seven years) and medium to long terms. This means that the projects planned to be executed beyond 2025 should be reviewed for the timing of development during the course of the execution of projects proposed to be executed in the short-term timeframe, by analyzing the change of cargo volumes transported that can be monitored by means of various surveys with regard to transport volumes, traffic volumes and truck terminal dwell times.

In addition to the list of projects and their development timeframe, the possibility of development of projects under the Private Financial Initiative (PFI) applying the most suitable mode of investment by the private sector in conjunction with the public investment by the concerned ministry or agency should be examined carefully.

Table-10.2.18 shows the list of proposed projects under Group-A in the short-term development timeframe.

Table-10.2.18 List of 47 Proposed Projects under Group-A (Short-term)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	NS	YGN/MDL	LRP-01	Yangon-Nay Pyi Taw-Mandalay Expressway (Upgrading)	A			676	494
Road	SE	BGO	LRP-07	New Expressway between Bago-Kyaikhto	A			1,053	770
Road	SE	TAN	LRP-09	Three Pagoda Pass Road (Upgrading)	A			445	325
Road	SE	MON/KYN	LRP-08	Thaton Bypass Road	A			274	200
Road	SE	MON/KYN	LRP-15	Thaton – Eindu – Kawkareik – Myawaddy Road	A			192	140
IWT	MR/NS/MI	MDL	LIP-01	Mandalay Port Development	A			52	38
Railway	NS	YGN/MDL	LFP-01	Development of Freight Railway Station / ICD at Yangon and Mandalay	A			327	240
Railway	NS	YGN	LFP-02	Freight Station Development Project in Thilawa with Thilawa Line Improvement	A			2,069	1,517
Railway	Common	Common	LFP-03	Procurement of Locomotives and Container Freight Wagons	A			83	61
Logistics	NS	YGN	LLP-02	Establishment of New Yangon Truck Terminal at Ywatagyi	A			63	46
Waterborne	CM/NS	YGN	LWP-02	Yangon Port (Domestic Port) Improvement	A			127	93
Railway	SE	KYN	LFP-09	Myaingkalay CFS Development Project	A			19	14
Logistics	NS	YGN	LLP-05	Establishment of Yangon Multi-modal Logistics Complex	A			89	65
IWT	MR/NS	YGN/BGO /MGW/MDL	LIP-02	Yangon - Mandalay Navigation and Channel improvement	A			256	187
Road	NS	MDL	LRP-03	Myotar-Tada U Road	A			126	92
Waterborne	CM/SE	YGN	LWP-01	Yangon Port (Thilawa Terminal) Development	A			451	330
Road	NS/SE	BGO	LRP-06	Hanthawaddy Airport Access Road	A			108	79
Road	NS	YGN	LRP-05	Yangon Outer Ring Road (YORR) East Section	A			780	570
Road	SE	KYN	LRP-16	Gyaing (Kawkareik) Bridge	A			105	77
Road	SE	KYN	LRP-16	Gyaing (Zarthapyin) Bridge	A			141	103
Logistics	SE	KYN	LLP-03	Container Switching Station Development at Myawaddy Trade Zone	A			25	18
Road	MR	AYD	LRP-17	Yangon – Pathein Road	A			124	91
IWT	MR/CM	YGN	LIP-03	Yangon River Navigation Aid Improvement	A			20	15
Aviation	NS/SE	YGN	LAP-01	Yangon International Airport (Air Cargo Handling Facilities)	A			137	100
Aviation	NS	MDL	LAP-02	Mandalay International Airport (Air Cargo Handling Facilities)	A			27	20
Logistics	NS	YGN	LLP-01	Expansion and Improvement of Existing Yangon Truck Terminal	A			23	17
Railway	NS	YGN/MGL	LFP-16	Yangon - Mandalay Railway Track Improvement	A			1,755	1,283
Road	SE	MON	LRP-16	Atran Bridge	A			95	69
Logistics	SE/MI	MON	LLP-04	Cross-border Trade Facility coupled with Container Switching Yard at Three Pagoda Pass	A			36	27
IWT	MR/CM/NS	YGN	LIP-06	Improvement of Yangon River Water Transportation	A			93	68
IWT	MR/CM/NS	YGN	LIP-09	Yangon Port (Including Connectivity)	A			19	14
IWT	Common	Common	LIP-12	Container Vessel (Vessel Modernization)	A			34	25
IWT	MR/NS	SAG	LIP-14	Chindwin Wa-Monywa Navigation and Channel Improvement	A			50	37
Logistics	NS/SE/TM/MI	BGO	LLP-06	City Truck Terminal Improvement Project (Bago)	A			10	7
Logistics	SE	MON	LLP-07	City Truck Terminal Improvement Project (Mawlamyaine)	A			10	7
Logistics	SE	TAN	LLP-08	City Truck Terminal Improvement Project (Dawei)	A			10	7
Logistics	MR	MAG	LLP-09	City Truck Terminal Improvement Project (Magway)	A			10	7
Logistics	MR	BGO	LLP-10	City Truck Terminal Improvement Project (Pyey)	A			10	7
Logistics	TM	SHN	LLP-11	City Truck Terminal Improvement Project (Taungyi)	A			10	7
Logistics	NS	AYD	LLP-12	City Truck Terminal Improveent Project (Pathein)	A			10	7
IWT	CM	RAK	LIP-22	Rakhine Coastal Vessels	A			21	15
Waterborne	CM/SE	MON	LWP-09	Kyaikami International Grain Terminal / Port Development	A			497	363
Waterborne	CM	AYD	LWP-07	Pathein Port Improvement	A			101	74
IWT	CM	RAK	LIP-08	Kaladan Multi-Modal Transit Transport Project (Vessels, Channel, Navigation)	A			160	117
Waterborne	CM	TAN	LWP-12	Khawthaung Port Improvement	A			13	10
Aviation	NS	BGO	LAP-03	Hanthawaddy International Airport Development	A			1,368	1,000
Aviation	MR	MDL	LAP-04	Pakokku / Nyaung U Airport Development	A			42	31
Aviation	TM	SHN	LAP-05	Heho Airport Development	A			52	38
Railway	MR	BGO	LFP-08	Yangon-Pyay Line Improvement (Pyay - Hmawbi)	A			430	314
Total of 47 projects for short-term timeframe (Billion MMK and Million US$)								12,625	9,234

Source: Study Team

Table-10.2.19 shows the list of proposed projects under Group-B in the short-term development timeframe.

Table-10.2.19 List of 22 Proposed Projects under Group-B (Short-term)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Aviation	SE	TAN	LAP-06	Dawei Airport Development	B			44	32
Aviation	TM	RAK	LAP-07	Kyaukphyu Airport Development	B			21	15
Road	SE	MON	LRP-10	Mawlamyine Peripheral Road	B			11	8
Waterborne	CM/SE	TAN	LWP-10	Dawei Local Port Improvement	B			85	62
Railway	NS	BGO	LFP-19	Bago-Hanthawaddy Line Improvement	B			29	21
Waterborne	CM/TM	RAK	LWP-03	Sittwe Port Improvement	B			48	35
Road	MI	SAG	LRP-13	Construction of Bridges on India-Myanmar-Thailand Trilateral Highway (Tamu-Kyigone-Kaleywa Road)	B			74	54
Aviation	TM	RAK	LAP-10	Sittwe Airport Development	B			25	18
Railway	Common	Common	LFP-04	Bulk Cargo Railway Freight Improvement	B			66	48
IWT	MR	SAG	LIP-10	Monywa Port	B			10	7
IWT	MR/TM	MAG	LIP-11	Magway, Pakokku Inland Waterway Hub Port Development	B			14	10
Railway	SE	BGO	LFP-17	Bago-Mawlamyine Line Improvement	B			366	268
Aviation	TM	SHN	LAP-08	Tachileik Airport Development	B			40	29
Aviation	SE	TAN	LAP-09	Myeik Airport Development	B			18	13
Waterborne	CM	RAK	LWP-06	Thandwe Port Improvement	B			8	6
Waterborne	CM	TAN	LWP-11	Myeik Port Improvement	B			28	20
Aviation	MR	KAC	LAP-11	Myitkyina Airport Development	B			14	10
Road	NS/SE	YGN	LRP-18	Yangon (from toll gate) - Bago Road	B			115	84
IWT	MR	SAG	LIP-24	Mwaleik-Homalin Channel and Navigation Improvement	B			6	4
IWT	MR	SAG	LIP-25	Monywa - Upstream Channel and Navigation Improvement	B			36	26
IWT	MR/MI	KAC	LIP-26	Mandalay - Bhamo Channel and Navigation Improvement	B			75	55
Total of 22 projects for short-term timeframe (Billion MMK and Million US$)								1,130	826

Table-10.2.20 shows the list of proposed projects under Group-A in the mid-/long-term development timeframe.

Table-10.2.20 List of 9 Proposed Projects under Group-A
(Middle-Long Term Development Timeframe)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Railway	NS	YGN	LFP-12	Thilawa - Bago New Line Development Project	A			1,197	875
Road	NS/SE	BGO	LRP-22	Yangon City - Hanthawaddy - Existing Expressway	A			388	284
IWT	Common	YGN	LIP-07	Dala Shipyard Modernization with TA	A			29	21
Road	NS	YGN	LRP-04	Yangon Urban Expressway (YUEX)	A			2,382	1,741
IWT	MR/CM	YGN	LIP-13	Connectivity of Oversea, Coastal and Inland Water Transportation	A			11	8
Logistics	NS	MDL	LLP-13	Establishment of Mandalay Multi-modal Logistics Complex	A			62	45
Logistics	NS/SE	BGO	LLP-14	Establishment of Bago Multi-modal Logistics Complex	A			89	65
Waterborne	CM	RAK	LWP-05	Kyaukphyu Port Improvement	A			28	20
Total of 9 projects for mid and long timeframe (Billion MMK and Million US$)								4,185	3,059

Source: Study Team

Table-10.2.21 shows the list of proposed projects under Group-B in the mid-/long-term development timeframe.

Table-10.2.21 List of 19 Proposed Projects under Group-B
(Middle-Long Term Development Timeframe)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
IWT	Common	Common	LIP-04	Replacement of Wooden Vessel to FRP Vessel with TA	B			12	9
Railway	SE	MON	LFP-10	Kyaikkhami Freight Terminal Development and Upgrading of Bridges between Mawlamyine and Thanbyuzayat	B			568	415
Road	MI	SAG	LRP-11	Pong Taung-Pone Nyar Tunnel between Magway and Sagain	B			260	190
Road	TM	SHN/MDL	LRP-12	Fast Shan Plateau Access Road (Yin Mar Bin-Kalaw)	B			499	365
Waterborne	SE	TAN	LWP-04	Dawei SEZ Port Development (Implementation)	B			2,040	1,491
IWT	Common	Common	LIP-05	IWT Barge and Tugs (Replacement)	B			164	120
Railway	NS	SHN	LFP-13	Mandalay-Muse New Railway Line Development (Implementation)	B			6,840	5,000
Road	MI	RAK	LRP-23	Yaw Chaung (Yepyar) Bridge	B			39	29
Road	MR	BGO	LRP-24	Yangon – Pyay - Mandalay Road	B			1,139	833
Road	NS	SHN/MDL	LRP-02	Alternative Route of Mandalay - Muse Road	B			908	664
Road	NS	SHN/MDL	LRP-25	Mandalay – Lashio – Muse Road	B			440	322
Aviation	TM	SHN	LAP-12	Kengtung Airport Development	B			4	3
Road	SE	TAN	LRP-26	Dawei – Phunamron Road	B			1,127	824
Aviation	NS	SHN	LAP-13	Lashio Airport Development	B			27	20
Road	NS	BGO	LRP-27	Bago – Mandalay Road	B			880	643
Aviation	SE	TAN	LAP-14	Kawthaung Airport Development	B			11	8
Road	NS	SHN	LRP-28	New Goat Twin Viaduct	B			130	95
Waterborne	CM/SE	MON	LWP-08	Mawlamyaing Port Improvement	B			89	65
Aviation	SE	MON	LAP-15	Mawlamyine Airport Improvement	B			3	2
Total of 19 projects for mid and long timeframe (Billion MMK and Million US$)								15,181	11,097

Source: Study Team

10.2.7 Prioritized Project Identified by Region / State

The projects proposed are sorted by region and state. The national project such as the improvement of Yangon – Mandalay Expressway that spans through various regions and states are excluded from the lists presented below. The abbreviations referring to the names of regions and states in an alphabetical order are as follows.

Region or State	Abbreviation	Region or State	Abbreviation
Ayeyarwaddy Region	AYD	Bago Region	BGO
Chin State	CHN	Kachin State	KAC
Kayah State	KAY	Kayin State	KYN
Mandalay Region	MDL	Magway Region	MAG
Mon State	MON	Rakhain State	RAC
Sagain Region	SAG	Shan State	SHN
Tanintharyi Region	TAN	Yangon Region	YGN

Source: Study Team

Tables below show the list of proposed projects by region / state in alphabetical order. The projects proposed that are of inter-regional nature are exempted from the lists presented below as these projects are considered as managed by the central government.

Table-10.2.22 List of Projects Proposed in Ayeyarwaddy Region

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	MR	AYD	LRP-17	Yangon – Pathein Road	A			124	91
Logistics	NS	AYD	LLP-12	City Truck Terminal Improveent Project (Pathein)	A			10	7
Waterborne	CM	AYD	LWP-07	Pathein Port Improvement	A			101	74
IWT	MR	AYD	LIP-17	Ayeyarwaddy Delta Channel and Navigation Improvement	C			53	39
IWT	MR	AYD	LIP-19	Hinthada Port	C			30	22
IWT	MR/CM	AYD	LIP-16	Pathein Port	C			11	8
Aviation	MR	AYD	LAP-26	Pathein Airport Development	C			3	2
IWT	MR	AYD	LIP-29	Ayeyarwady Delta Vessels	D			20	15
Road	MR	AYD	LRP-48	Hinthada Bridge	D			276	202
Road	NS	AYD	LRP-49	Thetkal Thoung Bridge	D			29	21
Railway	SE	YGN/AYD	LFP-21	Yangon-Pathein Line Improvement	D			239	175
Road	MR	AYD/MAG	LRP-51	Monywa – Pathein Road	D			700	512
Road	MR	AYD	LRP-53	Ayeyarwaddy (Thayat-Aunglan) Bridge	D			157	115
Road	MR	AYD	LRP-55	Ayeyarwaddy (Kathar) Bridge	D			127	93
Total of 16 projects for short and mid-long timeframe (Billion MMK and Million US$)								1,879	1,373

Source: Study Team

Table-10.2.23 List of Projects Proposed in Bago Region

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	SE	BGO	LRP-07	New Expressway between Bago-Kyaikhto	A			1,053	770
IWT	MR/NS	YGN/BGO /MGW/MDL	LIP-02	Yangon - Mandalay Navigation and Channel improvement	A			256	187
Road	NS/SE	BGO	LRP-06	Hanthawaddy Airport Access Road	A			108	79
Logistics	NS/SE/TM/MI	BGO	LLP-06	City Truck Terminal Improvement Project (Bago)	A			10	7
Logistics	MR	BGO	LLP-10	City Truck Terminal Improvement Project (Pyey)	A			10	7
Aviation	NS	BGO	LAP-03	Hanthawaddy International Airport Development	A			1,368	1,000
Railway	NS	BGO	LFP-19	Bago-Hanthawaddy Line Improvement	B			29	21
Railway	SE	BGO	LFP-17	Bago-Mawlamyine Line Improvement	B			366	268
IWT	MR	BGO	LIP-18	Pyay Port	C			13	10
Railway	MR	BGO	LFP-08	Yangon-Pyay Line Improvement (Pyay - Hmawbi)	A			430	314
Road	NS/SE	BGO	LRP-22	Yangon City - Hanthawaddy - Existing Expressway	A			388	284
Logistics	NS/SE	BGO	LLP-14	Establishment of Bago Multi-modal Logistics Complex	A			89	65
Road	MR	BGO	LRP-24	Yangon – Pyay - Mandalay Road	B			1,139	833
Road	NS	BGO	LRP-27	Bago – Mandalay Road	B			880	643
Railway	NS	YGN/BGO	LFP-15	High Speed Railway Linking Between Yangon and Hanthawaddy (Implementation)	C			2,005	1,466
Road	MR	BGO	LRP-32	Hapasawing - Pyay Road	C			283	207
Total of 16 projects for short and mid-long timeframe (Billion MMK and Million US$)								8,426	6,160

Source: Study Team

Table-10.2.24 List of Projects Proposed in Kachin State

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Aviation	MR	KAC	LAP-11	Myitkyina Airport Development	B			14	10
IWT	MR/MI	KAC	LIP-26	Mandalay - Bhamo Channel and Navigation Improvement	B			75	55
Railway	NS	KAC	LFP-18	Myohaung-Myitkyina Railway Improvement	C			912	667
IWT	MR	KAC	LIP-23	Bhamo Port	D			13	10
Road	NS	SAG/KAC	LRP-35	Shwebo – Myitkyina Road	C			462	338
Aviation	NS	KAC	LAP-20	Bhamo Airport Development	C			4	3
Road	NS	MDL/KAC	LRP-40	Mandalay – Thabeikkyin – Tagaung – Bhamo Road	D			274	200
Total of 7 projects for short and mid-long timeframe (Billion MMK and Million US$)								1,754	1,282

Source: Study Team

Table-10.2.25 List of Projects Proposed in Kayah State

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	TM	MAG/KAY	LRP-31	Loikaw - Magway Road	C			363	265
Aviation	TM	KAY	LAP-19	Loikaw Airport Development	C			4	3
Total of 2 projects for short and mid-long timeframe (Billion MMK and Million US$)								367	268

Source: Study Team

Table-10.2.26 List of Projects Proposed in Kayin State

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	SE	MON/KYN	LRP-08	Thaton Bypass Road	A			274	200
Road	SE	MON/KYN	LRP-15	Thaton – Eindu – Kawkareik – Myawaddy Road	A			192	140
Railway	SE	KYN	LFP-09	Myaingkalay CFS Development Project	A			19	14
Road	SE	KYN	LRP-16	Gyaing (Kawkareik) Bridge	A			105	77
Road	SE	KYN	LRP-16	Gyaing (Zarthapyin) Bridge	A			141	103
Logistics	SE	KYN	LLP-03	Container Switching Station Development at Myawaddy Trade Zone	A			25	18
IWT	SE	KYN	LIP-21	Thanlwin River Channel and Navigation Improvement	D			137	100
Total of 7 projects for short and mid-long timeframe (Billion MMK and Million US$)								892	652

Source: Study Team

Table-10.2.27 List of Projects Proposed in Magway Region

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
IWT	MR/NS	YGN/BGO /MGW/MDL	LIP-02	Yangon - Mandalay Navigation and Channel improvement	A			256	187
Logistics	MR	MAG	LLP-09	City Truck Terminal Improvement Project (Magway)	A			10	7
IWT	MR/TM	MAG	LIP-11	Magway, Pakokku Inland Waterway Hub Port Development	B			14	10
Aviation	MR	MAG	LAP-16	Magway Airport Development	C			3	2
Road	TM	MAG/KAY	LRP-31	Loikaw - Magway Road	C			363	265
Road	MR	AYD/MAG	LRP-51	Monywa – Pathein Road	D			700	512
Total of 6 projects for short and mid-long timeframe (Billion MMK and Million US$)								1,345	983

Source: Study Team

Table-10.2.28 List of Projects Proposed in Mandalay Region

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	NS	YGN/MDL	LRP-01	Yangon-Nay Pyi Taw-Mandalay Expressway (Upgrading)	A			676	494
IWT	MR/NS/MI	MDL	LIP-01	Mandalay Port Development	A			52	38
Railway	NS	YGN/MDL	LFP-01	Development of Freight Railway Station / ICD at Yangon and Mandalay	A			327	240
IWT	MR/NS	YGN/BGO /MGW/MDL	LIP-02	Yangon - Mandalay Navigation and Channel improvement	A			256	187
Road	NS	MDL	LRP-03	Myotar-Tada U Road	A			126	92
Aviation	NS	MDL	LAP-02	Mandalay International Airport (Air Cargo Handling Facilities)	A			27	20
Railway	NS	YGN/MDL	LFP-16	Yangon - Mandalay Railway Track Improvement	A			1,755	1,283
Aviation	MR	MDL	LAP-04	Pakokku / Nyaung U Airport Development	A			42	31
Logistics	NS	MDL	LLP-13	Establishment of Mandalay Multi-modal Logistics Complex	A			62	45
Road	TM	SHN/MDL	LRP-12	Fast Shan Plateau Access Road (Yin Mar Bin-Kalaw)	B			499	365
Road	NS	SHN/MDL	LRP-02	Alternative Route of Mandalay - Muse Road	B			908	664
Road	NS	SHN/MDL	LRP-25	Mandalay – Lashio – Muse Road	B			440	322
Road	NS	MDL	LRP-30	Mandalay Circular Expressway	C			329	240
Road	NS	MDL/KAC	LRP-40	Mandalay – Thabeikkyin – Tagaung – Bhamo Road	D			274	200
Railway	TM	MDL	LFP-20	Nay Pyi Taw - Bagan Line Improvement	D			556	406
IWT	MR/NS/MI	MDL	LIP-31	Mandalay - Upstream Vessels (Passenger Cargo)	D			12	9
IWT	MR/NS/MI	MDL	LIP-32	Mandalay Shipyard Modernization	D			26	19
Total of 17 projects for short and mid-long timeframe (Billion MMK and Million US$)								6,368	4,656

Source: Study Team

Table-10.2.29 List of Projects Proposed in Mon State

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	SE	MON/KYN	LRP-08	Thaton Bypass Road	A			274	200
Road	SE	MON/KYN	LRP-15	Thaton – Eindu – Kawkareik – Myawaddy Road	A			192	140
Road	SE	MON	LRP-16	Atran Bridge	A			95	69
Logistics	SE/MI	MON	LLP-04	Cross-border Trade Facility coupled with Container Switching Yard at Three Pagoda Pass	A			36	27
Logistics	SE	MON	LLP-07	City Truck Terminal Improvement Project (Mawlamyaine)	A			10	7
Waterborne	CM/SE	MON	LWP-09	Kyaikami International Grain Terminal / Port Development	A			497	363
Road	SE	MON	LRP-10	Mawlamyine Peripheral Road	B			11	8
Road	SE	MON	LRP-19	Payagyi – Mawlamyaine - Thanbuzayat Road	C			393	287
Railway	SE	MON	LFP-10	Kyaikkhami Freight Terminal Development and Upgrading of Bridges between Mawlamyine and Thanbyuzayat	B			568	415
Waterborne	CM/SE	MON	LWP-08	Mawlamyaing Port Improvement	B			89	65
Aviation	SE	MON	LAP-15	Mawlamyine Airport Improvement	B			3	2
IWT	SE	MON	LIP-28	Thanlwin River Vessels	D			5	4
Road	SE	MON	LRP-38	Don Tha Mi and Naung Lon Bridge	D			16	12
Road	SE	MON	LRP-39	Chaungnitkwa Bridge	D			14	10
Road	MI	MON	LRP-44	Thanlwin(Tarsotpha) Bridge	D			12	9
IWT	SE	MON	LIP-30	Improvement of Sittaung River and Bank Protection Project	D			30	22
Total of 16 projects for short and mid-long timeframe (Billion MMK and Million US$)								2,243	1,640

Source: Study Team

Table-10.2.30 List of Projects Proposed in Rakhine State

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
IWT	CM	RAK	LIP-22	Rakhine Coastal Vessels	A			21	15
IWT	CM	RAK	LIP-08	Kaladan Multi-Modal Transit Transport Project (Vessels, Channel, Navigation)	A			160	117
Aviation	TM	RAK	LAP-07	Kyaukphyu Airport Development	B			21	15
Waterborne	CM/TM	RAK	LWP-03	Sittwe Port Improvement	B			48	35
Aviation	TM	RAK	LAP-10	Sittwe Airport Development	B			25	18
Waterborne	CM	RAK	LWP-06	Thandwe Port Improvement	B			8	6
Waterborne	CM	RAK	LWP-05	Kyaukphyu Port Improvement	A			28	20
Road	MI	RAK	LRP-23	Yaw Chaung (Yepyar) Bridge	B			39	29
Road	CC	RAK	LRP-29	Minbu – Ann – Kyauktaw – Sittwe Road	C			463	338
Road	TM	RAK	LRP-14	Ann-Kyaukpyu Road	C			629	460
Aviation	TM	RAK	LAP-21	Ann Airport Development	C			4	3
Road	MI	RAK	LRP-43	Yaw Chaung (Ohn Taw) Bridge	D			29	21
Total of 12 projects for short and mid-long timeframe (Billion MMK and Million US$)								1,474	1,078

Source: Study Team

Table-10.2.31 List of Projects Proposed in Sagain Region

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
IWT	MR/NS	SAG	LIP-14	Chindwin Wa-Monywa Navigation and Channel Improvement	A			50	37
Road	MI	SAG	LRP-13	Construction of Bridges on India-Myanmar-Thailand Trilateral Highway (Tamu-Kyigone-Kaleywa Road)	B			74	54
IWT	MR	SAG	LIP-10	Monywa Port	B			10	7
IWT	MR	SAG	LIP-24	Mwaleik-Homalin Channel and Navigation Improvement	B			6	4
IWT	MR	SAG	LIP-25	Monywa - Upstream Channel and Navigation Improvement	B			36	26
IWT	MR/MI	SAG	LIP-20	Kalewa Port	D			7	5
Road	MI	SAG	LRP-11	Pong Taung-Pone Nyar Tunnel between Magway and Sagain	B			260	190
Road	NS	SAG/KAC	LRP-35	Shwebo – Myitkyina Road	C			462	338
Aviation	MI	SAG	LAP-17	Kalay Airport Development	C			4	3
Aviation	MI	SAG	LAP-18	Homalin Airport Development	C			4	3
Aviation	NS	SAG	LAP-22	Kamti Airport Development	C			4	3
Aviation	MR	SAG	LAP-25	Monywa Airport Development	C			4	3
IWT	MR/MI	SAG	LIP-27	Chindwin River Vessels	D			5	4
Road	MI	SAG	LRP-36	Shwebo - Ye U - Kalaywa Road	D			283	207
Road	MI	SAG	LRP-41	Monywa - Pale - Gangaw – Kalaymyo Road	D			302	221
Road	MI	SAG	LRP-42	Monywa – Yargyi – Kalewa Road	D			181	132
Railway	TM	SAG	LFP-22	Myohaung-Monywa Line Improvement	D			128	94
Railway	TM	SAG	LFP-23	Pyawbwe-Shwenyaung Line Improvement	D			386	282
Road	MR	SAG	LRP-56	Chindwin (Phaungbyin) Bridge	D			34	25
Railway	TM	SAG	LFP-14	Mandalay – Tamu New Railway Line Development	D			7,934	5,800
Total of 20 projects for short and mid-long timeframe (Billion MMK and Million US$)								10,174	7,437

Source: Study Team

Table-10.2.32 List of Projects Proposed in Shan State

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Logistics	TM	SHN	LLP-11	City Truck Terminal Improvement Project (Taungyi)	A			10	7
Aviation	TM	SHN	LAP-05	Heho Airport Development	A			52	38
Aviation	TM	SHN	LAP-08	Tachileik Airport Development	B			40	29
Road	TM	SHN/MDL	LRP-12	Fast Shan Plateau Access Road (Yin Mar Bin-Kalaw)	B			499	365
Railway	NS	SHN	LFP-13	Mandalay-Muse New Railway Line Development (Implementation)	B			6,840	5,000
Road	NS	SHN/MDL	LRP-02	Alternative Route of Mandalay - Muse Road	B			908	664
Road	NS	SHN/MDL	LRP-25	Mandalay – Lashio – Muse Road	B			440	322
Aviation	TM	SHN	LAP-12	Kengtung Airport Development	B			4	3
Aviation	NS	SHN	LAP-13	Lashio Airport Development	B			27	20
Road	NS	SHN	LRP-28	New Goat Twin Viaduct	B			130	95
Aviation	TM	SHN	LAP-23	Mong-Hsat Airport Development	C			3	2
Road	TM	SHN	LRP-37	Taunggyi – Loilim – Kyaington Road	D			658	481
Road	TM	SHN	LRP-45	Thibaw – Loilem Road	D			232	170
Road	TM	SHN	LRP-46	Taunggyi – Loikaw – Hpapun – Pha an Road	D			660	482
Road	TM	SHN	LRP-50	Watalone Tunnel	D			137	97
Road	TM	SHN	LRP-52	Kyaington – Mongla Road	D			90	66
Road	TM	SHN	LRP-54	Thanlwin (Kunlone) Bridge	D			20	15
Total of 17 projects for short and mid-long timeframe (Billion MMK and Million US$)								10,750	7,855

Source: Study Team

Table-10.2.33 List of Projects Proposed in Tanintharyi Region

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	SE	TAN	LRP-09	Three Pagoda Pass Road (Upgrading)	A			445	325
Logistics	SE	TAN	LLP-08	City Truck Terminal Improvement Project (Dawei)	A			10	7
Waterborne	CM	TAN	LWP-12	Khawthaung Port Improvement	A			13	10
Aviation	SE	TAN	LAP-06	Dawei Airport Development	B			44	32
Waterborne	CM/SE	TAN	LWP-10	Dawei Local Port Improvement	B			85	62
Aviation	SE	TAN	LAP-09	Myeik Airport Development	B			18	13
Waterborne	CM	TAN	LWP-11	Myeik Port Improvement	B			28	20
Road	SE	TAN	LRP-21	Tha Mouk Bridge	D			14	10
Waterborne	SE	TAN	LWP-04	Dawei SEZ Port Development (Implementation)	B			2,040	1,491
Road	SE	TAN	LRP-26	Dawei – Phunamron Road	B			1,127	824
Aviation	SE	TAN	LAP-14	Kawthaung Airport Development	B			11	8
Road	SE	TAN	LRP-33	Tanintharyi – Mawtaung Road	C			107	78
Road	SE	TAN	LRP-34	Thanbyuzayat – Dawei – Myeik – Kawthonng Road	C			907	663
Aviation	SE	TAN	LAP-24	Bokpyinn Airport Development	C			4	3
Total of 14 projects for short and mid-long timeframe (Billion MMK and Million US$)								4,851	3,546

Source: Study Team

Table-10.2.34 List of Projects Proposed in Yangon Region

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	NS	YGN/MDL	LRP-01	Yangon-Nay Pyi Taw-Mandalay Expressway (Upgrading)	A			676	494
Railway	NS	YGN/MDL	LFP-01	Development of Freight Railway Station / ICD at Yangon and Mandalay	A			327	240
Railway	NS	YGN	LFP-02	Freight Station Development Project in Thilawa with Thilawa Line Improvement	A			2,069	1,517
Logistics	NS	YGN	LLP-02	Establishment of New Yangon Truck Terminal at Ywatagyi	A			63	46
Waterborne	CM/NS	YGN	LWP-02	Yangon Port (Domestic Port) Improvement	A			127	93
Logistics	NS	YGN	LLP-05	Establishment of Yangon Multi-modal Logistics Complex	A			89	65
IWT	MR/NS	YGN/BGO /MGW/MDL	LIP-02	Yangon - Mandalay Navigation and Channel improvement	A			256	187
Waterborne	CM/SE	YGN	LWP-01	Yangon Port (Thilawa Terminal) Development	A			451	330
Road	NS	YGN	LRP-05	Yangon Outer Ring Road (YORR) East Section	A			780	570
IWT	MR/CM	YGN	LIP-03	Yangon River Navigation Aid Improvement	A			20	15
Aviation	NS/SE	YGN	LAP-01	Yangon International Airport (Air Cargo Handling Facilities)	A			137	100
Logistics	NS	YGN	LLP-01	Expansion and Improvement of Existing Yangon Truck Terminal	A			23	17
Railway	NS	YGN/MDL	LFP-16	Yangon - Mandalay Railway Track Improvement	A			1,755	1,283
IWT	MR/CM/NS	YGN	LIP-06	Improvement of Yangon River Water Transportation	A			93	68
IWT	MR/CM/NS	YGN	LIP-09	Yangon Port (Including Connectivity)	A			19	14
Road	NS/SE	YGN	LRP-18	Yangon (from toll gate) - Bago Road	B			115	84
Railway	NS	YGN	LFP-11	Improvement of Yangon CBD Freight Station	C			14	10
Road	NS	YGN	LRP-20	Watayar Bridge	D			238	174
Railway	NS	YGN	LFP-12	Thilawa - Bago New Line Development Project	A			1,197	875
IWT	Common	YGN	LIP-07	Dala Shipyard Modernization with TA	A			29	21
Road	NS	YGN	LRP-04	Yangon Urban Expressway (YUEX)	A			2,382	1,741
IWT	MR/CM	YGN	LIP-13	Connectivity of Oversea, Coastal and Inland Water Transportation	A			11	8
Railway	NS	YGN/BGO	LFP-15	High Speed Railway Linking Between Yangon and Hanthawaddy (Implementation)	C			2,005	1,466
Road	NS	YGN	LRP-47	Hlaing River Bridge	D			58	42
Railway	SE	YGN/AYD	LFP-21	Yangon-Pathein Line Improvement	D			239	175
Railway	MR	YGN	LFP-24	New Railway Bridge Crossing the Hlaing River	D			29	21
Railway	NS	YGN	LFP-05	Yangon Outer Ring Freight Railway Development	D			1,546	1,130
Total of 27 projects for short and mid-long timeframe (Billion MMK and Million US$)								14,748	10,786

Source: Study Team

10.3 Prioritization of Logistics Corridor Developments

10.3.1 Outline of Each Logistics Corridor and Identified Projects

Six corridors are determined as the key logistics corridors in Myanmar up to the year 2030. The outline information for each corridor is summarized in **Table-10.3.1** below:

Table-10.3.1 Outline of each Logistics Corridor

Name of Logistics Corridor	Approx. Length (km)	Projected Annual Cargo Transport Volume (Million Tonnes per Year in 2030)				Population Influenced ('000)
		Road		Railway	Waterway	
		Low Segment	High Segment			
1) Myanmar-India	400	14.2	16.0		8.0	8.300
2) North-South	990	32.0	54.0			11,600
3) South-East	290	13.0	26.0	0.7		4,500
4) Main River	1,230	0.6	3.3	1.4	2.0	9,000
5) Trans Myanmar	960	0.4	0.6			3,900
6) Coastal	1,885				10.1	5,000

Source: Study Team

10.3.2 Feature of Each Logistics Corridor

(1) South-East Logistics Corridor

The growth rate of cargo flow volume along this corridor is considered as the highest amongst corridors. This corridor is to be developed and completed as planned to meet with ever increasing cargo demand, otherwise the cargo flow volume will be concentrated on Yangon Port, which would create port congestion hindering smooth flow of international cargo. The development of this corridor is given the highest priority as cargo demand has been increasing rapidly and cross-border facilities along the corridor would create bottlenecks for international / regional trade cargo flows in coming years.

The reinforcement of regional connectivity and enhancement of rural development especially along the borders are allocated the highest development priority in the new national economic policy, as well. The development of this corridor (providing proper gateways along the Myanmar border with Thailand) is considered as an urgent aspect of Myanmar's economic development.

The identified projects proposed for the development of South-East Logistics Corridor by priority group are listed in **Table-10.3.2.**

Table-10.3.2 Identified Projects by Logistics Corridor (South-East Logistics Corridor)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	SE	BGO	LRP-07	New Expressway between Bago-Kyaikhto	A			1,053	770
Road	SE	TAN	LRP-09	Three Pagoda Pass Road (Upgrading)	A			445	325
Road	SE	MON/KYN	LRP-08	Thaton Bypass Road	A			274	200
Road	SE	MON/KYN	LRP-15	Thaton – Eindu – Kawkareik – Myawaddy Road	A			192	140
Railway	SE	KYN	LFP-09	Myaingkalay CFS Development Project	A			19	14
Waterborne	CM/SE	YGN	LWP-01	Yangon Port (Thilawa Terminal) Development	A			451	330
Road	NS/SE	BGO	LRP-06	Hanthawaddy Airport Access Road	A			108	79
Road	SE	KYN	LRP-16	Gyaing (Kawkareik) Bridge	A			105	77
Road	SE	KYN	LRP-16	Gyaing (Zarthapyin) Bridge	A			141	103
Logistics	SE	KYN	LLP-03	Container Switching Station Development at Myawaddy Trade Zone	A			25	18
Aviation	NS/SE	YGN	LAP-01	Yangon International Airport (Air Cargo Handling Facilities)	A			137	100
Road	SE	MON	LRP-16	Atran Bridge	A			95	69
Logistics	SE/MI	MON	LLP-04	Cross-border Trade Facility coupled with Container Switching Yard at Three Pagoda Pass	A			36	27
Logistics	NS/SE/TM/MI	BGO	LLP-06	City Truck Terminal Improvement Project (Bago)	A			10	7
Logistics	SE	MON	LLP-07	City Truck Terminal Improvement Project (Mawlamyaine)	A			10	7
Logistics	SE	TAN	LLP-08	City Truck Terminal Improvement Project (Dawei)	A			10	7
Waterborne	CM/SE	MON	LWP-09	Kyaikami International Grain Terminal / Port Development	A			497	363
Aviation	SE	TAN	LAP-06	Dawei Airport Development	B			44	32
Road	SE	MON	LRP-10	Mawlamyine Peripheral Road	B			11	8
Waterborne	CM/SE	TAN	LWP-10	Dawei Local Port Improvement	B			85	62
Railway	SE	BGO	LFP-17	Bago-Mawlamyine Line Improvement	B			366	268
Aviation	SE	TAN	LAP-09	Myeik Airport Development	B			18	13
Road	NS/SE	YGN	LRP-18	Yangon (from toll gate) - Bago Road	B			115	84
Road	SE	MON	LRP-19	Payagyi – Mawlamyaine - Thanbuzayat Road	C			393	287
IWT	SE	KYN	LIP-21	Thanlwin River Channel and Navigation Improvement	D			137	100
Road	SE	TAN	LRP-21	Tha Mouk Bridge	D			14	10
Road	NS/SE	BGO	LRP-22	Yangon City - Hanthawaddy - Existing Expressway	A			388	284
Logistics	NS/SE	BGO	LLP-14	Establishment of Bago Multi-modal Logistics Complex	A			89	65
Railway	SE	MON	LFP-10	Kyaikkhami Freight Terminal Development and Upgrading of Bridges between Mawlamyine and Thanbyuzayat	B			568	415
Waterborne	SE	TAN	LWP-04	Dawei SEZ Port Development (Implementation)	B			2,040	1,491
Road	SE	TAN	LRP-26	Dawei – Phunamron Road	B			1,127	824
Aviation	SE	TAN	LAP-14	Kawthaung Airport Development	B			11	8
Waterborne	CM/SE	MON	LWP-08	Mawlamyaing Port Improvement	B			89	65
Aviation	SE	MON	LAP-15	Mawlamyine Airport Improvement	B			3	2
Road	SE	TAN	LRP-33	Tanintharyi – Mawtaung Road	C			107	78
Road	SE	TAN	LRP-34	Thanbyuzayat – Dawei – Myeik – Kawthonng Road	C			907	663
Aviation	SE	TAN	LAP-24	Bokpyinn Airport Development	C			4	3
IWT	SE	MON	LIP-28	Thanlwin River Vessels	D			5	4
Road	SE	MON	LRP-38	Don Tha Mi and Naung Lon Bridge	D			16	12
Road	SE	MON	LRP-39	Chaungnitkwa Bridge	D			14	10
Railway	SE	YGN/AYD	LFP-21	Yangon-Pathein Line Improvement	D			239	175
IWT	SE	MON	LIP-30	Improvement of Sittaung River and Bank Protection Project	D			30	22
IWT	MR/SE/MI	Common	LIP-33	Other 10 Ports Construction	D			143	105
Total of 43 projects (Billion MMK and Million US$)								10,568	7,725

Source: Study Team

(2) North-South Logistics Corridor

This corridor is the main corridor sustaining the economic growth of Myanmar and considered as the axis linking both of major cities in Myanmar, namely Yangon and Mandalay. The Thilawa International Container Terminal Development Project will make the Port of Yangon the most important gateway node in Myanmar linking with the global market. The efficiency of cargo transport along the North-South Logistics Corridor is maximized by improving transport performance of roads and railways, coupled with the improvement of truck terminals for road transport and dry ports for railways. The railway track rehabilitation project is ongoing and is expected to be completed by 2023. Prior to the

completion of railway track rehabilitation project, the preparation for commissioning of container block train operations should be completed, including the completion of a railway ICD as scheduled and the Thilawa freight station, which includes off-dock facilities for container handling, as well as the purchase of the necessary locomotives and container wagons. The existing Yangon – Mandalay expressway is to be improved to permit safe operation of heavily loaded vehicles, to divert the major trucking route between the two growth poles of Yangon and Mandalay, from the narrow and dangerous existing national road (NH-1) to the Expressway. The truck terminal at Yangon handles around one third (1/3rd) of the total cargo traffic volume in and around Yangon, however, its capacity is almost at saturation, and operations have become inefficient.

Therefore, truck terminals at the end points of the Yangon – Mandalay expressway will be developed to meet increasing cargo transport demand. A creation of a strong and efficient logistic corridor that makes this corridor a real economic axis in Myanmar, through linking the growth poles of Yangon and Mandalay will ensure stable economic growth. The development of this corridor is considered as a fundamental aspect of Myanmar's economic development.

The identified projects proposed for the development of North-South Logistics Corridor are listed in **Table-10.3.3.**

Table-10.3.3 Identified Projects by Logistics Corridor (North-South Logistics Corridor)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Road	NS	YGN/MDL	LRP-01	Yangon-Nay Pyi Taw-Mandalay Expressway (Upgrading)	A			676	494
IWT	MR/NS/MI	MDL	LIP-01	Mandalay Port Development	A			52	38
Railway	NS	YGN/MDL	LFP-01	Development of Freight Railway Station / ICD at Yangon and Mandalay	A			327	240
Railway	NS	YGN	LFP-02	Freight Station Development Project in Thilawa with Thilawa Line Improvement	A			2,069	1,517
Logistics	NS	YGN	LLP-02	Establishment of New Yangon Truck Terminal at Ywatagyi	A			63	46
Waterborne	CM/NS	YGN	LWP-02	Yangon Port (Domestic Port) Improvement	A			127	93
Logistics	NS	YGN	LLP-05	Establishment of Yangon Multi-modal Logistics Complex	A			89	65
IWT	MR/NS	YGN/BGO /MGW/MDL	LIP-02	Yangon - Mandalay Navigation and Channel improvement	A			256	187
Road	NS	MDL	LRP-03	Myotar-Tada U Road	A			126	92
Road	NS/SE	BGO	LRP-06	Hanthawaddy Airport Access Road	A			108	79
Road	NS	YGN	LRP-05	Yangon Outer Ring Road (YORR) East Section	A			780	570
Aviation	NS/SE	YGN	LAP-01	Yangon International Airport (Air Cargo Handling Facilities)	A			137	100
Aviation	NS	MDL	LAP-02	Mandalay International Airport (Air Cargo Handling Facilities)	A			27	20
Logistics	NS	YGN	LLP-01	Expansion and Improvement of Existing Yangon Truck Terminal	A			23	17
Railway	NS	YGN/MDL	LFP-16	Yangon - Mandalay Railway Track Improvement	A			1,755	1,283
IWT	MR/CM/NS	YGN	LIP-06	Improvement of Yangon River Water Transportation	A			93	68
IWT	MR/CM/NS	YGN	LIP-09	Yangon Port (Including Connectivity)	A			19	14
IWT	MR/NS	SAG	LIP-14	Chindwin Wa-Monywa Navigation and Channel Improvement	A			50	37
Logistics	NS/SE/TM/MI	BGO	LLP-06	City Truck Terminal Improvement Project (Bago)	A			10	7
Logistics	NS	AYD	LLP-12	City Truck Terminal Improveent Project (Pathein)	A			10	7
Aviation	NS	BGO	LAP-03	Hanthawaddy International Airport Development	A			1,368	1,000
Railway	NS	BGO	LFP-19	Bago-Hanthawaddy Line Improvement	B			29	21
Road	NS/SE	YGN	LRP-18	Yangon (from toll gate) - Bago Road	B			115	84
Railway	NS	KAC	LFP-18	Myohaung-Myitkyina Railway Improvement	C			912	667
Railway	NS	YGN	LFP-11	Improvement of Yangon CBD Freight Station	C			14	10
Road	NS	YGN	LRP-20	Watayar Bridge	D			238	174
Railway	NS	YGN	LFP-12	Thilawa - Bago New Line Development Project	A			1,197	875
Road	NS/SE	BGO	LRP-22	Yangon City - Hanthawaddy - Existing Expressway	A			388	284
Road	NS	YGN	LRP-04	Yangon Urban Expressway (YUEX)	A			2,382	1,741
Logistics	NS	MDL	LLP-13	Establishment of Mandalay Multi-modal Logistics Complex	A			62	45
Logistics	NS/SE	BGO	LLP-14	Establishment of Bago Multi-modal Logistics Complex	A			89	65
Railway	NS	SHN	LFP-13	Mandalay-Muse New Railway Line Development (Implementation)	B			6,840	5,000
Road	NS	SHN/MDL	LRP-02	Alternative Route of Mandalay - Muse Road	B			908	664
Road	NS	SHN/MDL	LRP-25	Mandalay – Lashio – Muse Road	B			440	322
Aviation	NS	SHN	LAP-13	Lashio Airport Development	B			27	20
Road	NS	BGO	LRP-27	Bago – Mandalay Road	B			880	643
Road	NS	SHN	LRP-28	New Goat Twin Viaduct	B			130	95
Railway	NS	YGN/BGO	LFP-15	High Speed Railway Linking Between Yangon and Hanthawaddy (Implementation)	C			2,005	1,466
Road	NS	MDL	LRP-30	Mandalay Circular Expressway	C			329	240
Road	NS	SAG/KAC	LRP-35	Shwebo – Myitkyina Road	C			462	338
Aviation	NS	KAC	LAP-20	Bhamo Airport Development	C			4	3
Aviation	NS	SAG	LAP-22	Kamti Airport Development	C			4	3
Road	NS	MDL/KAC	LRP-40	Mandalay – Thabeikkyin – Tagaung – Bhamo Road	D			274	200
Road	NS	YGN	LRP-47	Hlaing River Bridge	D			58	42
Road	NS	AYD	LRP-49	Thetkal Thoung Bridge	D			29	21
Railway	NS	YGN	LFP-05	Yangon Outer Ring Freight Railway Development	D			1,546	1,130
IWT	MR/NS/MI	MDL	LIP-31	Mandalay - Upstream Vessels (Passenger Cargo)	D			12	9
IWT	MR/NS/MI	MDL	LIP-32	Mandalay Shipyard Modernization	D			26	19
Total of 47 projects f (Billion MMK and Million US$)								27,437	20,062

Source: Study Team

(3) Main River Logistics Corridor

This corridor is the main corridor for inland waterway transport and is the most influential corridor for agricultural development and transport of bulky goods with low value. This corridor will be developed to utilize the lowest cost transport mode. Its performance is maximized through the introduction of inland waterway transport ports, as hubs for efficient cargo transport along the main river, together with the efficient connection with the road and railway transport system. The transport capacity of inland waterway transport will be

expanded to meet the cargo demand forecast, otherwise the cargo transport capacity of the roads and railways will be unable to cope with the needs of transporting bulky and low-valued goods, thereby hindering the efficient total transport of cargo. There are no properly designed river ports for the inland waterway transport at present. The river ports along this corridor are to be developed as multimodal hubs in rural areas along the Ayeyarwaddy River and along the Chindwin River.

However, the development of the inland waterway transport system requires a comprehensive approach, as all elements structuring the system need to be properly developed. The major components structuring this system are 1) river ports, 2) properly secured navigation channels, 3) properly designed inland waterway transport vessels, 4) navigation aids, 5) shipyards for building and maintenance of inland waterway transport vessels, 6) human resources development, and 7) upgrading of laws, rules and regulation for the safety of ship and navigation system. Therefore, the development of this corridor is to be implemented on step-by-step basis, which will start with development of the major river ports.

The identified projects proposed for the development of Main River Logistics Corridor are listed in **Table-10.3.4**.

Table-10.3.4 Identified Projects by Logistics Corridor (Main River Logistics Corridor)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
IWT	MR/NS/MI	MDL	LIP-01	Mandalay Port Development	A			52	38
IWT	MR/NS	YGN/BGO /MGW/MDL	LIP-02	Yangon - Mandalay Navigation and Channel improvement	A			256	187
Road	MR	AYD	LRP-17	Yangon – Pathein Road	A			124	91
IWT	MR/CM	YGN	LIP-03	Yangon River Navigation Aid Improvement	A			20	15
IWT	MR/CM/NS	YGN	LIP-06	Improvement of Yangon River Water Transportation	A			93	68
IWT	MR/CM/NS	YGN	LIP-09	Yangon Port (Including Connectivity)	A			19	14
IWT	MR/NS	SAG	LIP-14	Chindwin Wa-Monywa Navigation and Channel Improvement	A			50	37
Logistics	MR	MAG	LLP-09	City Truck Terminal Improvement Project (Magway)	A			10	7
Logistics	MR	BGO	LLP-10	City Truck Terminal Improvement Project (Pyey)	A			10	7
Aviation	MR	MDL	LAP-04	Pakokku / Nyaung U Airport Development	A			42	31
IWT	MR	SAG	LIP-10	Monywa Port	B			10	7
IWT	MR/TM	MAG	LIP-11	Magway, Pakokku Inland Waterway Hub Port Development	B			14	10
Aviation	MR	KAC	LAP-11	Myitkyina Airport Development	B			14	10
IWT	MR	SAG	LIP-24	Mwaleik-Homalin Channel and Navigation Improvement	B			6	4
IWT	MR	SAG	LIP-25	Monywa - Upstream Channel and Navigation Improvement	B			36	26
IWT	MR/MI	KAC	LIP-26	Mandalay - Bhamo Channel and Navigation Improvement	B			75	55
IWT	MR	AYD	LIP-17	Ayeyarwaddy Delta Channel and Navigation Improvement	C			53	39
IWT	MR	BGO	LIP-18	Pyay Port	C			13	10
IWT	MR	AYD	LIP-19	Hinthada Port	C			30	22
IWT	MR/MI	SAG	LIP-20	Kalewa Port	D			7	5
IWT	MR	KAC	LIP-23	Bhamo Port	D			13	10
Railway	MR	BGO	LFP-08	Yangon-Pyay Line Improvement (Pyay - Hmawbi)	A			430	314
IWT	MR/CM	YGN	LIP-13	Connectivity of Oversea, Coastal and Inland Water Transportation	A			11	8
Road	MR	BGO	LRP-24	Yangon – Pyay - Mandalay Road	B			1,139	833
IWT	MR/CM	AYD	LIP-16	Pathein Port	C			11	8
Aviation	MR	MAG	LAP-16	Magway Airport Development	C			3	2
Road	MR	BGO	LRP-32	Hapasawing - Pyay Road	C			283	207
Aviation	MR	SAG	LAP-25	Monywa Airport Development	C			4	3
Aviation	MR	AYD	LAP-26	Pathein Airport Development	C			3	2
IWT	MR/MI	SAG	LIP-27	Chindwin River Vessels	D			5	4
IWT	MR	AYD	LIP-29	Ayeyarwady Delta Vessels	D			20	15
Road	MR	AYD	LRP-48	Hinthada Bridge	D			276	202
Railway	MR	YGN	LFP-24	New Railway Bridge Crossing the Hlaing River	D			29	21
IWT	MR/NS/MI	MDL	LIP-31	Mandalay - Upstream Vessels (Passenger Cargo)	D			12	9
IWT	MR/NS/MI	MDL	LIP-32	Mandalay Shipyard Modernization	D			26	19
IWT	MR/SE/MI	Common	LIP-33	Other 10 Ports Construction	D			143	105
Road	MR	AYD/MAG	LRP-51	Monywa – Pathein Road	D			700	512
Road	MR	AYD	LRP-53	Ayeyarwaddy (Thayat-Aunglan) Bridge	D			157	115
Road	MR	AYD	LRP-55	Ayeyarwaddy (Kathar) Bridge	D			127	93
Road	MR	SAG	LRP-56	Chindwin (Phaungbyin) Bridge	D			34	25
Total of 40 projects (Billion MMK and Million US$)								4,357	3,185

Source: Study Team

(4) Coastal Marine Logistics Corridor

This corridor is the main corridor for the domestic shipping of bulky cargoes and daily consumables for the population residing along the Coast, where other transport modes, such as roads and railways have insufficient connections. The cargo transport efficiency of domestic shipping is to be expanded, otherwise the transport load on the roads and the railways will become heavier, and in turn the transport costs will increase, especially for the population living in rural areas along the Coast. The national port management system needs to be established, based on newly legislated Port laws, so as to develop and maintain coastal shipping operations with optimum efficiency. Therefore, a comprehensive national coastal shipping improvement plan must be formulated first. Detailed development plans are to be prepared based on such a National plan.

The identified projects proposed for the development of Coastal Marine Logistics Corridor are listed in **Table-10.3.5**.

Table-10.3.5 Identified Projects by Logistics Corridor (Coastal Marine Logistics Corridor)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Waterborne	CM/NS	YGN	LWP-02	Yangon Port (Domestic Port) Improvement	A			127	93
Waterborne	CM/SE	YGN	LWP-01	Yangon Port (Thilawa Terminal) Development	A			451	330
IWT	MR/CM	YGN	LIP-03	Yangon River Navigation Aid Improvement	A			20	15
IWT	MR/CM/NS	YGN	LIP-06	Improvement of Yangon River Water Transportation	A			93	68
IWT	MR/CM/NS	YGN	LIP-09	Yangon Port (Including Connectivity)	A			19	14
IWT	CM	RAK	LIP-22	Rakhine Coastal Vessels	A			21	15
Waterborne	CM/SE	MON	LWP-09	Kyaikami International Grain Terminal / Port Development	A			497	363
Waterborne	CM	AYD	LWP-07	Pathein Port Improvement	A			101	74
IWT	CM	RAK	LIP-08	Kaladan Multi-Modal Transit Transport Project (Vessels, Channel, Navigation)	A			160	117
Waterborne	CM	TAN	LWP-12	Khawthaung Port Improvement	A			13	10
Waterborne	CM/SE	TAN	LWP-10	Dawei Local Port Improvement	B			85	62
Waterborne	CM/TM	RAK	LWP-03	Sittwe Port Improvement	B			48	35
Waterborne	CM	RAK	LWP-06	Thandwe Port Improvement	B			8	6
Waterborne	CM	TAN	LWP-11	Myeik Port Improvement	B			28	20
IWT	MR/CM	YGN	LIP-13	Connectivity of Oversea, Coastal and Inland Water Transportation	A			11	8
Waterborne	CM	RAK	LWP-05	Kyaukphyu Port Improvement	A			28	20
Waterborne	CM/SE	MON	LWP-08	Mawlamyaing Port Improvement	B			89	65
IWT	MR/CM	AYD	LIP-16	Pathein Port	C			11	8
Total of 18 projects for short-term timeframe (Billion MMK and Million US$)								1,809	1,323

Source: Study Team

(5) Myanmar-India Logistics Corridor

This corridor is an important corridor linking the North Eastern Region of India and Myanmar, as well as linking with Thailand, through Myanmar. However, the cargo flow volume is limited in short-term, although it is expected to increase substantially when the cargo transport capacity of the North-South Logistics Corridor and the South-East Logistics Corridor will have expanded fully and function as international cargo transport links.

The major portion of this corridor is the North-South Logistics Corridor; therefore the development schedule of the entire length of this corridor depends on the progress of the North-South Logistics Corridor. However, as the development of the north-western part of this corridor is important for the enhancement of rural development of the influence area and enhancement of connectivity between the North-Eastern part of India and the Northern part of Myanmar, the development of the road linking Mandalay and Muse is the focus for the beginning of the entire corridor development process. The identified projects proposed for the development of Myanmar-India Logistics Corridor are listed in **Table-10.3.6**.

Table-10.3.6 Identified Projects by Logistics Corridor (Myanmar-India Logistics Corridor)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
IWT	MR/NS/MI	MDL	LIP-01	Mandalay Port Development	A			52	38
Logistics	SE/MI	MON	LLP-04	Cross-border Trade Facility coupled with Container Switching Yard at Three Pagoda Pass	A			36	27
Logistics	NS/SE/TM/MI	BGO	LLP-06	City Truck Terminal Improvement Project (Bago)	A			10	7
Road	MI	SAG	LRP-13	Construction of Bridges on India-Myanmar-Thailand Trilateral Highway (Tamu-Kyigone-Kaleywa Road)	B			74	54
IWT	MR/MI	KAC	LIP-26	Mandalay - Bhamo Channel and Navigation Improvement	B			75	55
IWT	MR/MI	SAG	LIP-20	Kalewa Port	D			7	5
Road	MI	SAG	LRP-11	Pong Taung-Pone Nyar Tunnel between Magway and Sagain	B			260	190
Road	MI	RAK	LRP-23	Yaw Chaung (Yepyar) Bridge	B			39	29
Aviation	MI	SAG	LAP-17	Kalay Airport Development	C			4	3
Aviation	MI	SAG	LAP-18	Homalin Airport Development	C			4	3
IWT	MR/MI	SAG	LIP-27	Chindwin River Vessels	D			5	4
Road	MI	SAG	LRP-36	Shwebo - Ye U - Kalaywa Road	D			283	207
Road	MI	SAG	LRP-41	Monywa - Pale - Gangaw – Kalaymyo Road	D			302	221
Road	MI	SAG	LRP-42	Monywa – Yargyi – Kalewa Road	D			181	132
Road	MI	RAK	LRP-43	Yaw Chaung (Ohn Taw) Bridge	D			29	21
Road	MI	MON	LRP-44	Thanlwin(Tarsotpha) Bridge	D			12	9
IWT	MR/NS/MI	MDL	LIP-31	Mandalay - Upstream Vessels (Passenger Cargo)	D			12	9
IWT	MR/NS/MI	MDL	LIP-32	Mandalay Shipyard Modernization	D			26	19
IWT	MR/SE/MI	Common	LIP-33	Other 10 Ports Construction	D			143	105
Total of 19 projects for short-term timeframe (Billion MMK and Million US$)								1,554	1,136

Source: Study Team

(6) Trans Myanmar Logistics Corridor

This corridor is an important corridor for Yunnan Province of China, to connect China with the Indian Ocean partly by means of the Trans Myanmar Oil and Gas Pipeline. Kyaukpyu is the gateway port for this corridor and a SEZ is planned to be developed. However, at present the development of this SEZ has not been progressed. The timing of the development of the Trans Myanmar Logistics Corridor depends on the commissioning of this SEZ. However, the development of Magway, as a multimodal cargo transport hub as the intersection node of two logistics corridors, namely the Main River Logistics Corridor and this (TMLC) logistics corridor is to be implemented in parallel with the planned development schedule for the Main River Logistics Corridor, which aims at enhancement of rural development in the central part of Myanmar, along the Ayeyarwaddy River. The main terminal of this corridor is at Kyaukpyu. The development of this corridor depends on the development progress of Kyaukpyu SEZ, however, at present no significant development is taking place at this SEZ. The cargo demand along this corridor is generated chiefly by Yunnan province of China, however, the road passing along this corridor is important for the rural development of the center and north eastern part of Myanmar. Magway can be considered as an intersection node of this corridor, where the development of multimodal hub is appropriate as it is located at the riverbank of the Ayeyarwaddy River, and the junction of road and railway network. The development of Magway as a regional logistics hub in the center of Myanmar can be undertaken first. The identified projects proposed for the development of Myanmar-India Logistics Corridor are listed in **Table-10.3.7**.

Table-10.3.7 Identified Projects by Logistics Corridor (Trans Myanmar Logistics Corridor)

Sector	Logistics Corridor	Region/ State	Logistics Project ID	Project	Rank	Time Frame		Total Project Cost (Bil. MMK)	Total Project Cost (mil. USD)
						Short	Mid-long		
Logistics	NS/SE/TM/MI	BGO	LLP-06	City Truck Terminal Improvement Project (Bago)	A			10	7
Logistics	TM	SHN	LLP-11	City Truck Terminal Improvement Project (Taungyi)	A			10	7
Aviation	TM	SHN	LAP-05	Heho Airport Development	A			52	38
Aviation	TM	RAK	LAP-07	Kyaukphyu Airport Development	B			21	15
Waterborne	CM/TM	RAK	LWP-03	Sittwe Port Improvement	B			48	35
Aviation	TM	RAK	LAP-10	Sittwe Airport Development	B			25	18
IWT	MR/TM	MAG	LIP-11	Magway, Pakokku Inland Waterway Hub Port Development	B			14	10
Aviation	TM	SHN	LAP-08	Tachileik Airport Development	B			40	29
Road	TM	SHN/MDL	LRP-12	Fast Shan Plateau Access Road (Yin Mar Bin-Kalaw)	B			499	365
Aviation	TM	SHN	LAP-12	Kengtung Airport Development	B			4	3
Road	TM	RAK	LRP-14	Ann-Kyaukpyu Road	C			629	460
Road	TM	MAG/KAY	LRP-31	Loikaw - Magway Road	C			363	265
Aviation	TM	KAY	LAP-19	Loikaw Airport Development	C			4	3
Aviation	TM	RAK	LAP-21	Ann Airport Development	C			4	3
Aviation	TM	SHN	LAP-23	Mong-Hsat Airport Development	C			3	2
Road	TM	SHN	LRP-37	Taunggyi – Loilim – Kyaington Road	D			658	481
Road	TM	SHN	LRP-45	Thibaw – Loilem Road	D			232	170
Road	TM	SHN	LRP-46	Taunggyi – Loikaw – Hpapun – Pha an Road	D			660	482
Railway	TM	MDL	LFP-20	Nay Pyi Taw - Bagan Line Improvement	D			556	406
Railway	TM	SAG	LFP-22	Myohaung-Monywa Line Improvement	D			128	94
Railway	TM	SAG	LFP-23	Pyawbwe-Shwenyaung Line Improvement	D			386	282
Road	TM	SHN	LRP-50	Watalone Tunnel	D			137	97
Road	TM	SHN	LRP-52	Kyaington – Mongla Road	D			90	66
Road	TM	SHN	LRP-54	Thanlwin (Kunlone) Bridge	D			20	15
Railway	TM	SAG	LFP-14	Mandalay – Tamu New Railway Line Development	D			7,934	5,800
Total of 15 projects for short-term timeframe (Billion MMK and Million US$)								12,526	9,153

Source: Study Team

10.3.3 Evaluation Criteria for Prioritization of Logistics Corridor

Similar to the method of project prioritization, evaluation criteria were determined and a score for each corridor was calculated. The key parameters for the evaluation are as follows/Compliance with the Vision;

1) Cargo Volume and Its Speed of Growth specially in Short-term timeframe;
2) Volume of Population Influenced by Corridor;
3) Major Commodity to be Transported (Trade Cargo, Domestic Cargo);
4) Value of Goods to be Transported;
5) Level of Substandard Conditions of Existing Infrastructure;
6) Urgency in Short-term Timeframe.

Table-10.3. 8 shows the result of scoring.

Table-10.3.8 Scoring Table for Logistics Corridors

Name of Logidstics Corridor	Cargo Volume and Its Speed of Growth	Population Influenced	Major Commodities		Value of Goods	Level of Substandard of Existing Infra.	Urgency in Short Timeframe	Integrated Evaluation
			Domestic	Trade				
South-East Logistics Corridor	◎	△	△	◎	◎	◎	◎	1
North-South Logistics Corridor	◎	◎	○	○	◎	○	○	2
Main River Logistics Corridor	○	◎	◎	△	△	◎	○	3
Coastal Marine Logistics Corridor	○	○	◎	△	○	○	◎	4
Trans Myanmar Logistics Corridor	△	△	○	○	○	○	○	5
Myanmar-Inida Logistics Corridor	△	○	○	○	△	◎	△	6

Legend: ◎High, ○Medium, △Low
Source: Study Team

The priority of development for each logistics corridor is provided in the above table. The project prioritized and grouped as Group-A along the link of a corridor and including the gateway nodes, terminal nodes as well as intersection nodes in the corridor is to be given the highest priority for development. However, this does not mean to suggest following step-wise development of these corridors in order of priority in a strict manner. Any improvement and rectification of defects to complete the links of these corridors is suggested to be carried out at first hand to make the network of the logistics corridor in a complete form then the development of nodes are to be carried out to tie these links firmly together for efficient freight transport.

Through the evaluation of logistics corridor, the sequence of logistics corridor development was determined as follows:

1) South-East Logistics Corridor;
2) North-South Logistics Corridor;
3) Main River Logistics Corridor;
4) Coastal Marine Logistics Corridor;
5) Myanmar-India Logistic Corridor; and
6) Trans Myanmar Logistics Corridor.

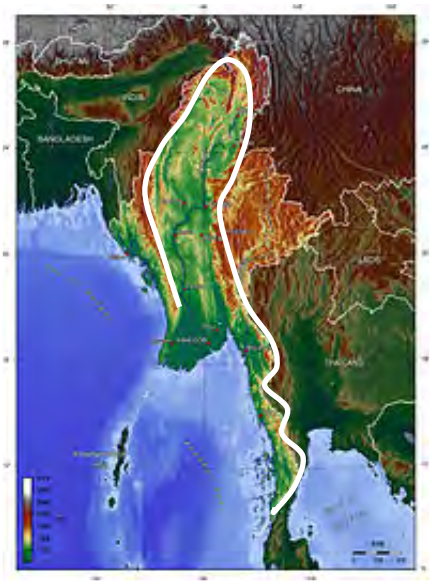
CHAPTER-11 MULTIMODAL FREIGHT LOGISTICS HUBS

11.1 Multimodal Freight Logistics Hubs

11.1.1 Rationale for Developing Multimodal Freight Logistics Hubs in Myanmar

(1) Notable Geographical Features of Myanmar

Myanmar is situated in between latitudes 18° and latitude 28° ; and lies in the western part of South East Asia. The geographically notable feature of Myanmar is a vast gentle plain stretching north to south within a horseshoe-shaped mountain range, as shown in the figure at the right (the mountain range is indicated by a white line). Myanmar is bordered by five neighboring countries: Thailand and the Lao PDR to the east; China to the northeast; India to the northwest; and Bangladesh to the west. The chain of steep mountain ranges that has created a horseshoe shaped natural wall surrounding Myanmar.



Source: Study Team based on website maps

In the central part of Myanmar, a vast area of flat land stretches from north to south. Its total length from north to south is about 2,050 km, and its width at the widest part, across the center of the country at about the latitude of the city of Mandalay, is approximately 930 km from east to west. Myanmar slopes from north to south gently to the Ayeyarwaddy River delta. Myanmar's main rivers, the Ayeyarwaddy and Chindwin, run from north to south similar to the mountain ranges at the eastern and western edges of the flat vast plain. The basin of the Ayeyarwaddy River and its tributaries drain about three-fifths of Myanmar's surface. Flowing entirely through Myanmar, it is navigable for nearly 1,600 km. At the apex of its delta, the Ayeyarwaddy breaks up into a vast network of streams and empties into the Andaman Sea. The seacoast faces the Andaman Sea and the Bay of Bengal. The total length of the coastline is around 2,000 km. The water depth along the coastline is shallow in general terms (around -6m), thus, international vessels plying even feeder links are forced to wait for sufficient tidal depth before entering ports.

(2) Transport Infrastructure Network of Myanmar

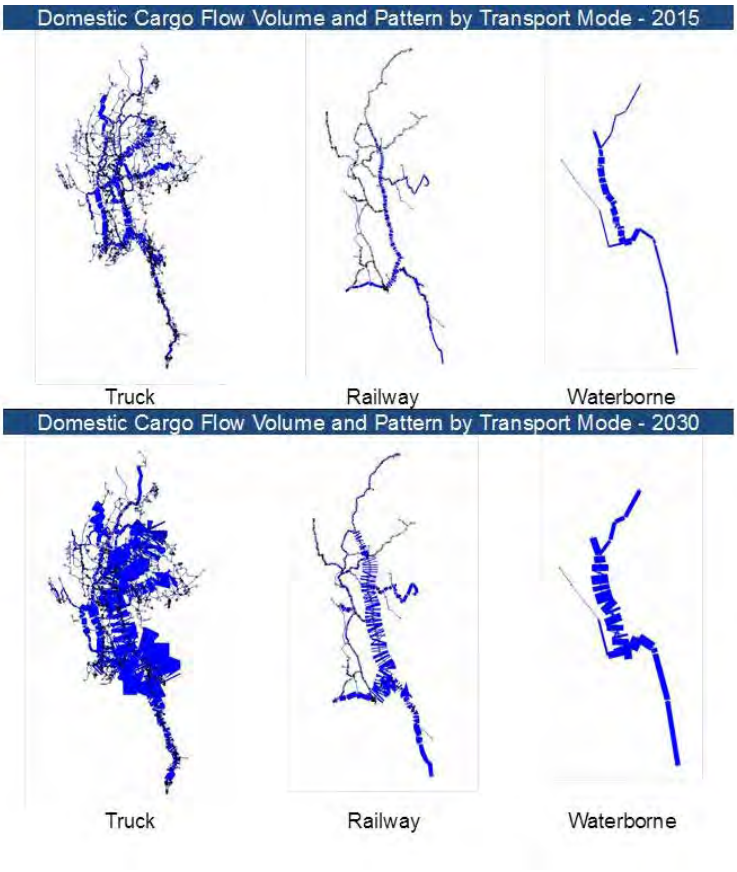
The road network has densely spread over the central plain, especially along the north-south axis. However, the major freight movement is concentrated along the axis linking Mandalay to the north and Yangon to the south, via Bago as the main intersection. The railway network is

fairly evenly spread throughout Myanmar, as the railway has been the main means of intercity passenger transport. The railway freight movement is concentrated along the axis linking Mandalay and Yangon, the same as road transport. The major river, namely Ayeyarwaddy River, runs through from north to south and serves as the major navigation channel for inland waterway transport especially for the rural areas spreading along major rivers. **Figure-11.1.1** illustrates the transport infrastructure network in Myanmar.

Source: NTMP 2014

Figure-11.1.1 Transport Infrastructure Network in Myanmar (MYT-Plan 2014)

Figure-11.1.2 illustrates the image of cargo flow pattern and the same by road, railway, and inland waterway transport mode respectively.



Source: Study Team

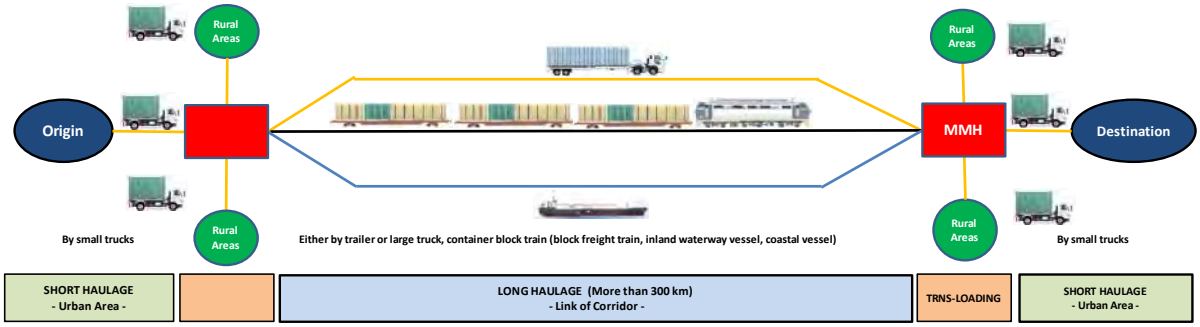
Figure-11.1.2 Cargo Volume and Pattern by Transport Mode

As the north-south axis of railway is trunk line and double track and the inland waterway transport is operated along the Ayeyarwaddy River, these two transport modes (i.e., railway and inland waterway) undertake substantial part of freight transport especially low value and bulky commodities. These trunk lines of railway and inland waterway running through the central plain vertically are supported by feeder and collector roads as well as the roads running through the central plain horizontally. Many roads cross at the point of intersection with the main railway line and inland waterways or link with the nodes of various forms such as railway freight stations or river ports. At such points of intersections or nodes the cargoes can be transshipped from one mode to other mode. Such points or nodes are the candidate locations for the development of multimodal freight logistics hubs that enable the transshipment of cargoes with least cost and shortest time, if the hub is designed and developed properly. The utilization of multimodal freight transport ensures the optimization and rationalization of freight transport cost that makes Myanmar products competitive and avoids unnecessary cost to waste.

11.1.2 Rationale of Establishment of Multimodal Freight Logistics Hubs

The terminal and intersection nodes along logistics corridors are to be designed to have a hub and spoke function, through the development of multimodal freight logistics hubs. In such a

way, the synergy created by and between urban industrial areas and rural agricultural areas can be enhanced efficiently. The aim of establishing multimodal freight logistics hub at strategic nodes is to connect various freight transport modes at strategic transport nodes (road transport, railway transport, inland waterway transport, marine transport, coastal shipping, air cargo transport) and to select most suitable cargo transport mode to ensure minimization of freight transport costs and lead times; as well as the optimization of investment impacts of both core projects (logistics facilities) and supporting projects (freight transport infrastructure) throughout Myanmar. **Figure-11.1.3** illustrates the conceptual transport operation of a Multimodal Freight Logistics Hub.



Source: Study Team

Figure-11.1.3 Concept of Multi-modal Transportation of Long Haulage

11.1.3 Target Areas for Establishment of Multimodal Freight Logistics Hubs

(1) Target Potential Locations for Multimodal Freight Logistics Hubs in Myanmar

Figure-11.1.4 illustrates the locations of nodes that are targeted for the establishment of multimodal freight logistics hubs of different types and the combination of freight transport modes as well as the logistics corridors. The logistics corridor is composed of nodes and links that connect the nodes located at the terminals of the links identified. The types of nodes in Myanmar can be classified as follows:

	Type of Node	Description
1	Gateway Nodes	Locations where major sea port for international trade, or major cross-border post for international trade or international airport, etc. exists.
2	Intersection Nodes	Locations which have two or more major intersection links (highways, highway crossing a railway, etc.)
3	Commercial Nodes	Locations where the commercial or industrial facilities (wholesale market, retails, industrial parks, etc.) are concentrated.
4	River Port Nodes	River ports where highway or railway is either (i) already connected or (ii) not connected but can be connected without large scale modification of highway or railway track.

Source: Study Team

These nodes are connected by linking firmly and efficiently the corridors, so as to form a robust freight transport network and to spread the investment effects to related infrastructure throughout Myanmar.

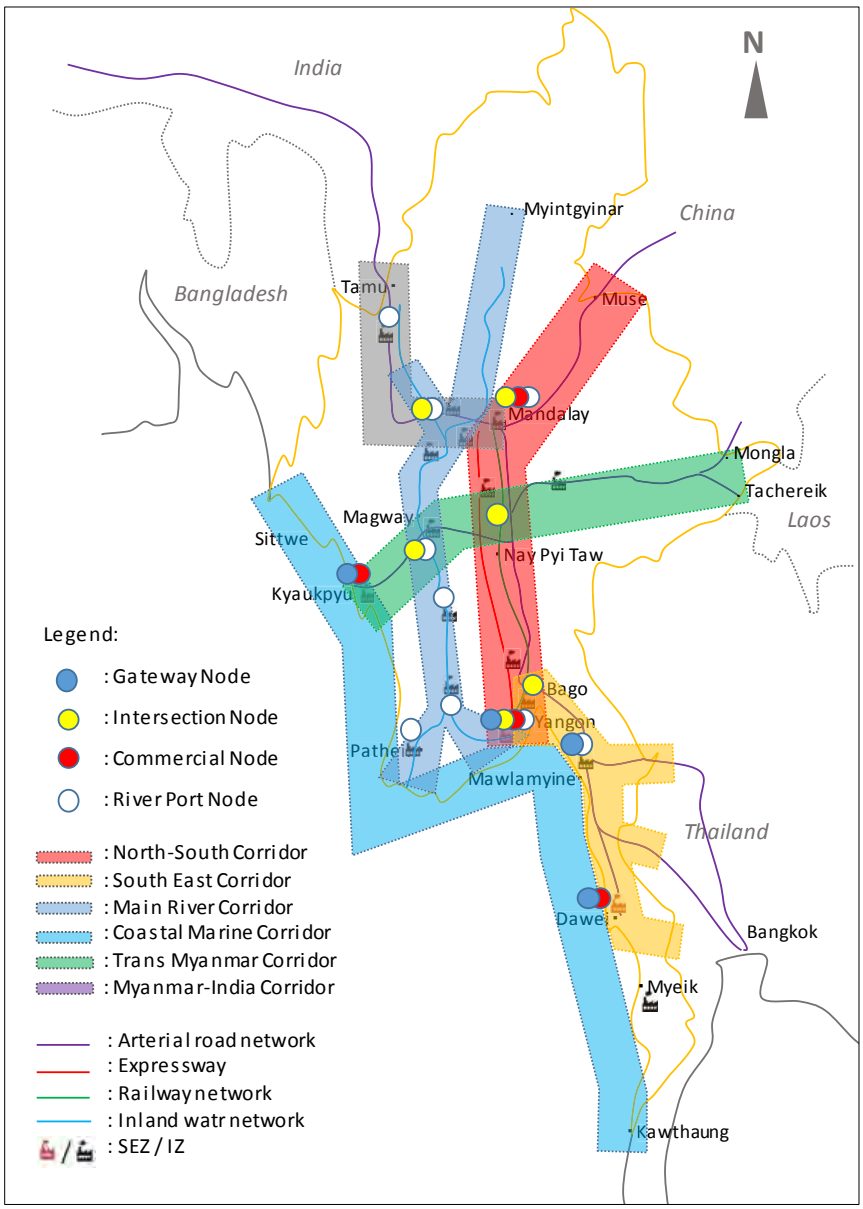
These nodes are connected by linking firmly and efficiently the corridors, so as to form a robust freight transport network and to spread the investment effects to related infrastructures throughout Myanmar. The detailed plans to link various freight transport infrastructure such as highway, freight railway line, international port, river port, and domestic port most of them exist at present; and logistics facilities such as truck terminals at targeted nodes that are identified by red colored circle need to be prepared for respective areas.

Table-11.1.1 tabulates the list of nodes for the establishment of multimodal freight logistics hubs and possible forms of combination of the different freight transport modes. As shown in this table, the potential location for the establishment of the multimodal freight logistics hubs should be the locations where various transport infrastructures exist and the linking of these infrastructure is easy, as the location is the node for long distance haulage in a considerable cargo volume, especially for the low value and bulky cargoes.

Table-11.1.1 Locations of Nodes for the Establishment of Multimodal Freight Logistics Hubs

MMH Ref No.	Type of Node				Location		Transport Mode Combined					
	Gateway	Commercial/ Industrial	River Port	Intersec-tion	City	Region	Ocean Going Ship	Road	Railway	Inland Water	Coastal Ship	Air
1	■	■			Yangon (Thilawa)	Yangon	O	O	O	O	O	O
2		■			Yangon	Yangon	O	O	O		O	O
3		■	■		Mandalay	Mandalay		O	O	O		O
4				■	Meiktila	Mandalay		O	O			
5		■	■		Mawlamyaing	Mon		O	O	O	O	
6	■				Kyaikami	Mon	O	O	O		O	
7		■		■	Bago	Bago		O	O			O
8		■	■		Pyay	Bago		O	O	O		
9		■	■		Magway	Magway		O	O	O		
10		■	■		Pathein	Ayeyarwaddy		O	O	O	O	
11		■	■		Hinthada	Ayeyarwaddy		O	O	O	O	
12		■	■		Monywa	Sagaing		O	O	O		
13	■	■			Dawei	Tanintharyi	O	O	O		O	O
14	■		■		Sittwe	Rakhain	O	O	O	O	O	O

Source: Study Team



Source: Study Team

Figure-11.1.4 Targeted Nodes for the Establishment of Multimodal Freight Logistics Hubs

(2) Impacts of the Multimodal Freight Logistics Hub

The major issue to be addressed in the logistics sector in Myanmar is the relatively high transport cost, as well as the long turnaround time of transport equipment. A fairly extensive network of railway tracks exists in Myanmar, although improvement is needed to enable the transport of heavier cargoes at higher speeds by freight trains, and the construction of a concrete surfaced expressway linking the two major cities of Yangon and Mandalay. On road, an improvement is needed to enable the transport of heavier cargoes at higher speeds by trailer trucks carrying fully loaded 40-footer containers. Furthermore, two major river systems, namely the Ayeyarwaddy and Chindwin Rivers, run through Myanmar from north to south. This is considered as an important inland waterway, although it will require a substantial

improvement of the channel and the river ports to enable the transport of heavier cargoes at higher speeds, as well as the smooth cargo handling at the river ports along the river system.

The improvement and/or development of freight transport infrastructure for respective transport modes are essential in order to reduce the freight transport cost and turnaround time of freight transport equipment, through increased freight transport efficiency. However, the freight transport efficiency can be increased further by combining different modes through provision of multimodal freight logistics hubs, where it is possible to streamline the linkages between different transport modes in highly efficient manner.

One of the optimum solutions to reduce transport costs through better transport system efficiency is the development of multimodal freight logistics hubs at appropriate locations or nodes, where the different transport modes meet. If multimodal freight logistics hubs are developed that are properly designed and aimed at maximizing the transport system efficiency, shippers or logistics providers may choose the best suited transport mode for freight transport, by means of a combination of transport modes with reduced cargo handling costs and times at cargo transfer points.

The improved transport system efficiency by use of multimodal freight logistics hubs can be measured quantitatively, based on assumptions of various conditions, as shown in **Table-11.1.2.** It is assumed that 20 tonnes of cargo is transported in urban areas by four units of small trucks, each carrying 5 tonnes of cargo over a distance of 20 km at low speed, from the place of origin first to the multimodal freight logistics hub and then the 20 tonnes of cargo is combined with other shipments and is transferred to another transport mode, such as to trailer truck, rail freight train or ship (by inland waterway transport or by coastal vessel) for a long haul distance trip of 500 km, to a multimodal freight logistics hub located close to the cargo destination. The cargo arriving at the multimodal freight logistics hub located at the city of the cargo destination is then transferred to the warehouse of the consignee, by small trucks that carry 5 tonnes of cargo each, at slow speeds for about 20 km from the multimodal freight logistics hub.

Table-11.1.2 Assumptions for Computation of Transport Cost and Time by Different Mode

Transport Equipment	Loading Capacity	Weight of Cargo	Average Speed	Transport Cost	Cost of Trans-loading	Required Time for Trans-loading
	tonnes	tonnes	Km/hour	US$/ton-km	US$/ton	hours
Small Truck (city)	5	20	30	0.1022	None	None
Small Truck (highway)	5	20	60	0.0750	None	None
Trailer Truck (highway)	30	20	80	0.0277	4.0	4
Freight Railway	3,000	20	90	0.0123	4.0	8
IWT/Coastal Ship	1,000	20	10	0.0030	4.0	12

Source: Study Team

Furthermore, the comparison of transport cost and time in the two cases are measured under Case-1 (conditions are as shown in the above table) and under Case-2 of which the required time for trans-loading the cargoes at the multimodal freight logistics hub is reduced to half of that of Case-1. **Table-11.1.3** shows the results of the computation of transport cost and time under each of the two different cases.

Table-11.1.3 Comparison of Transport Cost and Time

	Combination of Modes					Cost and Time		Diffference by Pattern		Difference by Case	
CASE-1	City-A	Trans-loading	Link	Trans-loading	City-B	Cost	Time	Cost	Time	Cost	Time
Distance	20km	Hours	500km	Hours	20km	US$	Hours				
Pattern-1	Small Truck	0	Small Truck	0	Small Truck	802	13.5	1.0	1.0	1.0	1.0
Pattern-2	Small Truck	4	Trailer Truck	4	Small Truck	566	15.3	0.7	1.1	1.0	1.0
Pattern-3	Small Truck	8	Railway	8	Small Truck	412	22.6	0.5	1.7	1.0	1.0
Pattern-4	Small Truck	12	Ship	12	Small Truck	318	75.0	0.4	5.6	1.0	1.0
CASE-2	City-A	Trans-loading	Link	Trans-loading	City-B	Cost	Time	Cost	Time	Cost	Time
Distance	20km	Hours	500km	Hours	20km	US$	Hours				
Pattern-1	Small Truck	0	Small Truck	0	Small Truck	802	13.5	1.0	1.0	1.0	1.0
Pattern-2	Small Truck	2	Trailer Truck	2	Small Truck	486	11.3	0.6	0.8	0.9	0.7
Pattern-3	Small Truck	4	Railway	4	Small Truck	332	14.6	0.4	1.1	0.8	0.6
Pattern-4	Small Truck	6	Ship	6	Small Truck	238	63.0	0.3	4.7	0.7	0.8

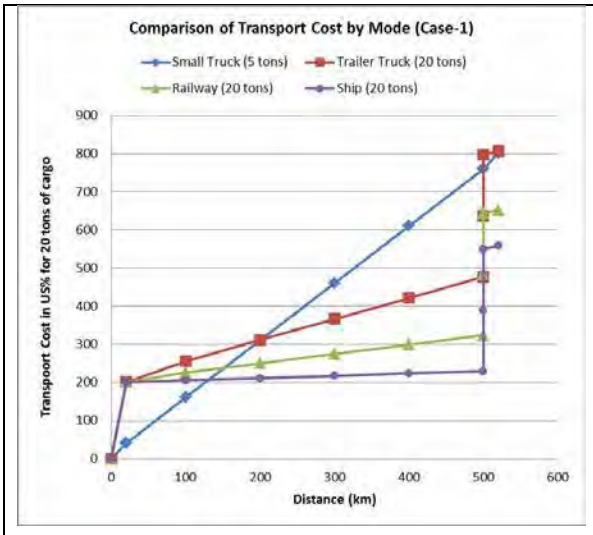
Source: Study Team

Figure-11.1.5 illustrates the comparison of transport costs and time by different transport modes to transport 20 tonnes of cargo from one transport mode to another, under Case-1 and Case-2.

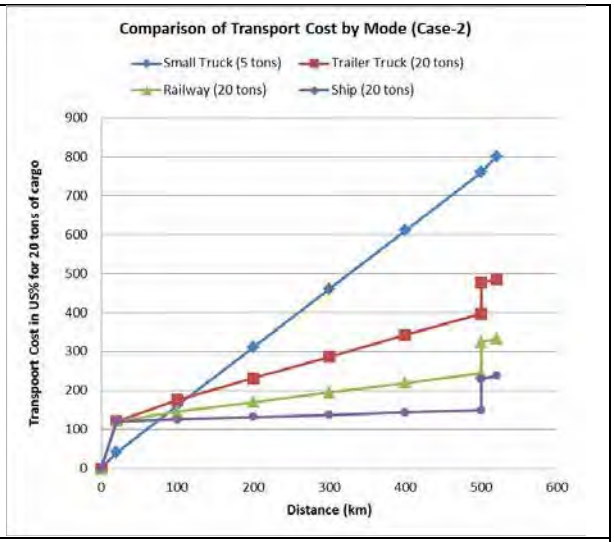
As shown in below figures, if the multimodal freight logistics hub for trans-loading operation is established to connect two different kinds of modes at least cost and in shortest possible time, the total transport cost can be minimized and the lead time can be shortened effectively.

Furthermore, as shown in below figures, the freight transport cost incurred by ship for long distance transport is the lowest amongst other transport modes, but the trip time is also significantly longer than by other modes. The transport cost incurred by railway transport is the second lowest amongst the other modes and the time required is similar to that of trailer trucks. The transport cost incurred by small trucks is very high, but the transport time required is similar to trailer trucks. Furthermore, the figures show that the transport cost and time can be reduced significantly by shortening the time needed for cargo trans-loading operations between two different transport modes.

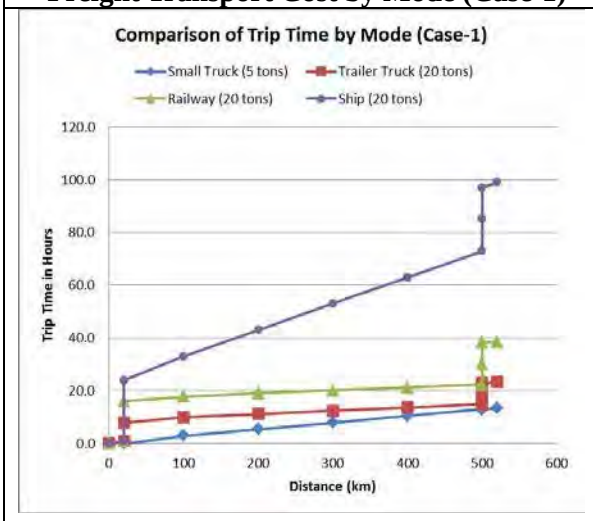
The results of the comparison of transport cost and time by freight transport patterns and use of multimodal freight logistics hubs for cargo trans-loading operation to link different freight transport modes for long distance cargo haulage, shows clearly the positive impact of the development of multimodal freight logistics hubs.



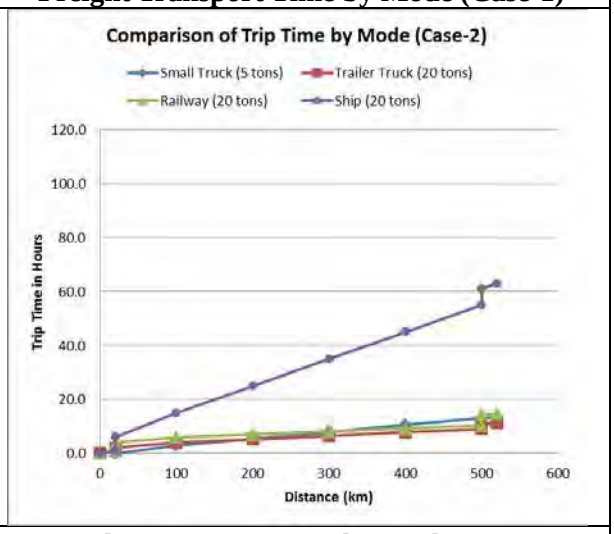
Freight Transport Cost by Mode (Case-1)



Freight Transport Time by Mode (Case-1)



Freight Transport Cost by Mode (Case-2)



Freight Transport Time by Mode (Case-2)

Source: Study Team

Figure-11.1.5 Results of Computation of Transport Cost and Time by Different Mode

(3) Rationale of Multimodal Freight Logistics Hub for Long Distance Haulage of Lower Value Commodities

Table-11.1.4 shows the share of transport cost by major domestic commodities in market prices, and **Figure-11.1.6** illustrates the share of freight transport cost in the market price of major commodities. As shown in this figure, the lower the market price of a commodity, the larger the share of the transport cost. Therefore, the transport mode for the transport of each type of commodity needs to be selected carefully, in order to maximize the margin / profit, taking into account the trip time that is required.

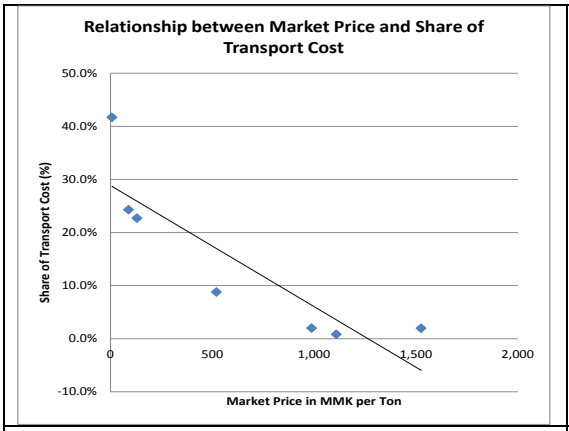


Figure-11.1.6 Relationship between Market Price and Share of Transport Cost

	Market Price (MMK/kg)	Transport Cost (MMK/kg)	Transport Cost (%)
Edible Oil	5,607	82.7	1.5%
Fish	4,203	37.3	0.9%
Rice	1,525	29.9	2.0%
Sugar	1,108	9.0	0.8%
Bean	987	19.6	2.0%
Steel Bar	520	45.8	8.8%
Cement	130	29.5	22.7%
Coal	89	21.6	24.3%
Sand	7	3.1	41.7%

Table-11.1.4 Market Price and Transport Cost by Major Commodities

Source: Study Team

This figure and table show that the lower the value of commodity (cargo) the larger the share of freight transport cost. Thus, the effect of use of multimodal freight transport for such low value commodity is much higher. Therefore, the multimodal freight logistics hubs are much needed in locations where the cargo is concentrated such as river ports for inland waterway transportation or domestic ports for coastal shipping.

Normally, the higher the value of commodity, the time of delivery or lead time needs to be as short as possible. Therefore, multimodal freight logistics hubs with high performance are much needed at locations close to commercial and industrial nodes, where roads run beside major railway freight stations.

11.1.4 Objectives of the Development of Multimodal Freight Logistics Hubs

Multimodal transportation represents a largely unexplored concept within Myanmar, as the predominant mode of transport is by road. The main objectives of the development of multimodal freight transport is an optimal integration of different freight transport modes enabling and efficient and cost-effective use of the freight transport system through seamless, customer-oriented door-to-door services, whilst favoring competition between freight transport operators effectively. Such a policy would give transport users maximum flexibility to decide for themselves on the optimum use of the different modes. The contribution of the policy would be then merely to establish the regulatory and economic pricing environment that would influence these decisions (largely by governing the level of competition between operators within the same mode).

The location and modal links to and from both intermodal and multimodal nodes are critical components in ensuring that the overall logistics costs are minimized in the supply chain and the node itself becomes a long-term viable and sustainable economic development.

11.1.5 Structure of Multimodal Cargo Transport Hub in Myanmar

Node: The nodes consists primarily of an intermodal freight terminal, and freight logistics services which provide intermediate locations where logistics value is added to the movement of containers and ultimately the associated cargoes. The modal links are usually dominated by road and rail modes, but inland-waterways, or air are other common connectivity modes. The node and links form the crucial mobility framework for freight logistics corridors that connects sea ports / river ports / cross-border points with hinterland cargo origins and market destinations.

Dry Port: The inland intermodal terminal or dry port concept has been developed to integrate various individual components in adding logistics value at a facility that acts as an intermediary point in the supply chain. This concept works on a "hub-and-spoke" principle, where containers are received from various origins but unit or block trains or inland waterway transport systems move cargoes to the intermodal or multimodal terminal at a central hub and these are then distributed to the final destinations, usually by road. Benefits accrue to all parties by offering consolidation services for both imports and exports, as well as utilizing the unit or block train concept, which streamlines the rail transport haul significantly.

Rail: The rail service provider benefits by creating concentrated rail flows with high frequency levels. This provides a stable and consistent operating plan with a high utilization rate required to make rail systems competitive and financially viable. Such a rail system naturally results in the cargo owners receiving better service levels at lower unit cost.

Inland Waterway: The inland waterway transport service provider benefits by creating a regular inland waterway transport service that makes it is possible to transport both bulky cargoes and containerized cargoes with high frequency levels. This provides a stable and consistent operating plan with a high utilization rate required to make such systems competitive and financially viable. Such an inland waterway transport system naturally results in cargo owners receiving better service levels at lower unit cost. However, the prerequisite for efficient freight transport by the inland waterway transport system are properly designed and developed river ports with locations where different freight transport modes can be combined and seamlessly connected in one location-as a multimodal freight logistics hub.

Figure-11.17 and **11.1.8** illustrate the product flow diagram and typical general layout of an intermodal or multimodal freight logistics hub, respectively.

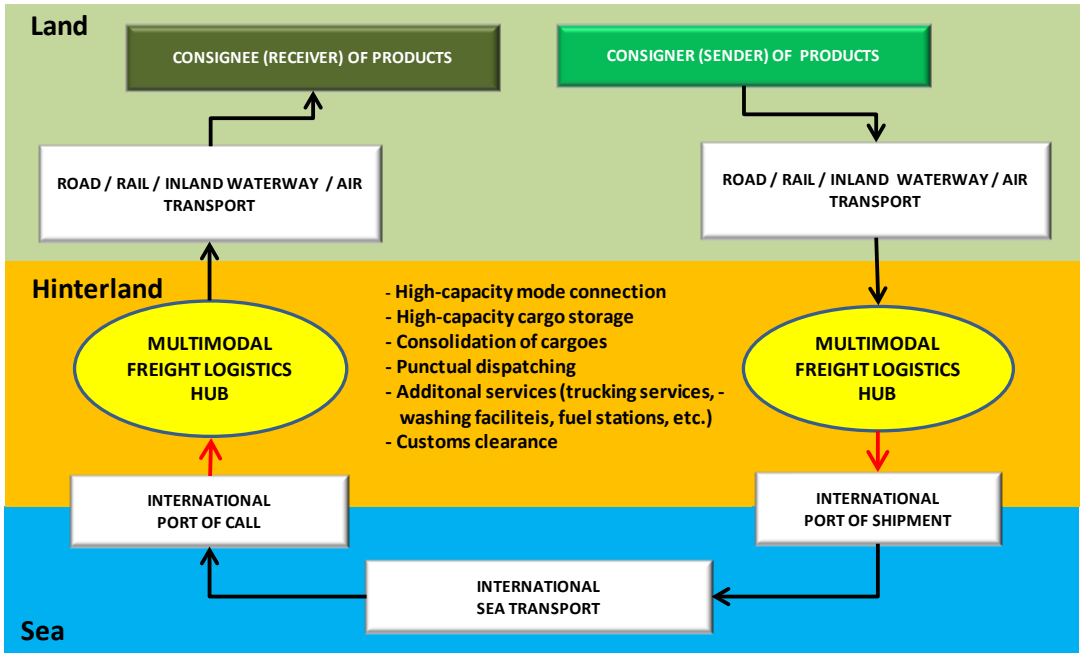


Figure-11.1.7 Products Flow Diagram

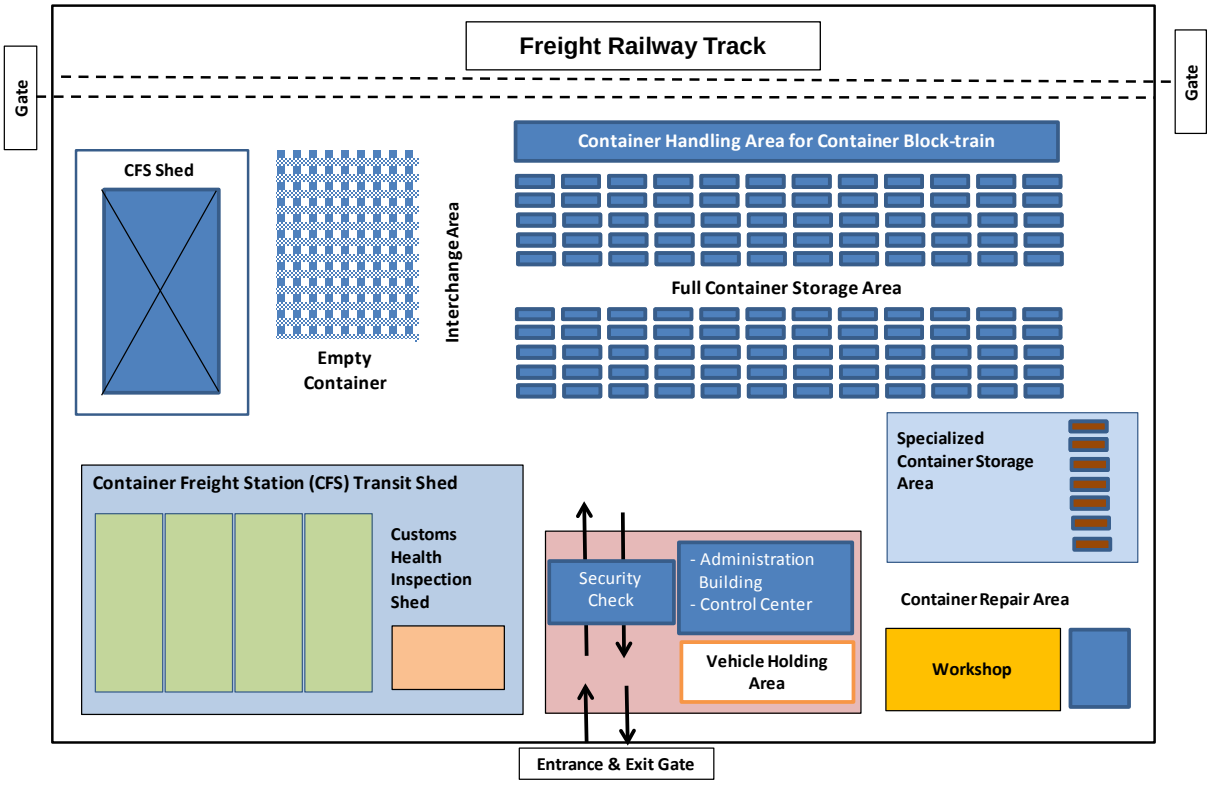
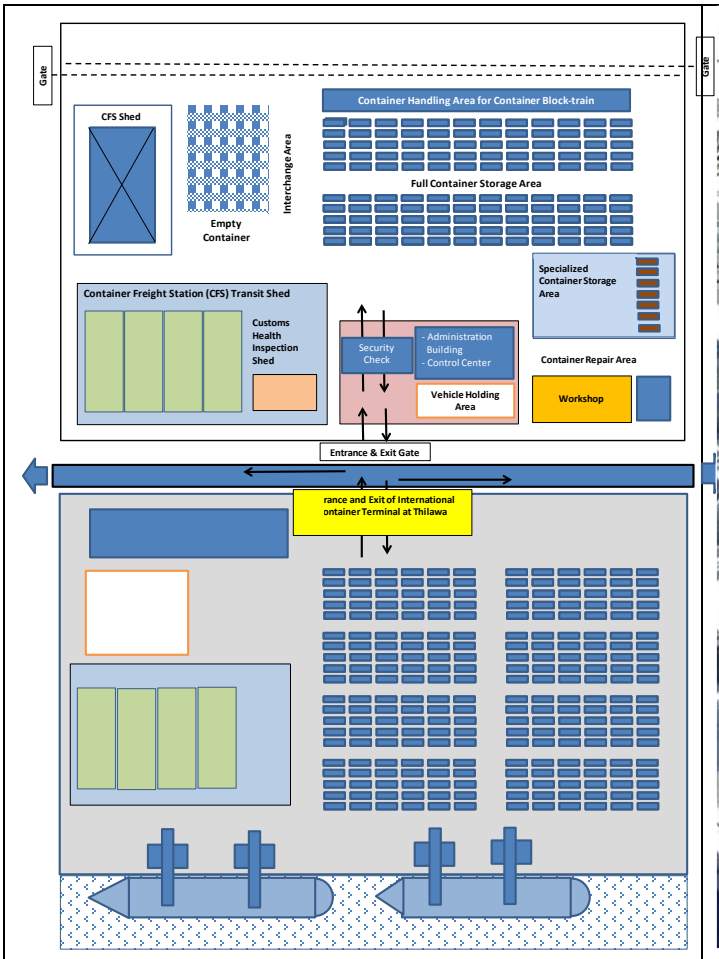


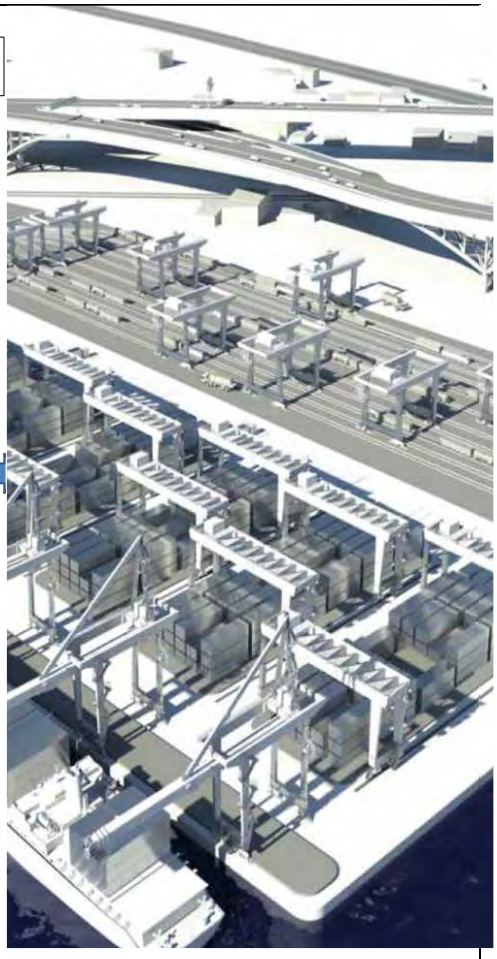
Figure-11.1.8 Typical General Layout of a Multimodal Freight Logistics Center or Dry Port

A typical physical layout often depends on the intended design capacity and transport modes that are involved but **Figure-11.1.8** suggests a typical functional layout for a rail-based dry port. As shown in **Figure-11.1.8,** road trucks enter and leave through the entrance gate where receipt or delivery operations take place. A container freight station (CFS) provides for stuffing and de-stuffing (de-vanning) of containers and facilities are provided for customs and

other examinations. The container yard area includes a CFS shed and workshop with a container repair area as well as the usual space allocated for empty, full and specialized containers. Import and export flow processes, operational requirements, involve suitable cargo and container-handling equipment with specific reference to the tractor-trailer system, lift truck system (front-end loaders or reach stackers), rubber-tired gantry crane or rail-mounted gantry crane. From the railroad interface point of view, it is important to note the need to keep the entrances of both modes apart so as to prevent impact of the traffic from one mode on the other and to allow for the safe shunting of incoming and outgoing trains. The two modes will, however, meet-around the container storage areas.

Figure-11.1.9 illustrates the typical layout of a multimodal freight logistics hub that combines a rail container terminal and an international container terminal.





Source: Study Team | Source: SIEMENS

Figure-11.1.9 Multimodal Freight Logistics Hub at the International Container Terminal

11.1.6 Multimodal Freight Logistics Hub Initiative and Structure of Each Project

The nodes listed in **Table-11.1.5** are the targeted nodes that are planned to be designed and create the multimodal freight logistics hubs, aimed at maximizing freight transport efficiency and providing opportunities to select the best combination of freight transport mode, in view of cost and lead-time.

Of the total 160 projects identified and listed, several projects can be supporting or structured projects for the creation of multimodal freight logistics hubs at strategic hubs located throughout Myanmar. The Multimodal Freight Logistics Projects are formulated in combination of the core projects, whose functions are cargo handling/storing/transshipment; and the supporting project, which connects a link with a node, at the location where the multimodal freight logistics hubs are planned. The projects envisage the creation of multimodal freight logistics hubs that are listed in **Table 11.1.5** below.

Table-11.1.5 List of the Projects under the Multimodal Freight Logistics Hub Initiative

Project ID	No.	Project Title	Location	
			City	Region/State
MMH	01	Thilawa Area MMH Project	Yangon	Yangon
MMH	02	Yangon City MMH Project	Yangon	Yangon
MMH	03	Mandalay City MMH Project	Mandalay	Mandalay
MMH	04	Meiktila Intersection MMH Project	Meiktila	Mandalay
MMH	05	Mawlamyine MMH Project	Mawlamyine	Mon
MMH	06	Kyaikkami MMH Project	Kyaikkami	Mon
MMH	07	Bago MMH Project	Bago	Bago
MMH	08	Pyay MMH Project	Pyay	Bago
MMH	09	Magway MMH Project	Magway	Magway
MMH	10	Pathein MMH Project	Pathein	Ayeyarwaddy
MMH	11	Hinthada MMH Project	Hinthada	Ayeyarwaddy
MMH	12	Monywa MMH Project	Monywa	Sagaing
MMH	13	Sittwe MMH Project	Sittwe	Rakahin
MMH	14	Dawei MMH Project	Dawei	Tanintharyi

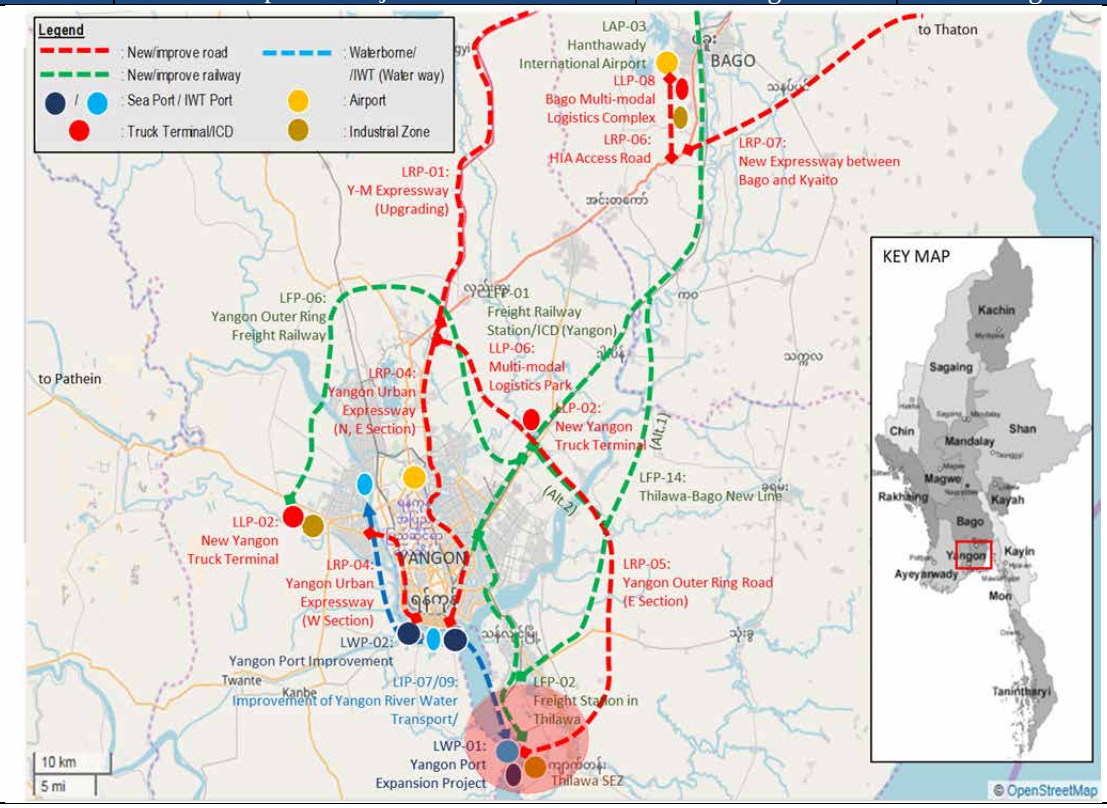
This is to be noted that the order of development sequence of the Multimodal Freight Logistics Hub is almost in line with the order of the corridor development discussed in Chapter 9.

The figures below summarize the outline of each Multimodal Freight Logistics Hub development project structured in terms of core project and the supporting projects.

11.2 Composition of Each Multimodal Freight Logistics Hub Projects

The composition of each multimodal freight logistics hub project listed in **Table-11.1.5** are presented in this sub-chapter.

Ref. No.	Integrated Project Title	Location	
MMH-01	Thilawa Area Multimodal Freight Logistics Hub Development Project	City	Region
		Yangon	Yangon



Core Project

Project ID No.	Project Title	Transport Mode
LFP-02	Freight Station Development Project in Thilawa with Thilawa Line Improvement	Rail

Supporting Project

Project ID No.	Project Title	Transport Mode
LWP-01	Yangon Port (Post Thilawa) Development Project	Seaport
LWP-02	Yangon Port (Domestic Port) Improvement Project	Seaport
LRP-05	Yangon Outer Ring Road (E Section)	Road
LFP-14	Thilawa-Bago Railway New Line	Railway
LIP-09	Yangon Port (including connectivity)	IWT
LIP-04	Replacement of Wooden Vessel to FRP Vessel with TA	IWT

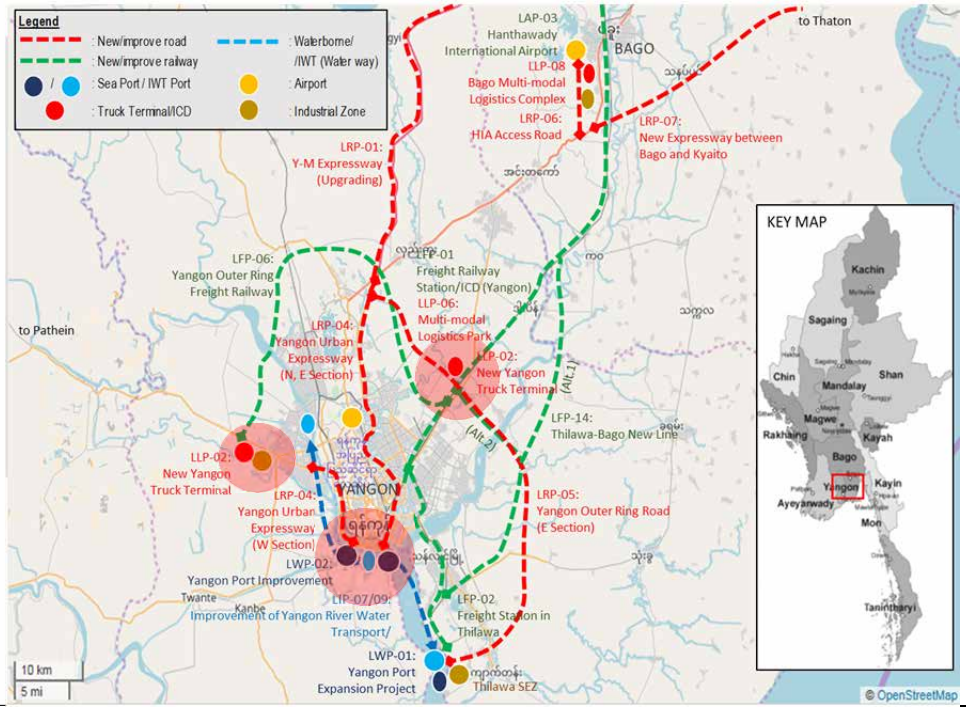
Rationale

The development of the international container terminal is ongoing at Thilawa Terminal Area of Yangon Port at present and it is expected to start operation by 2023. At the same time the Yangon-Mandalay railway track improvement project is expected to be completed and the operation of the container block train is planned to be commissioned by 2023. The linkage between the container terminal and the railway freight terminal is to be firmly established aimed at minimizing transshipment time and cost and maximizing the impact of the investment to the transport infrastructure development projects.

Remarks

The locations of two terminals of different modes are adjacent to each other as close as is possible, so as to use tractor-trailer chassis for the transfer of containers between the two terminals effectively. The planning of the multimodal freight logistics terminals in this area is to be carried out in an integrated manner.

Ref. No.	Integrated Project Title	Location	
MMH-02	Yangon City Multimodal Freight Logistics Hub Development Project	City: Yangon	Region: Yangon



Core Project

Project ID No.	Project Title	Transport Mode
LLP-02	Establishment of New Yangon Truck Terminal	Logistics
LLP-06	Yangon Multi-modal Logistics Park	Logistics
LFP-01	Development of Freight Railway Station / ICD at Yangon and Mandalay (Ywathargyi ICD Project)	Rail
LWP-02	Yangon Port Improvement (domestic)	Seaport

Supporting Project

Project ID No.	Project Title	Transport Mode
LRP-05	Yangon Outer Ring Road (YORR) East Section	Road
LFP-06	Yangon Outer Ring Freight Railway Development Project	Rail
LRP-04	Yangon Urban Expressway	Road
LIP-09	Yangon Port (including connectivity)	IWT

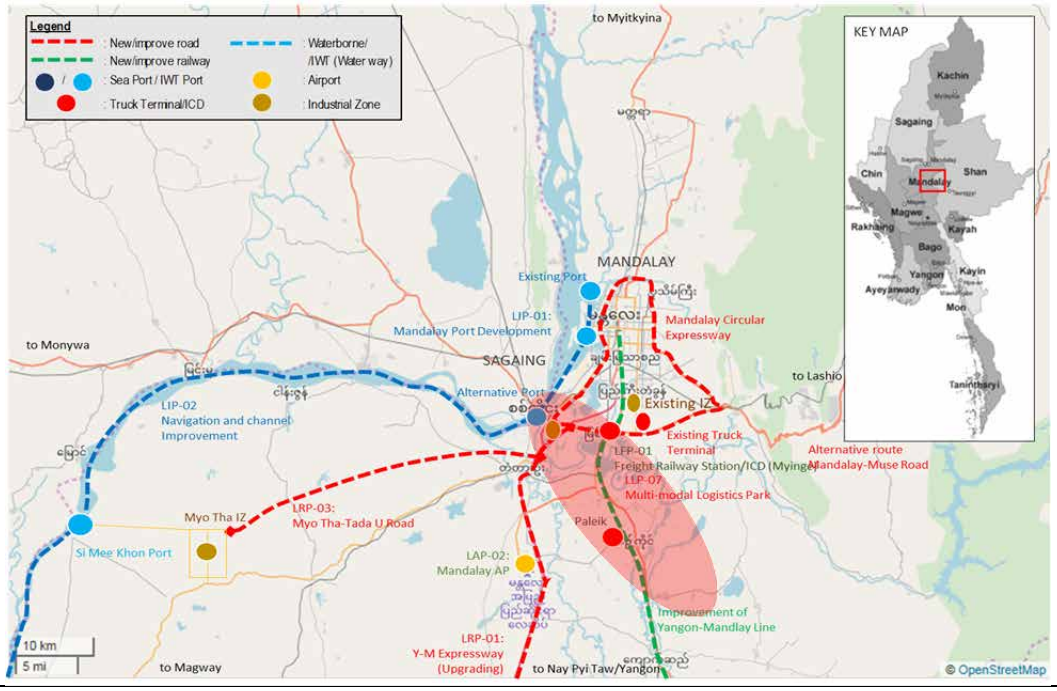
Rationale

The expansion of the handling capacity of the truck terminal in Yangon is needed to meet with the rapidly increased traffic demand for domestic cargoes. The new Yangon Truck Terminal for domestic cargoes will be located at the right bank of the Yangon River, as shown in above figure. At the same time, the demand for rail freight transport will increase significantly, from the time of completion of Yangon-Mandalay railway track as well as the time of the commissioning of container block train operations. In Ywathargyi, the railway ICD will be established by 2020 by MR and a Yangon Multi-modal Logistics Terminal is also planned to be established in Ywathargyi, just beside the Ywathargyi rail ICD, to handle both domestic and international cargoes. These two terminals for different transport modes are to be combined, so as to maximize the freight transport efficiency for both domestic and international cargo traffic. The connectivity of Yangon Port with the road and railway networks needs to be improved, to maximize the transport efficiency of freight movements in the urban area of Yangon City.

Remarks

The completion of construction of Yangon Outer Ring Road (East Section) is scheduled taking into account the completion of both the Yangon New Truck Terminal and the Iwatagi Rail ICD.

Ref. No.	Integrated Project Title	Location	
MMH-03	Mandalay City Multimodal Freight Logistics Hub Development Project	City: Mandalay	Region: Mandalay



Core Project

Project ID No.	Project Title	Transport Mode
LLP-07	Mandalay Multi-modal Logistics Park	Logistics
LFP-01	Development of Freight Railway Station / ICD at Yangon and Mandalay	Railway
LIP-01	Mandalay Port Development Project	IWT

Supporting Project

Project ID No.	Project Title	Transport Mode
LIP-02	Yangon – Mandalay Navigation and Channel Improvement	IWT

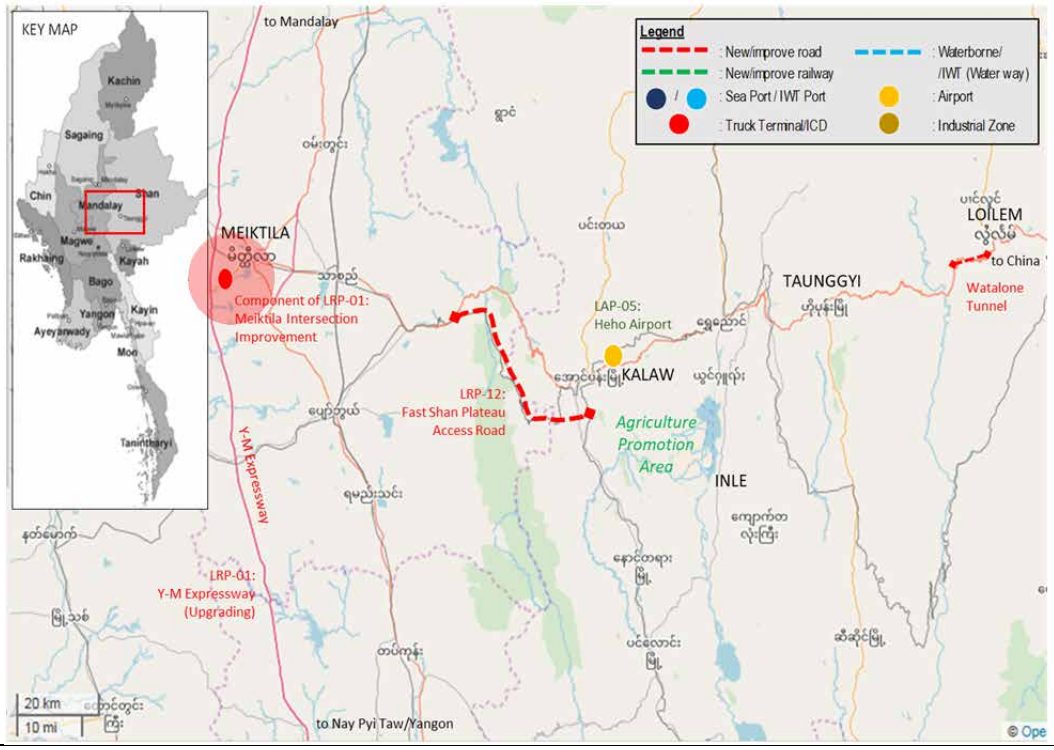
Rationale

Mandalay is the second largest city in Myanmar and an important growth pole in the northern part of the country, where all kinds of freight transport modes are concentrated (i.e. expressway, rail, inland waterway and airport). The development of this multimodal freight logistics hub is needed at a strategic position in or at the perimeter of the city, so as to maximize freight transport efficiency.

Remarks

The position of the Multimodal Freight Logistics Hub is to be selected and determined taking into account the cargo flows by the type of cargo, such as containerized cargo, break bulk, bulk and liquid cargo. The transit cargo movement to and from the neighboring country (China) is to be taken into account when the selection and determination of the position of hub is undertaken. In this case, the urban land use plan is to be considered as well. At present, the location of the rail ICD has been determined, however, the land area allocated will be insufficient to deal with the cargo demand forecast, which should include the cargo flow volume of transit cargoes. It is recommended that the position of the hub should be convenient for the respective freight transport modes such as road, rail, inland waterway and air transport. Taking into account such different elements, the area indicated by a red circle seems to be the optimum location, as it becomes possible to accommodate the inland waterway transport facility, a road transport terminal (near the exit of the expressway), the outer ring road, the railway track and Mandalay International Airport.

Ref. No.	Integrated Project Title	Location	
MMH-04	Meiktila Intersection Multimodal Freight Logistics Hub	City: Meiktila	Region: Mandalay



Core Project

Project ID No.	Project Title	Transport Mode
LLP-09	Meiktila Intersection Development Project	Logistics

Supporting Project

Project ID No.	Project Title	Transport Mode
LRP-12	Fast Shan Plateau Access Road	Road

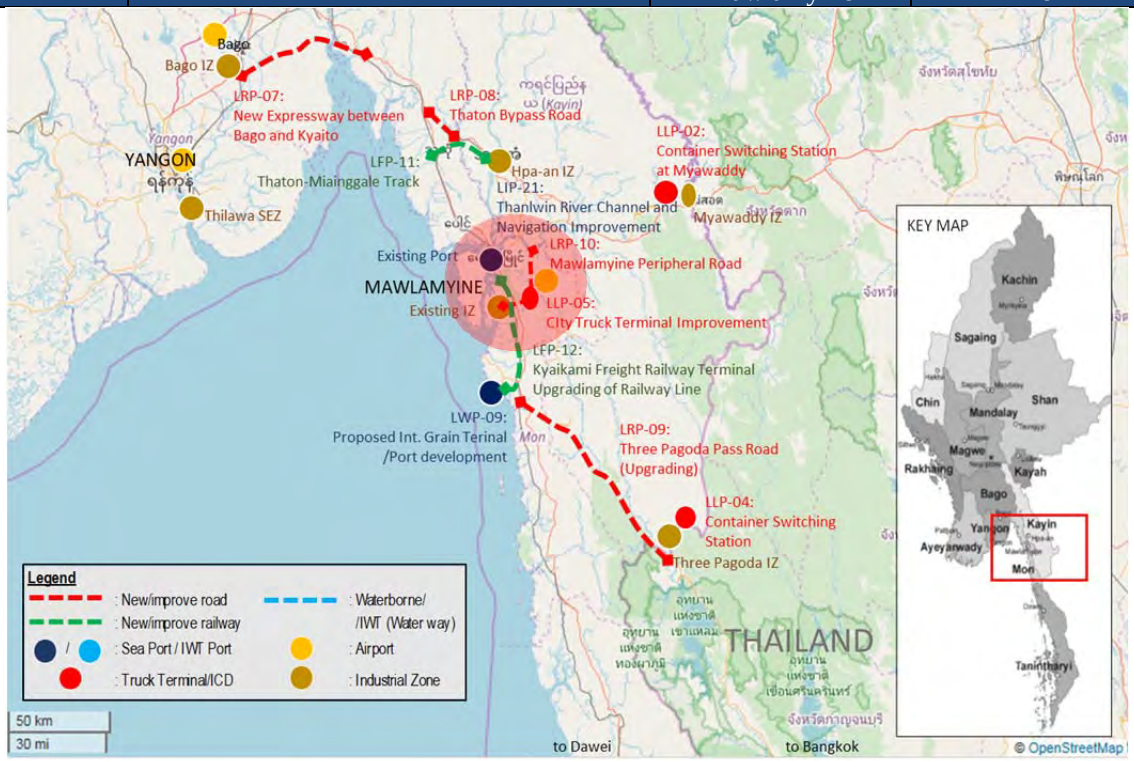
Rationale

Meiktila is located at the intersection node of the North-South Logistics Corridor and the Trans Myanmar Logistics Corridor. Meiktila has been a location where the potential value-added farm products are collected, stored and distributed in the central part of Myanmar, thus, it has played a 'hub and spoke' function traditionally. Shan, particularly Inle area, has attractive tourist resources and greater potential to develop luxury hotel accommodation. There will be higher demand for perishable fresh foodstuffs to these resorts. Shan is suitable for horticulture, as its altitude and climatic conditions are suitable for such kind of farming activities. Horticulture is expected to expand substantially. Taking these into account, a fast and high-design standard access road between the Shan Plateau and the central plain area will be needed. The improved access will connect with the international airport at Nay Pyi Taw or at Mandalay, and also improved access will permit these value-added farm products to access the domestic major markets, such as at Yangon and Mandalay. As the road condition of the Shan area is narrow, with steep slopes and with a lot of hairpin turn, thus large trucks are unsuitable for the transport of such farm and horticulture products. These products are suggested to be collected at Meiktila and transshipped to destinations by large-sized trucks or refrigerated vans at Meiktila.

Remarks

The demand forecast for the major commodities should be carried out in detail, in order to design the facilities that are needed for the establishment of the Multimodal Freight Logistics Hub.

Ref. No.	Integrated Project Title	Location	
MMH-05	Mawlamyine Multimodal Freight Logistics Hub	City	Region
		Mawlamyine	Mon



Core Project

Project ID No.	Project Title	Transport Mode
LLP-05	Mawlamyine Truck Terminal Project	Logistics
LRP-10	Construction of Mawlamyine Peripheral Road	Road

Supporting Project

Project ID No.	Project Title	Transport Mode
LLP-03	Container Switching Station Development at Myawaddy Trade Zone	Logistics
LWP-08	Mawlamyine Port Improvement Project	Seaport
LIP-21	Thanlwin River Channel and Navigation Improvement	IWT
LLP-07	City Truck Terminal Development Project (Mawlamyine)	Logistics

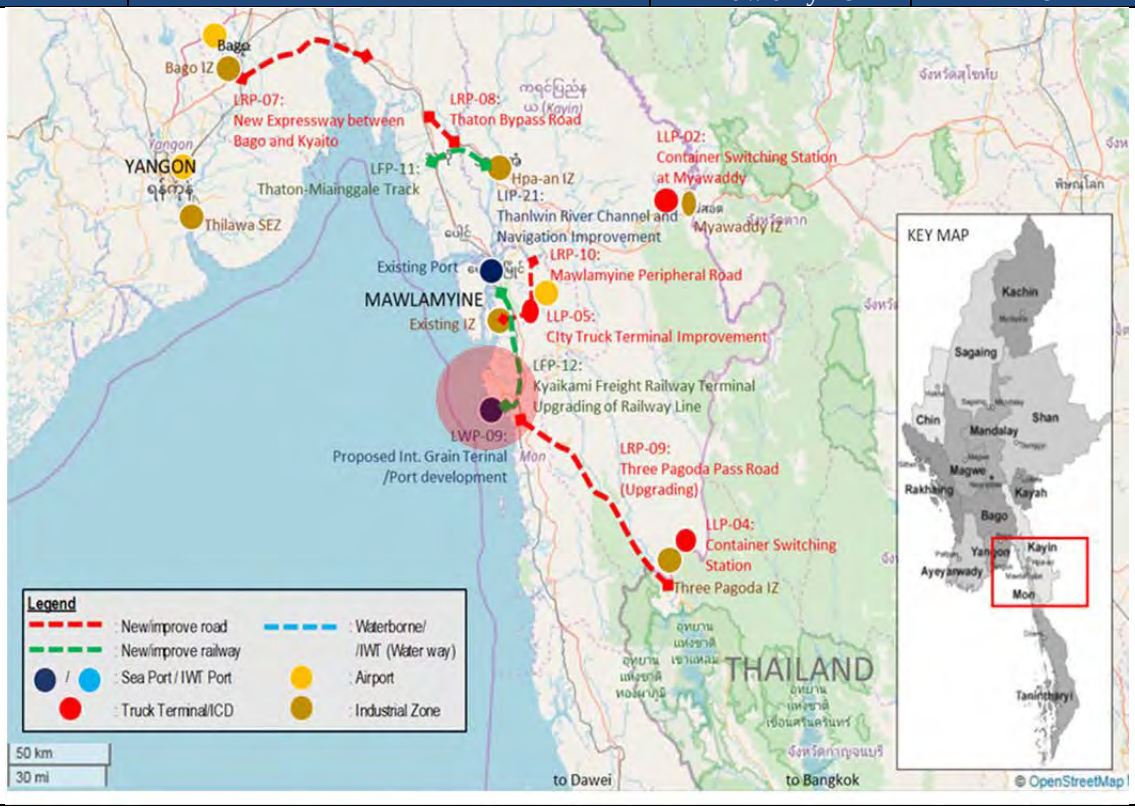
Rationale

Mawlamyine is the third largest city in Myanmar and is located at the intersection of three freight links such as the roads and railways linking 1) Yangon / Bago and Mawlamyine; 2) Mawlamyine and Dawei, and 3) Mawlamyine and Myawaddy. The cargoes collected at Mawlamyine as an intersection node are transshipped to destinations, thus, it has a 'hub and spoke' function. Mawlamyine is an intersection node of four different transport modes including road, rail, coastal shipping and inland waterway transport. The cargoes coming from Thailand and going to Yangon or Mandalay via Bago can be transshipped at this location to gain the maximum benefits from transshipment.

Remarks

The cargo traffic volume through the South East Logistics Corridor will increase significantly in the future through the East-West and the South Economic Corridors. The design of the Multimodal Freight Logistics Hub should carefully take into account the cargo flow volumes, as well as the cargo directions. The multimodal freight logistics hub of Mawlamyine is planned to be formed with the new truck terminal in conjunction with the construction of peripheral road and its location should be as close as possible to the Mawlamyine Port.

Ref. No.	Integrated Project Title	Location	
MMH-6	Kyaikkami Multimodal Freight Logistics Hub	City	Region
		Mawlamyine	Mon



Core Project

Project ID No.	Project Title	Transport Mode
LWP-09	Kyaikkami International Grain Terminal / Port Development Project	Seaport
LFP-12	Kyaikkami Freight Terminal Development and Upgrading of Bridges between Mawlamyine and Thanbyuzayat	Rail

Supporting Project

Project ID No.	Project Title	Transport Mode
LLP-04	Container Switching Station Development at the Three Pagoda Pass	Logistics
LRP-09	Three Pagoda Pass Road (Upgrading)	Road

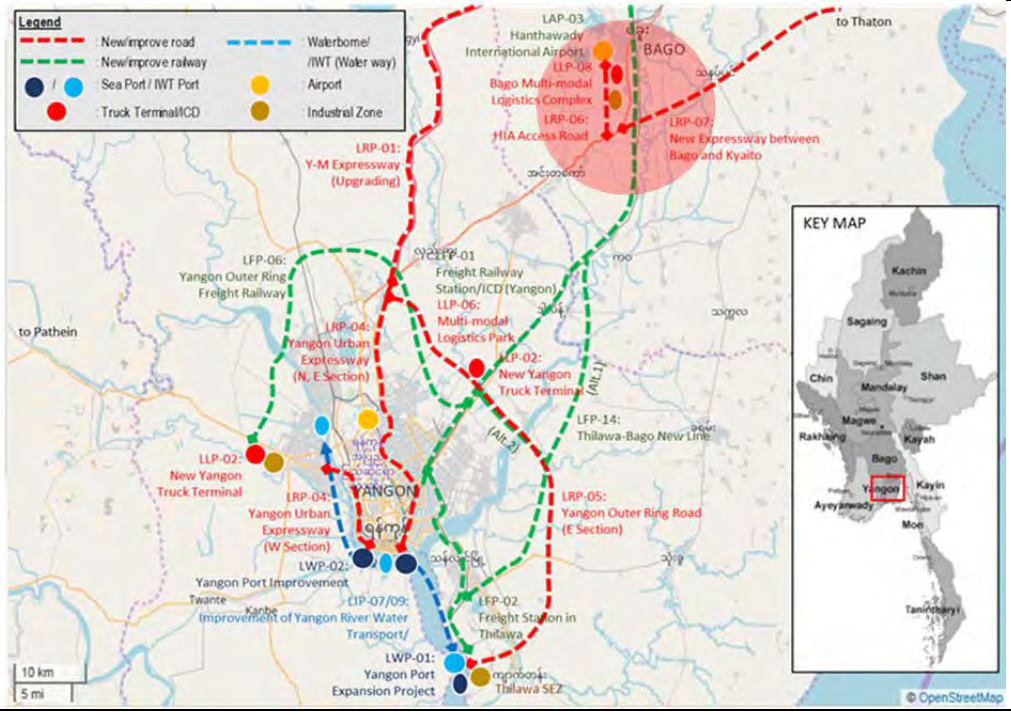
Rationale

Kyaikkami is a potential location for the development of a deep-sea port and is expected to function first as a grain terminal where rice and beans will be collected from nearby regions including Bago by road and rail; and from the Ayeyarwaddy Region by inland waterway ships capable of navigating the coastal areas of Myanmar, as well as coastal shipping. When the road and / or rail linking Myanmar and Thailand through the Three Pagoda Pass will become available for freight traffic by heavily loaded trucks carrying fully loaded containers, Kyaikkami will function in a second phase for the import of wheat for which demand is expected to increase substantially in future and as a terminal for various types of cargoes including containers, liquids and other kinds of bulk cargoes, as a multipurpose international port.

Remarks

Kyaikkami has good conditions for the development of a deep-sea port. The purpose of the development of this port varies widely, such as a port for trading grain, industrial products, containerized cargoes, and even Liquefied Natural Gas (LNG). Thus, when the development plan for this port is developed, the master plan should be prepared over the long-term and should consider a wide variety of different objectives.

Ref. No.	Integrated Project Title	Location	
MMH-07	Bago Multimodal Freight Logistics Hub Development Project	City	Region
		Bago	Bago



Core Project

Project ID No.	Project Title	Transport Mode
LLP-08	Establishment of Bago Multi-modal Logistics Complex Project	Logistics

Supporting Project

Project ID No.	Project Title	Transport Mode
LAP-03	Hanthawaddy International Airport Project (HIA)	Air
LRP-06	Construction of Hanthawaddy International Airport Access Road	Road
LFP-14	Thilawa - Bago New Line Development Project	Rail
LRP-04	Yangon Urban Expressway (YUEX)	Road

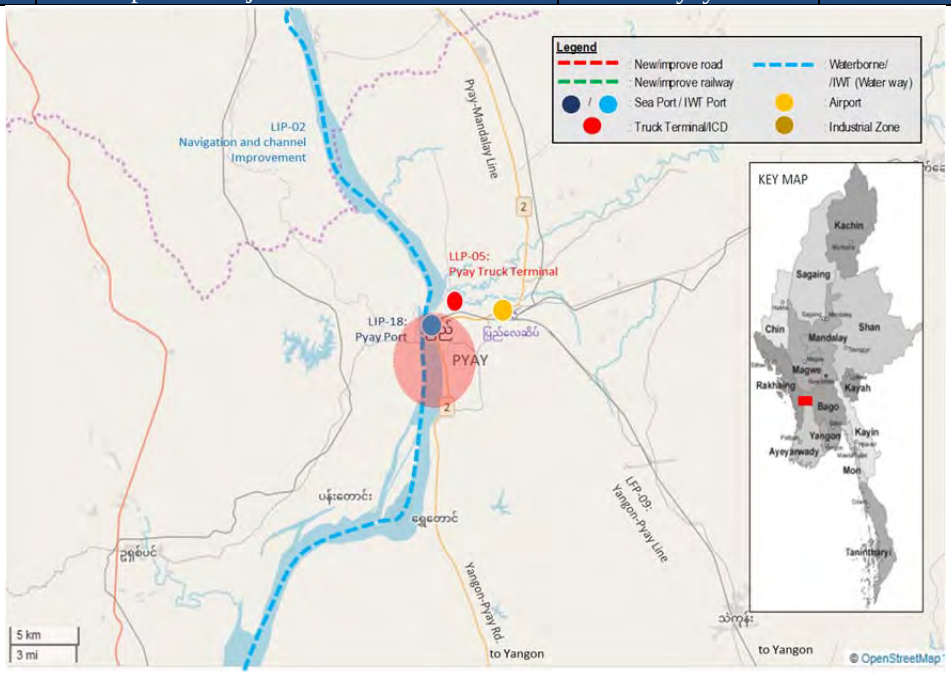
Rationale

Bago is located at the intersection of two major logistics corridors: the North-South Logistics Corridor and the South-East Logistics Corridor, thus, the cargo flow volume passing through Bago is the largest amongst other nodes in Myanmar. It is expected that industrial / manufacturing activities will increase sharply in Bago due its proximity to Yangon, a vast land area appropriate for development of industrial zones, a large number of human resources, and also as it is considered as an important intersection as well as a commercial node in Myanmar. In addition to this, Bago is the location where the largest international airport is going to be built. Bago is located at the major cross roads of different transport modes such as road, rail, and air transport. As the cargo flows of industrial products to and from Thailand is projected to increase substantially, industrial activities will emerge at this location quite quickly. Taking these factors into consideration, Bago will become an important multimodal freight logistics hub.

Remarks

The land use plan for Bago Region and Bago City is to be prepared taking into account a large increase in the cargo flow patterns in Myanmar as well as the existence of the new Hanthawaddy International Airport. Although the Urban Development of Yangon City itself has been ongoing, it is limited to the urban development plan for Yangon; the regional development master plan including Bago has not been undertaken.

Ref. No.	Integrated Project Title	Location	
MMH-08	Pyay Multimodal Freight Logistics Hub Development Project	City	Region
		Pyay	Bago



Core Project

Project ID No.	Project Title	Transport Mode
LLP-05	Pyay Truck Terminal Development Project	Logistics
LIP-18	Pyay Port Development Project	IWT

Supporting Project

Project ID No.	Project Title	Transport Mode
LIP-02	Yangon – Mandalay Navigation and Channel Improvement Project	IWT
LFP-09	Yangon – Pyay Line Improvement Project	Rail
NTMP	Yangon – Pyay – Mandalay Road Project	Road

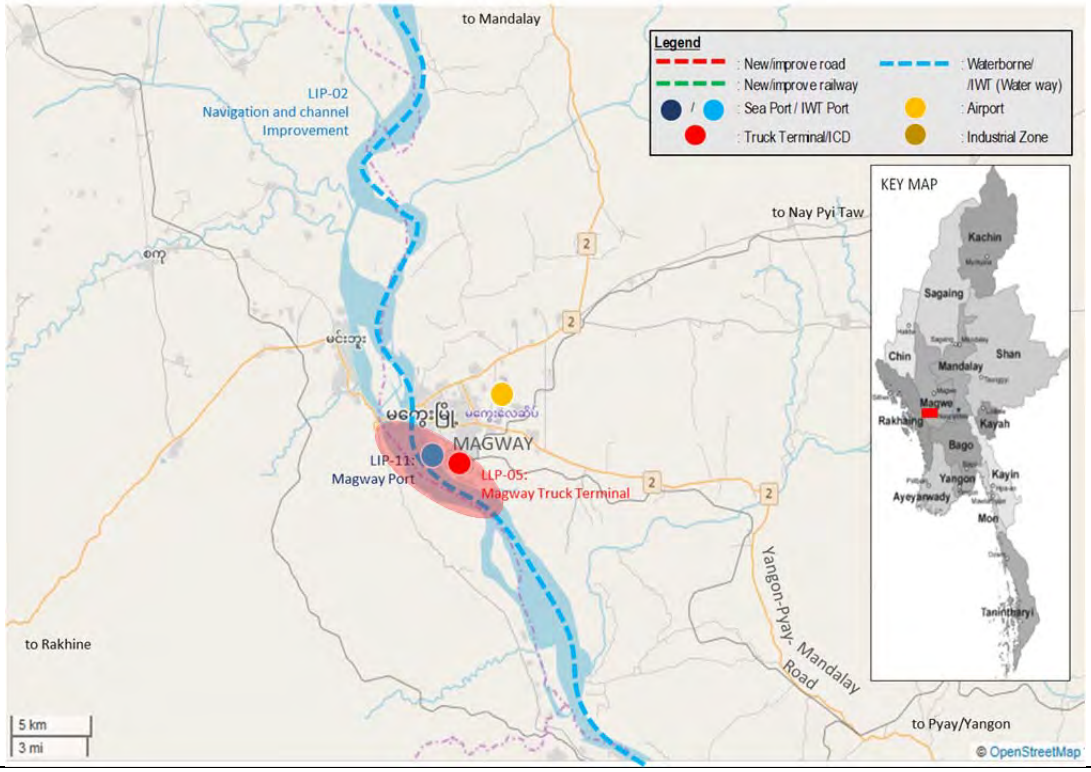
Rationale

Pyay is an old town, which is located along the left bank of the Ayeyarwaddy River to the north of Yangon City. Pyay is connected by the Yangon-Pyay-Mandalay Road route, the Yangon-Pyay-Mandalay Railway and by inland waterway. Pyay is an important location that connects the Bago Region and the Chin Region by a road bridge crossing over the Ayeyarwaddy River. Pyay has played an important role as a hub for the transport of farm products amidst the agricultural area north of Yangon City.

Remarks

If the river port of Pyay for inland waterway transport were closely connected by road and rail modes that exist in close proximity to the river port, it would function as a Multimodal Freight Logistics Hub. The selection of the precise location where the Multimodal Freight Logistics Hub is to be developed and it should be made in conjunction with the preparation of the master plan for the development of inland waterway transport along the Ayeyarwaddy River as the Main River Logistics Corridor. The freight railway station of Pyay can be designed in conjunction with the construction site of river port of Pyay. The spur line can be extended from the existing Pyay station toward the site of river port which is planned to be located as close as possible to the location where the Pyay railway station is located at present.

Ref. No.	Integrated Project Title	Location	
MMH-09	Magway Multimodal Freight Logistics Hub Development Project	City	Region
		Magway	Magway



Core Project

Project ID No.	Project Title	Transport Mode
LLP-05	Magway Truck Terminal Improvement Project	Logistics
LIP-11	Magway (Pakokku) Inland Waterway Hub Port Development	IWT

Supporting Project

Project ID No.	Project Title	Transport Mode
LIP-02	Yangon – Mandalay Navigation and Channel Improvement Project	IWT
NTMP	Yangon – Pyay - Mandalay Road Improvement	Road

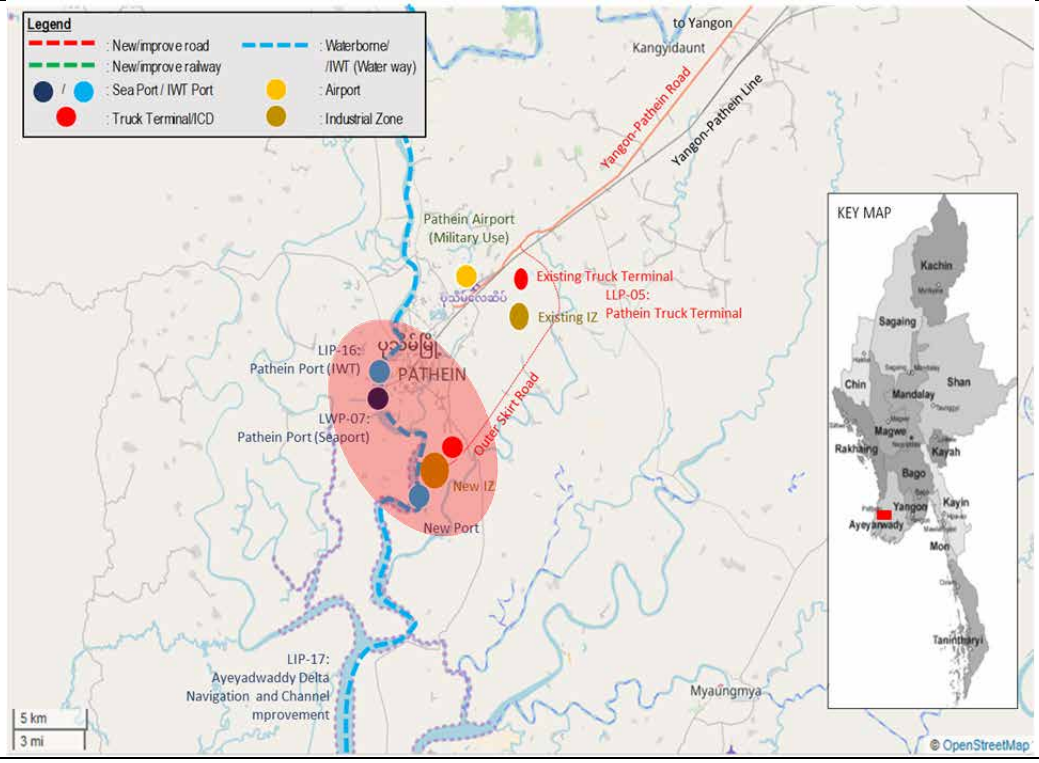
Rationale

Magway is located at an important intersection node lying along the Trans Myanmar Logistics Corridor that crosses the Ayeyarwaddy River, and where inland waterway transport plays an important role for the transport of bulk cargoes and containers on long-haul basis. Magway is the place where farm products and daily consumables are collected and distributed in the Magway Region.

Remarks

At Magway there exists a road bridge linking with Magway Region and Rakhine State, and with road, railway and inland waterway modes. The river port of Magway is in poor condition at present, however, it could be formed as a multimodal freight logistics hub when planned, in conjunction with the improvement of the rail terminal and the road network. The master plan for the development of the river port at this location is recommended to be carried out on a short-term basis. At the south of Magway city there exist the railway station close to the river bank. The spur line can be extended to the location where a new river port can be constructed. The truck terminal can be constructed at the location as close as possible to the river port planned to be connected with the spur line to form the multimodal freight logistics hub.

Ref. No.	Integrated Project Title	Location	
MMH-10	Pathein Multimodal Freight Logistics Hub Development Project	City: Pathein	Region: Ayeyarwaddy



Core Project

Project ID No.	Project Title	Transport Mode
LLP-05	Pathein Truck Terminal Project	Logistics
LWP-07	Pathein Port Improvement Project (Seaport)	Seaport
LIP-16	Pathein Port Improvement Project (IWT Port)	IWT

Supporting Project

Project ID No.	Project Title	Transport Mode
LIP-17	Ayeyarwaddy Delta Channel and Navigation Improvement	IWT
LLP-02	Establishment of New Yangon Truck Terminal	Logistics
NTMP	Yangon-Pathein Road Improvement Project	Road
NTMP	Yangon-Pathein Railway Line Improvement	Rail

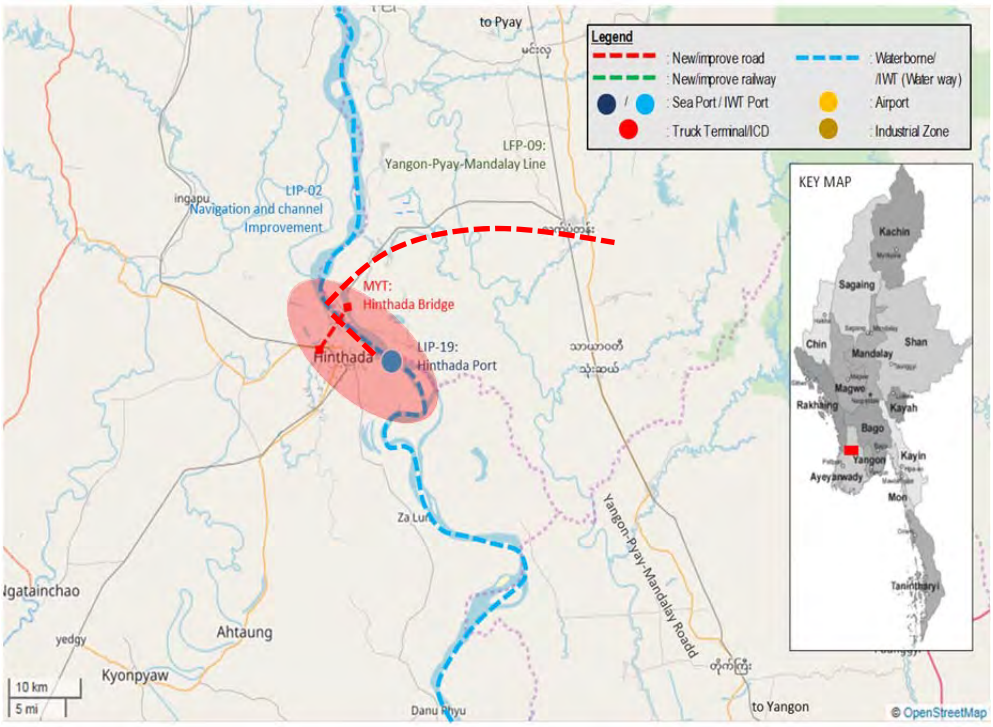
Rationale

Pathein is located in the middle Ayeyarwaddy Delta - the bread basket of Myanmar- and serves as an important river port traditionally. Pathein River Port can be re-cast as a multimodal freight logistics hub in Ayeyarwaddy Region for the transport and storage of rice and daily consumables.

Remarks

Pathein river port may possibly serve as the port for exporting rice to the world via Yangon Port and / or Kyaikkami Grain Terminal by inland waterway transport as well as by coastal shipping. Therefore, a master plan for development of this port is needed, taking into account the emergence of the new port at Kyaikkami as a grain terminal / port in its first development stage. The new truck terminal is recommended to be constructed at the location as close as possible to the Pathein sea port to where an outer skirt road is planned to be extended from Yangon-Pathein Road. The Pathein sea port is recommended to be expanded and to function as the river port as well for linking the coastal shipping and inland waterway transport system.

Ref. No.	Integrated Project Title	Location	
MMH-11	Hinthada Multimodal Freight Logistics Hub Development Project	City: Hinthada	Region: Ayeyarwaddy



Core Project

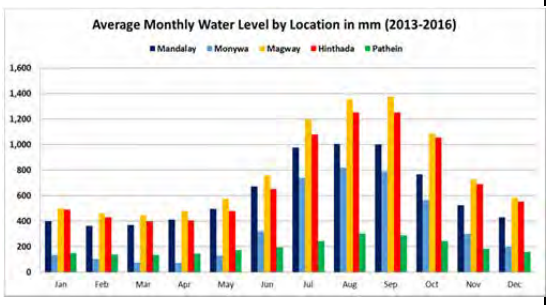
Project ID No.	Project Title	Transport Mode
LIP-19	Hinthada Port Improvement Project	IWT

Supporting Project

Project ID No.	Project Title	Transport Mode
LFP-09	Yangon – Pyay Line Improvement Project	Rail
NTMP	Yangon – Pyay Road Improvement Project	Road
NTMP	Hinthada Bridge Project	Road

Rationale

Hinthada is located at the northern tip of the Ayeyarwaddy Delta. As shown in the figure the minimum monthly level of water at the measuring point of Hinthada is 400 mm, which is much deeper than that of Pathein, located in the middle of the Ayeyarwaddy Delta. Because of this depth of water and the traditional role of Hinthada as a collecting point for rice grown in the Ayeyarwaddy Delta, Hinthada is considered as a suitable location for the development of a river port for large-size inland water transport vessels plying between Hinthada and Mandalay.

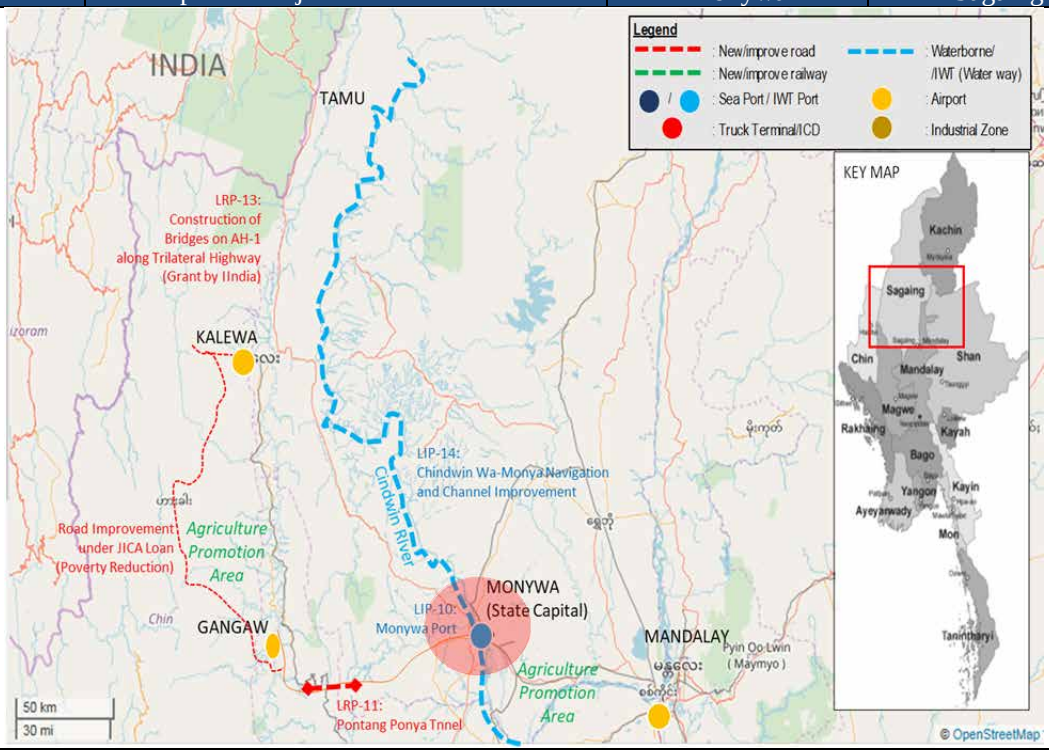


Source: Study Team

Remarks

A plan needs to be formulated in conjunction with the preparation of the master plan Study for Inland Waterway Transport along the Ayeyarwaddy River. The access road connecting with the planned location of Hinthada Bridge is needed to be studied carefully as the land area where this access road passes through is the area frequently inundated at flooding season and the geological condition is quite soft. The cargo demand forecast is needed to be carefully conducted taking into account the agricultural and industrial development plans at the top of the Ayeyarwaddy Delta where Hinthada is located.

Ref. No.	Integrated Project Title	Location	
MMH-12	Monywa Multimodal Freight Logistics Hub Development Project	City: Monywa	Region: Sagaing



Core Project

Project ID No.	Project Title	Transport Mode
LIP-10	Monywa Port Improvement Project	IWT

Supporting Project

Project ID No.	Project Title	Transport Mode
LIP-14	Chindwin Wa-Monywa Navigation and Channel Improvement	IWT
LRP-11	Pong Taung-Pone Nyar Tunnel between Magway and Sagaing	Road
LRP-13	Construction of Bridges on AH-1 along Trilateral Highway	Road

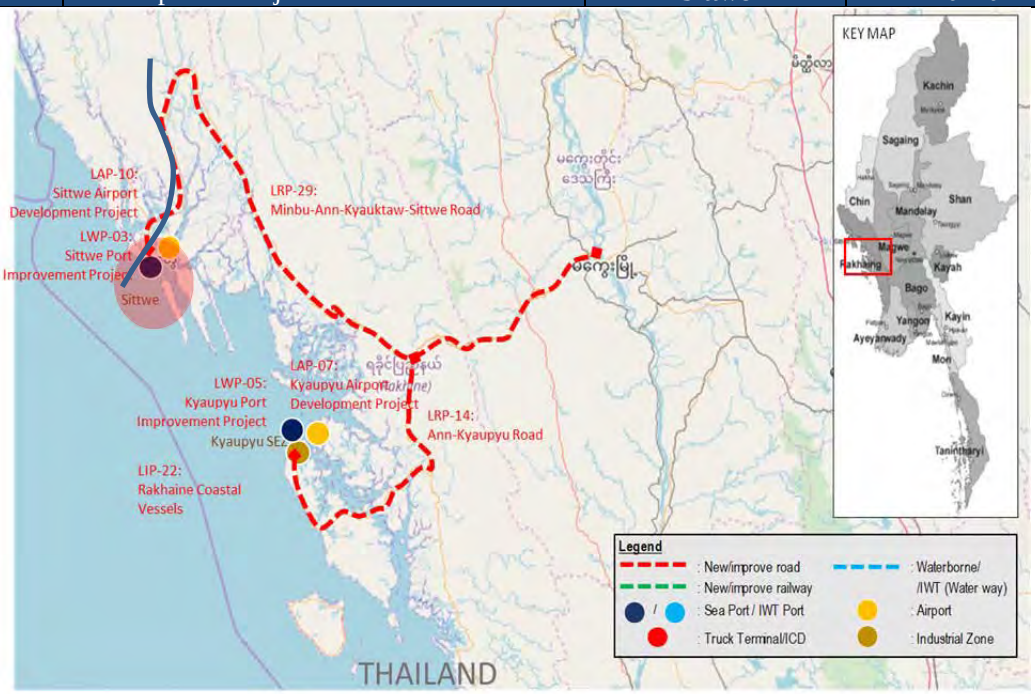
Rationale

The plain area between Gangaw and Kale produces sesame, beans and other crops. These are exported to India through the border gate at Tamu. The area is surrounded by mountain ranges on both east and west sides. The national highway to cross the eastern mountain range has a narrow mountainous alignment with frequent road closures due to slope failures and landslides. The improvement of the access road between the plain area and Monywa (the State Capital City) will contribute for the smooth and stable access to major market places such as Mandalay and Yangon. Monywa is located at the intersection nodal point of road and inland water transport.

Remarks

The cargo traffic volumes to and from India will increase significantly in future through Asian Highway No.1. This corridor is also identified as the Tri-lateral Highway between Indian and Thailand, via Myanmar. The design of the Multimodal Freight Logistics Hub should carefully take into account the cargo flow volumes as well as the cargo directions. The road linking Tamu-Kalewa-Monywa is to be linked firmly with the new truck terminal of which location is to be as close as possible to the Monywa.

Ref. No.	Integrated Project Title	Location	
MMH-13	Sittwe Multimodal Freight Logistics Hub Development Project	City: Sittwe	Region: Rakhain



Core Project

Project ID No.	Project Title	Transport Mode
LIP-08	Kaladan Multimodal Transit Transport Project	IWT
LWP-03	Sittwe Port Improvement Project	Seaport

Supporting Project

Project ID No.	Project Title	Transport Mode
LAP-10	Sittwe Airport Development Project	Air

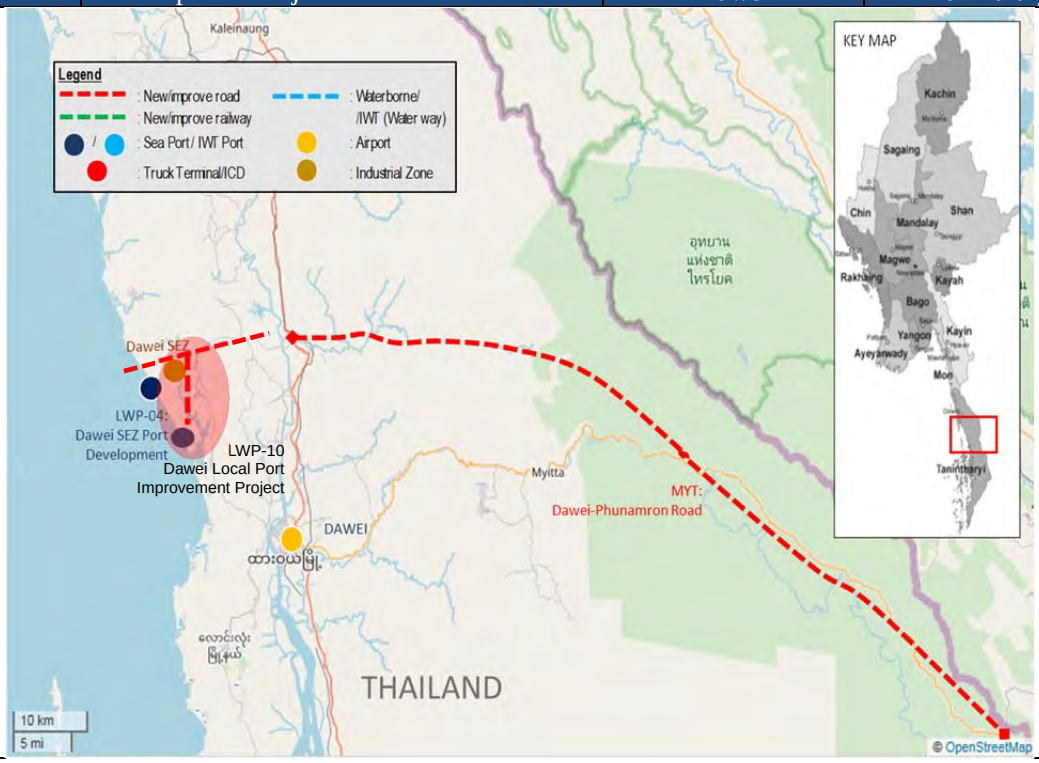
Rationale

The Kaladan Multi-Modal Transit Transport Project is a project that will connect the eastern Indian seaport of Kolkata with Sittwe seaport in Rakhine State, Myanmar by sea at Sittwe. In Myanmar, it will then link Sittwe seaport to Paletwa, Chin State via the Kaladan river boat route, and then from Paletwa by road to Mizoram state in Northeast India. Sittwe port is located near the border of Bangladesh and India and utilized as a part of waterborne detour of road transport at the east of those countries where road development is weak. This port plays an important role as a distribution base to village facing the coastal area of Myanmar and the Kaladan River where roads are not well developed due to the existence of many rivers and their tributaries. Sittwe port acts as a transit port of general cargo for local demand and as a transit port to transport the goods to the North East India through Kaladan River and road link. This port is needed to be developed as a core border trade between Myanmar and Bangladesh and India.

Remarks

The multimodal freight logistics hub planned at Sittwe is composed of international commercial port, domestic port, inland waterway, road and railway (future) mainly for transit cargo from the southern part of India and the North-East Region of India in the shortest possible distance. Therefore, the Government of India cooperates with Myanmar for its development.

Ref. No.	Integrated Project Title	Location	
MMH-14	Dawei Multimodal Freight Logistics Hub Development Project	City: Dawei	Region: Tanintharyi



Core Project

Project ID No.	Project Title	Transport Mode
LWP-10	Dawei Local Improvement Project	Seaport
LWP-04	Dawei SEZ Port Development Project	Seaport

Supporting Project

Project ID No.	Project Title	Transport Mode
NTMP	Dawei-Phunamron Road	Road

Rationale

When the deep-sea port is constructed for the Dawei SEZ, a large volume of cargo will be generated and concentrated in the Dawei SEZ area by maritime transport and through road and/or railway links between Dawei and Bangkok. A part of cargo flow is expected to be transferred from the Dawei SEZ area to the hinterland within Myanmar (i.e. to Yangon, Bago, Mandalay, etc.). Connectivity between the sea port and other transport modes are to be firmly established aiming at maximizing freight transport efficiency. Although the Dawei SEZ port is large and deep water port the cargo transport needed by the Dawei City depend upon the Dawei Local Port. The expansion and improvement of Dawei Local Port is indispensable for the life of Dawei City population. The multimodal freight logistics hub is much needed to attain higher efficient freight transport for both Dawei City and Tanintharyi Region.

Remarks

The links connecting Dawei and the major cities in Myanmar need to be reinforced, through development of coastal shipping, railway track and road. The spur line of the railway needs to be extended from the existing railway freight station to the backyard of the Dawei Local Port, where the new truck terminal is planned to be located as close as possible to the Dawei Local Port, to form a multimodal freight logistics hub for the needs of Dawei City. This multimodal freight logistics hub is planned to start to handle the cargoes generated by the Dawei SEZ for distribution of domestic cargoes when the Dawei SEZ commences industrial activities.

CHAPTER-12 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

12.1 Policy of Environmental and Social Considerations

12.1.1 Myanmar Regulatory Framework

12.1.1.1 Administration Divisions in Myanmar

Under the 2008 Constitution, the Union of the Republic of Myanmar is organized into seven states and seven regions (formerly known as divisions), six Self-Administered Zones and Self-Administered Divisions and one union territory containing the capital Nay Pyi Taw and surrounding townships. 41 Ethnic minorities live mostly in the seven states along the border of the country, and the ethnic majority Burman/ Bamar people live mostly in the seven regions, which, with the exception of Tanintharyi and Sagaing Regions, mainly run through the middle of Myanmar.

As mentioned earlier, Myanmar is divided into seven regions (previously called divisions (taing)) and seven states (*pyi-nè*), classified by ethnic composition. The seven regions are Ayeyarwaddy Region, Bago Region, Magway Region, Mandalay Region, Sagaing Region, Tanintharyi Region and Yangon Region; the seven states are Chin State, Kachin State, Kayin State, Kayah State, Mon State, Rakhine State and Shan State.

12.1.1.2 Fundamental Laws and Regulations Related to Environmental and Social Considerations

The fundamental laws and regulations related to environmental and social considerations and health in Myanmar are shown in **Table-12.1.1**. In addition, major international agreements and treaties that the Myanmar government has ratified related to environmental and social considerations are shown in **Table-12.1.2.**

Table-12.1.1 Fundamental Laws and Regulations Related to Environmental and Social Considerations and Health in Myanmar

No.	Laws and Regulations as of October 2017
Environmental Framework	
1	The National Environment Policy (1994)
2	The Environmental Conservation Law (2012)
3	The Environmental Conservation Rule (2014)
Water Environment	
4	The Underground Water Act (1930)
5	The Territorial Sea and Maritime Zone Law (1977)
6	The Law on Aquaculture (1989)
7	The Conservation of Water Resources and Rivers Law (2006)
8	The Conservation of Water Resources and River Rules (2013)
Forestry/Biodiversity	
9	The Forest Law (1992)
10	The Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994)
EIA/Environmental Standards	
11	EIA Procedures (December 2015)
12	National Environmental Quality (Emission) Guidelines (December 2015)
Land Use	
13	The Land Acquisition Act (1894)
14	The Farmland Law (2012)
15	The Farmland Rules (2012)
16	The Vacant, Fallow and Virgin Lands Management Law (2012)
17	The Vacant, Fallow and Virgin Lands Management Rules (2012)
Heritage	
18	The Protection of Preservation of Cultural Heritage Region Law (1994)
19	The Heritage Goods Protection Law (2015)
Public Health	
20	The Public Health Law (1972)
21	The Prevention and Control of Communicable Diseases Law (1995, revised in 2011)
Working Environment	
22	The Worker's Compensation Act (1923)
23	The Payment of Wages Act (1936)
24	The Factory Act (1951)
25	The Shops and Establishment Act (1951)
26	The Leave and Holiday Act (1951, partially revised in 2014)
27	The Labor Organization Law (2011)
28	The Social Security Law (2012)
29	The Labor Organization Rule (2012)
30	The Labor Dispute Settlement Law (2012)
31	The Employment and Skill Development Law (2013)
32	The Minimum Wage Law/Rules (2013)
Infrastructure/Economic Development	
33	The Foreign Investment Law (2012)
34	The Export and Import Law (2012)
35	The Myanmar Citizen Investment Law (2013)
36	The Electricity Law (2014)

Source: JICA Study Team

Table-12.1.2 Major International Agreements and Treaties that the Myanmar Government has Ratified Related to Environmental and Social Considerations

	International Agreements and Treaties	Date Ratified
1	Ramsar Convention (Convention on Wetlands of International Importance Especially as Waterfowl Habitat), 1971	2005
2	Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, D.C., 1973; and this convention as amended in Bonn, Germany, 1979	1997
3	Vienna Convention for the Protection of the Ozone Layer, 1985	1993
4	Basel Convention, 1989	2015
5	Montreal Protocol on Substances that Deplete the Ozone Layer, 1989	1993
6	London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, 1990	1993
7	United Nations Framework Convention on Climate Change (UNFCCC), New York, 1992	1994
8	Convention on Biological Diversity, Rio de Janeiro, 1992	1994
9	Stockholm Convention on Persistent Organic Pollutants (POPs), 2001	2004 (Accession)

Source: The Republic of the Union of Myanmar, National Biodiversity Strategy and Action Plan (2011), Website of the Basel Convention (http://www.basel.int/Countries/StatusofRatifications/PartiesSignatories/tabid/4499/Default.aspx)

The following are summaries of the key laws related to the natural and social environment in Myanmar that will likely be relevant to environmental and social considerations.

Environmental Framework

The Environmental Conservation Law (ECL) (2012) and Environmental Conservation Rules (ECRs) (2014)

The Environmental Conservation Law (ECL) was enacted in March 2012. This law is the fundamental law of environmental management and environmental conservation in Myanmar prepared by Ministry of Natural Resources and Environmental Conservation (MONREC). Subsequently, the Environmental Conservation Rules (ECRs) were enacted in June 2014 as the detailed enforcement regulations for ECL. ECL stipulates MONREC's responsibility for environmental policy and administration, formulation of environmental management plan, implementation of environmental monitoring, setting of environmental standards, management of hazardous waste, and formulation and implementation of EIA, amongst others.

Water Environment

The Conservation of Water Resources and Rivers Law (2006)

The aims of this law are as follows: (a) to conserve and protect the water resources and river systems for the beneficial utilization of the public; (b) to enable smooth and safe waterway navigation along rivers and creeks; (c) to contribute to the development of the state economy through improving water resources and river systems; and (d) to protect against environmental impact.

Forestry/Biodiversity

The Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994)

The objectives of this law are to implement the Government policy for wildlife protection and natural areas conservation, to carry out in accordance with the relevant International

Conventions, to protect endangered species of wildlife and their natural habitats, to contribute to the development of research on natural science, and to protect wildlife by the establishment of zoological/botanical gardens.

EIA/Environmental Standards

The EIA Procedure (2015)

The EIA Procedure formulated by Ministry of Natural Resources and Environmental Conservation (MONREC) in coordination with the Asian Development Bank (ADB) was enacted in December 2015. This EIA Procedure covers the following contents: screening of projects, qualification for conducting the initial environmental examination (IEE)/EIA, categorization of projects for IEE/EIA/environmental management plan (EMP), preparation of IEE/EIA report and EMP, public involvement, procedure on how to get the approval of IEE/EIA report from the Environmental Conservation Department (ECD) under MONREC, environmental compliance certificate (ECC), and monitoring process after getting the approval of the IEE/EIA report.

National Environmental Quality (Emission) Guidelines (2015)

MONREC formulated the National Environmental Quality (Emission) Guidelines (NEQG) in coordination with the ADB in December 2015. The NEQG determines the guideline values for general emissions, such as air emissions, wastewater, noise levels, odor, and those for sector-specific emissions such as emissions from forestry, agribusiness/food production, chemicals, oil and gas, infrastructure, general manufacturing, mining, and power.

Land Use

The Land Acquisition Act (1894)

The Land Acquisition Act (1894) serves as the fundamental law for land acquisition in Myanmar that sets out the procedure of land acquisition and compensation. The Act further outlines relevant procedures (including notice periods) procedures for objections to acquisition (Article 5), method of valuation of land, process for taking possession of land (Article 16 and 17), court processes and appeals (Article 18 and 24), procedures for the temporary occupation of land (Article 35), and the acquisition of land for companies (Article 38). The Act requires that compensation 'at market value' be provided to those from whom the land is acquired (Article 23).

The Farmland Law and Rules (2012)

The Law determines the land use rights of farmland and the granting of land use rights to eligible farmers. It allows the right to sell, mortgage, lease, exchange, and give either whole or part of the right to use the farmland. The Law determines the formation as well as the roles/responsibilities of farmland administrative bodies at various levels. The Farmland Law

and Rules determine procedures such as the application for farmland registration and obtaining land use certificates, application of transfer of farmlands for other purposes, and indemnities and compensation.

Heritage

The Protection of Preservation of Cultural Heritage Region Law (1994)

This Law prescribes the determination of cultural heritage regions for protection and preservation to prevent the occurrence of deterioration due to natural disaster or man-made destruction.

Public Health

The Public Health Law (1972)

It is concerned with protection of people's health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases and regulation of private clinics.

The Prevention and Control of Communicable Diseases Law (1995, revised in 2011)

This Law describes functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases. It also describes measures to be taken in relation to environmental sanitation, reporting and control of outbreaks of epidemics and penalties for those failing to comply. The Law also authorizes the Ministry of Health to issue rules and procedures when necessary with approval of the Government.

Working Environment

The Worker's Compensation Act (1923)

It stipulates that employers are required to make payments to workers who are injured or who die in any accidents arising during and in consequence of their employment.

The Leave and Holidays Act (1951, partially revised in 2014)

This Act has been used as the basic framework for leaves and holidays for workers with minor amendment in 2006 and 2014. This defines the public holidays that every employee shall be granted with full payment. It also defines the rules of leaves for workers including medical leave, earned leave and maternity leave.

The Labor Organization Law (2011)

The Labor Organization Law replaced the Trade Union Act enacted in 1927 for protecting the rights of the workers, having good relations among the workers or between the employer and the worker, and for forming and carrying out the labor organizations systematically and independently. Under the Law, the labor organizations have the right to draw up their constitution and rules freely. It assures the right to negotiate and settle with the employer if the

workers are unable to obtain their rights contained in the labor laws. On the other hand, the employer shall recognize the labor organizations and assist as much as possible if the labor organizations request for help for the interest of their workers.

The Social Security Law (2012)

The Social Security Law, enacted in 2012, amended the Social Security Act in 1954. It stipulates the formation and implementation of social security systems.

The Minimum Wage Law (2013)

The Minimum Wage Law, passed in March 2013, has replaced the 1949 Minimum Wage Act. The Law provides a framework for minimum wage determination: the presidential office establishing a tripartite minimum wage committee which shall decide minimum wage with industrial variation based on a survey on living costs of workers possibly every two years. This also stipulates equal payment.

12.1.1.3 Strategic Environmental Assessment (SEA)

The EIA procedure approved by Union Government in November 2015 and officially launched in December 2015 with support of Asia Development Bank is regarded as significant milestone for environmental sector of Myanmar and was heartily welcomed by private and public sectors at all.

Under the Article 123 of section 10, SEA requirement is generally stated that MONREC may ask relevant authorities to conduct SEA for policy strategy development plan and program prepared by government organizations of state, regional and township administration, self-administered zone and division or private sector .Where significant environmental and social impact is likely to occur, MONREC may ask responsible agency for undertaking scoping study to identify and access environmental and social impact, provision of monitoring frame work for those of policy, plan and program.

However, this section does not provide enough detail on application of strategic environmental assessment in decision making process. Reviewing the procedure, it is found to be quite general and does not explicitly stress the requirements of SEA.

Thus, it can be concluded that there is no strong mandatory requirement for conducting SEA from the legal perspective. SEA studies are currently being conducted in Myanmar by international organizations on a voluntary basis.

12.2 Existing Status of the Environment in Myanmar

12.2.1 Natural Environment

12.2.1.1 Physical Features

Myanmar is located in mainland Southeast Asia and the areal coverage of the country is about 676,578 km². Myanmar is bordered in north and northeast by China, in east by Laos and Thailand, in south by the Andaman Sea and the Bay of Bengal, and in west by Bangladesh and India. With 5,881 m (19,295 ft.) Mount Hkakabo Razi in Kachin state on the border tri-point with China and India is the highest elevation in Myanmar and Southeast Asia's highest mountain. Main rivers are the Chindwin, Thanlwin and the Irrawaddy (Ayeyarwaddy).

The major physical features of the country are mostly determined by the type and structure of the underlying geology. In general, there are four main geographic units, generally becoming lower from north to south, and each unit runs more or less north-south direction.

1) Eastern Highland
2) Central Lowland
3) Western Ranges
4) Rakhine Coastal Strip

Eastern Highland

It comprises the plateau of the Shan State in the north and its southern continuation through Kayin into the Tanintharyi Region. The area of the Shan Highland is a combination of hill ranges, steep river valleys and a few elevated plains, also known as the Shan Plateau. The high plain averages about 1,000 m (3,300 ft.) in elevation and is sparsely populated. The Shan Plateau straddles central eastern Myanmar and northwestern Thailand. They rise steeply from Myanmar's central plain and stretch for hundreds of km eastwards into Thailand's northwest. The average elevation is around 1,000 m.

Central Lowland

It comprises of dry zone, Ayeyarwaddy River Basin and Ayeyarwaddy Delta Region. This unit is located between the Shan Plateau in the east and Rakhine Yoma Mountain in the west.

Western Ranges

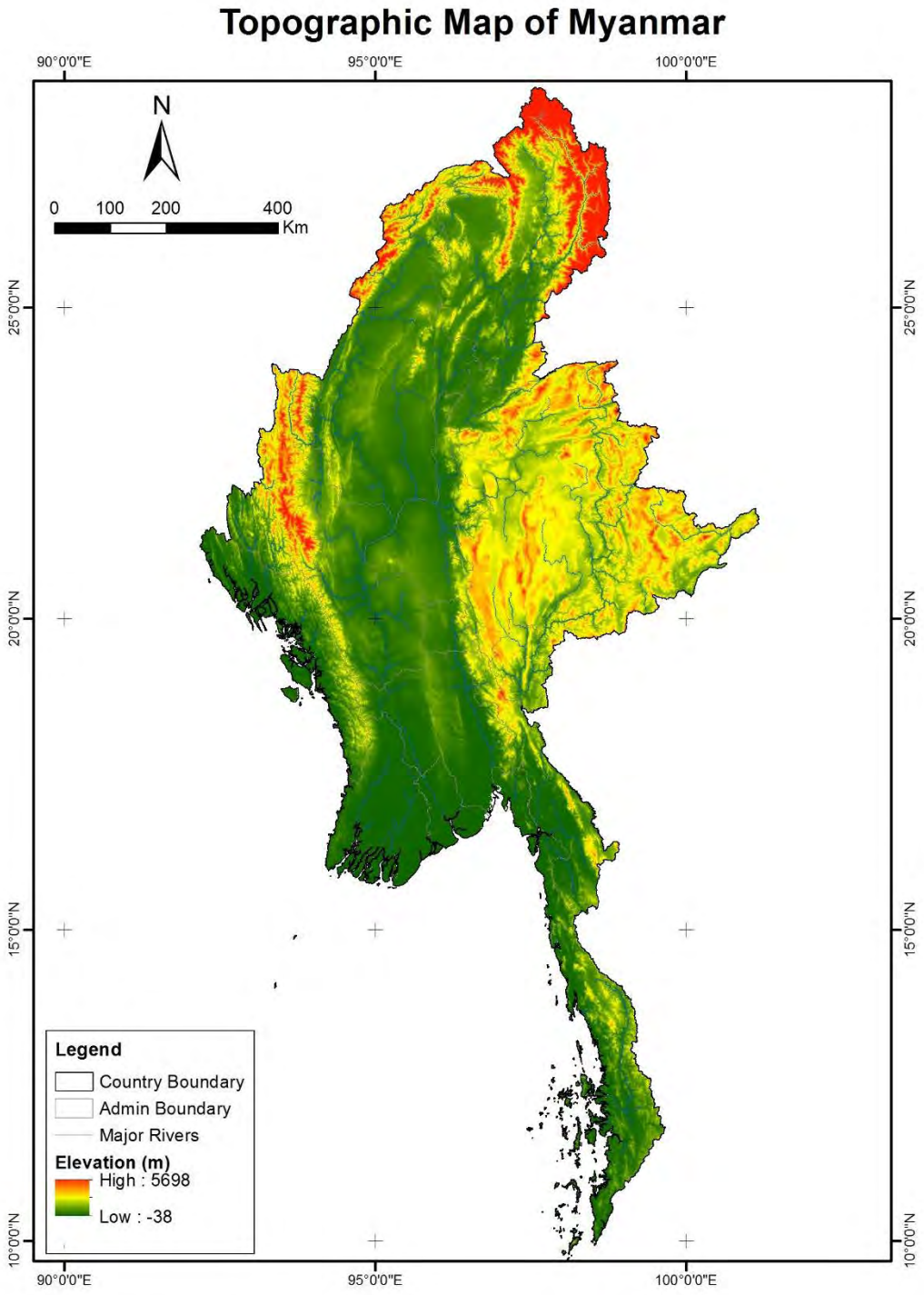
This unit comprises the range of hills that start from northern Assam and continue to Nagris point in the extreme south-west of Myanmar. The hill ranges in the north are the Patkoi, Lushai, Naga, Manipur and Chin hills, all of which ultimately pass on southwards to form the Rakhine Yoma.

Rakhine Coastal Strip

This unit lies between the Rakhine Yoma to the east and Bay of Bengal to the west. The low-lying strip of land is very narrow and in some places the hills approach closes to the sea

and actually form steep cliffs. The coast itself is usually very rocky and there are many large islands adjoining the mainland, such as Yanbye and Manaung. There are five main rivers in Myanmar: Ayeyarwaddy, Chindwin, Thanlwin, Sittaung and Tanintharyi. Ayeyarwaddy River is the longest, comprising about 2,179 km from north to south of country and entering into the Mottama Gulf.

The topographic map of Myanmar is shown in **Figure-12.2.1**



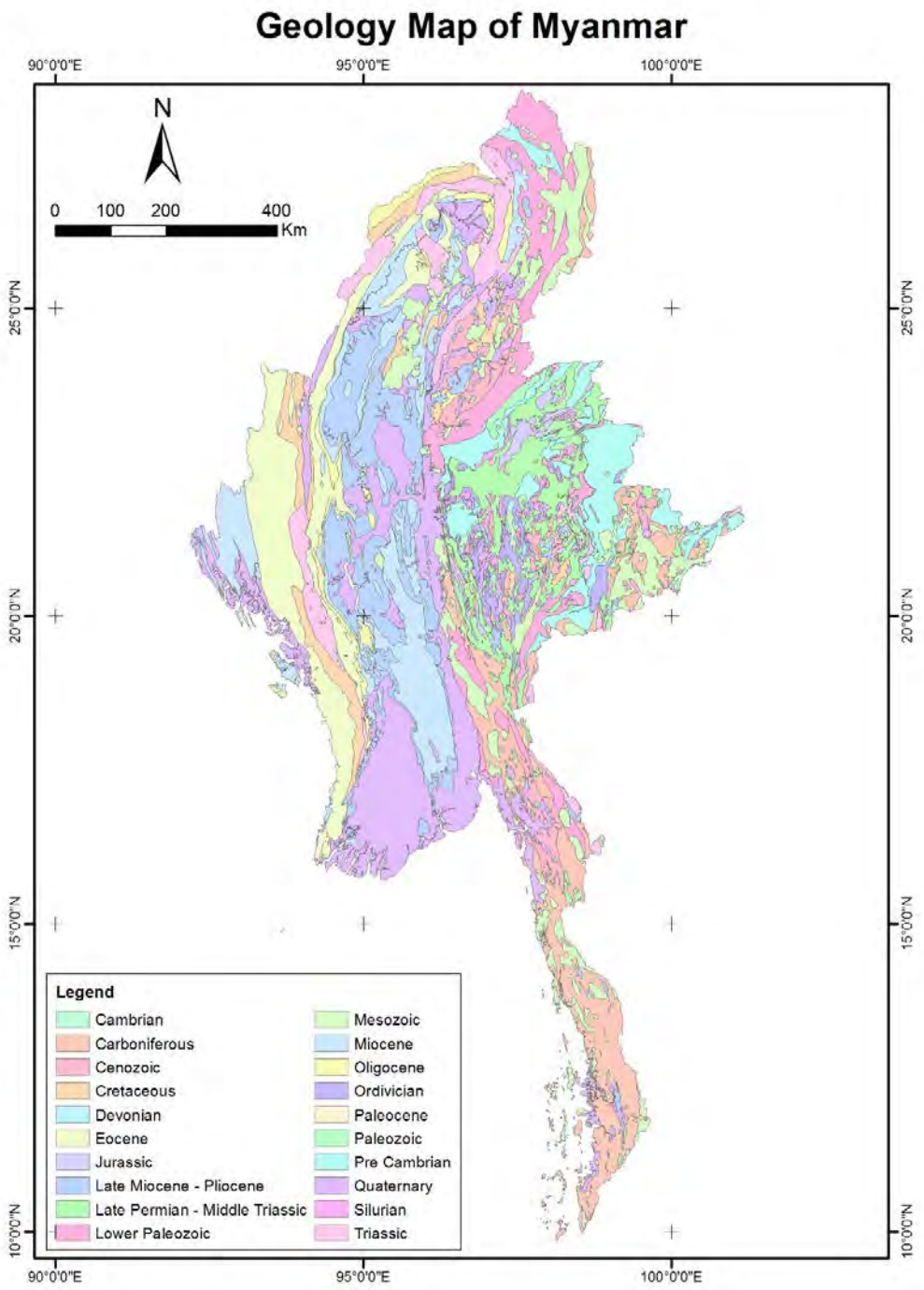
Source: Study Team

Figure-12.2.1 Topographic Map of Myanmar

12.2.1.2 Geology

Myanmar can conveniently be divided into five main morphological belts: the Eastern Highlands, the Central Lowlands, the Indo-Burma Ranges, the Upper Ayeyarwaddy Province, and the Arakan Coastal Plain. Each morphological belt comprises one or more structural units, and in some cases smaller morphological units, some of which continue beyond Myanmar into Eastern or Southeast Asia.

The geological map of Myanmar is shown in **Figure-12.2.2**



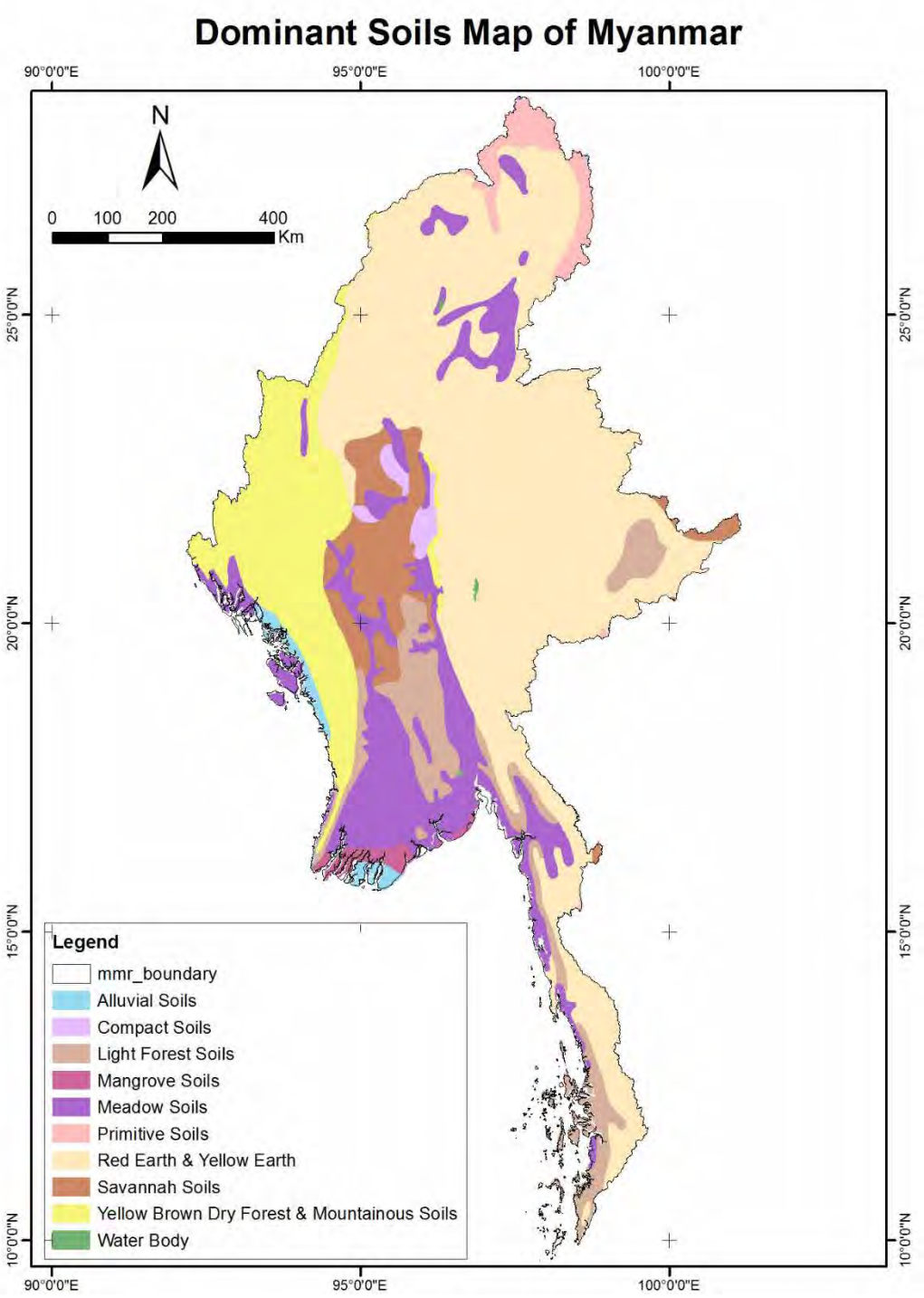
Source: Myanmar Geoscience Society's Geology Map, 2014

Figure-12.2.2 Geological Map of Myanmar

12.2.1.3 Soil

Soil classification has generally been based on the distribution of the important land resources for agriculture. The characteristics of the soils are determined by the physical and mineral composition of the parent material, the relief; the climate under which the soil material has been developed, and the vegetation. Also, soil types of Myanmar are referred and modified from the Soil Map of the World by FAO-UNESCO. According to the soil types, Red Earth and Yellow Earth are the most dominant, occupied in northern, eastern and southern parts of Myanmar. Western part is mainly occupied by Dry Forest and Mountainous soils. Light Forest Soil and Savannah Soil occur in Central Lowland while Alluvial Soil and Mangrove Soil occur in Delta area.

The dominant soil types in Myanmar are shown in **Figure-12.2.3**.



Source: FAO-UNESCO Soil Map of the World

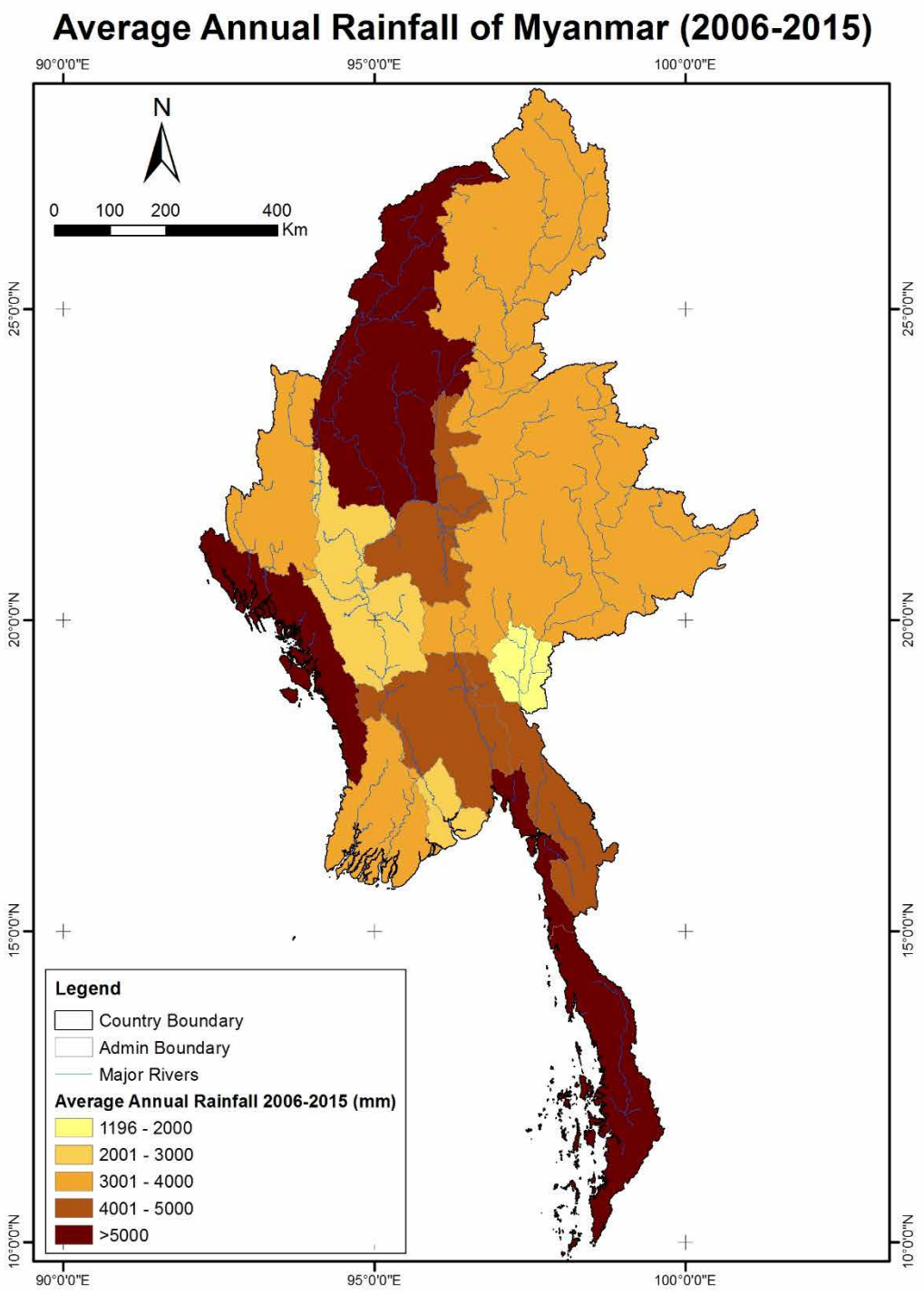
Figure-12.2.3 Dominant Soil Types in Myanmar

12.2.1.4 Rainfall

Myanmar is in tropical monsoon climate, characterized by three distinct seasons, namely, summer season (March to Mid-May), rainy season (Mid-May to Mid-October), and winter season (Mid-October to February).

Southwest monsoon wind is the main source of rain. The following data analysis is referred from Statistical Yearbook of Myanmar (2016) that was published by Ministry of Planning and Finance. In which, the mean annual rainfall is classified as three ranges during 2006 to 2015. The average maximum annual rainfall is more than 4000 mm in most of the regions and states such as Sagaing Region, Mandalay Region, Bago Region, Rakhine State, Kayin State, Mon State and Tanintharyi Region, where as Rakhine State is the maximum at around 5700 mm. The minimum annual rainfall is observed only in Kayah State at around 1200 mm.

The average rainfall in Myanmar (2006-2015) is shown in **Figure-12.2.4**.



Source: Department of Meteorology and Hydrology

Figure-12.2.4 Average Annual Rainfall in Myanmar from 2006 to 2015

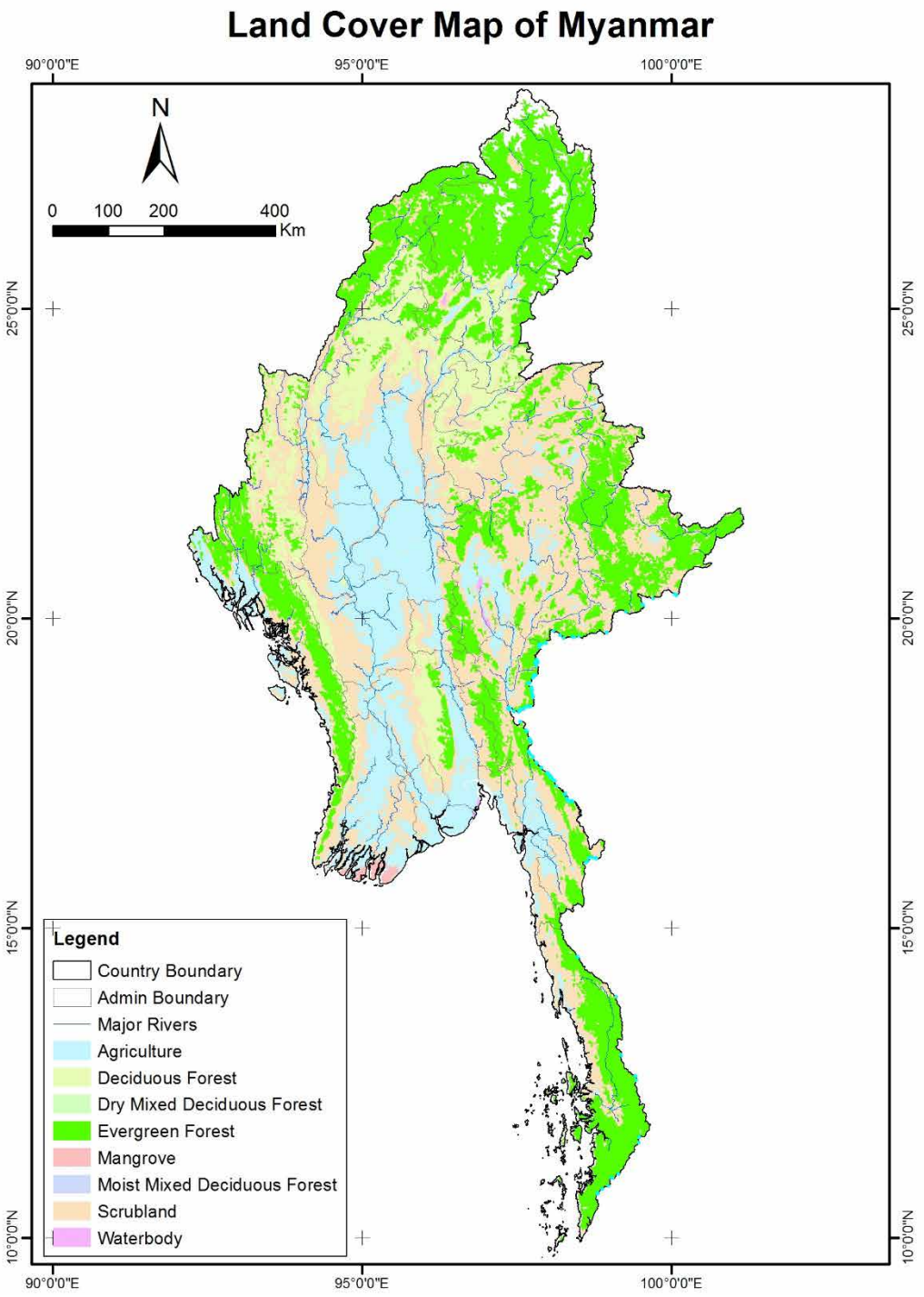
12.2.1.5 Land Cover

In Myanmar, around 42.92% of total land was forest cover area, approximately 112 to 127 square miles in 2015-2016 (Statistical Yearbook of Myanmar). This land cover classification is modified from the Land Use Map of MIMU.

According to the classification, Evergreen Forest occurs in areas of highest rainfall in various forms and structure, especially in northern part, eastern part and western costal area of Myanmar. Mixed deciduous forest is economically known for its teak, which forms pure stands on moist slopes. Deciduous dipterocarp forest, characterized by *Dipterocarpus tuberculatus*, is found on lateritic soils. The canopy is somewhat open, with an herb layer of grasses. In areas between 900 and 1,800m ASL, Hill (oak) forest dominates. There are around 9 million ha of bamboo forest in Myanmar and many species are economically important. There are especially large areas of bamboo forest in Rakhine, the Bago Yoma and Tanintharyi. Scrub forest is found where the rainfall is generally less than 1,000 mm/yr. and is mostly found in the central dry zone.

The southern and coastal areas were formerly covered with lowland tropical rainforest, mangrove and freshwater swamp forest. The Central Dry Zone holds thorn scrub and a stunted type of dry deciduous woodland called Indaing. Fringing the dry zone in the low hills is mixed deciduous forest, which is fringed by moist semi-evergreen forest. As one goes higher up the hills forming an arc around central and north Myanmar, evergreen montane forest is found.

Types of land cover in Myanmar are shown in **Figure-12.2.5**.



Source: MIMU-UNEP Land Cover Map

Figure-12.2.5 Types of Land Cover in Myanmar

12.2.1.6 Biodiversity

Around 300 mammal species, more than 1,114 birds, 370 reptiles and 1,1800 plants are recorded in Myanmar, including 45 species of mammals, 45 species of birds, 21 species of reptiles and 43 species of plants, and one type of butterfly that are globally threatened (NCEA, 2009a). 76 Key Biodiversity Areas (KBAs) have been identified, out of which 54 are recognized as Important Birds Areas (IBAs) (BLI 2005). Endemism is relatively low compared to other Countries in South East Asia. There are seven Endemic Birds Areas EBAs and secondary endemic areas (BLI 2005 and IUCN-WCPA 2007), three exclusively located in Myanmar (Eastern Himalayas, Irrawaddy plains and North Myanmar Lowlands), two stretching across Myanmar and Thailand (Myanmar-Thailand Mountains and Peninsular Thailand lowland forests) and two others centered mainly in other countries but extending in Myanmar (Andaman Islands and Yunnan mountains). Natma Taung National Park is a particular area of local endemism.

Threatened Species

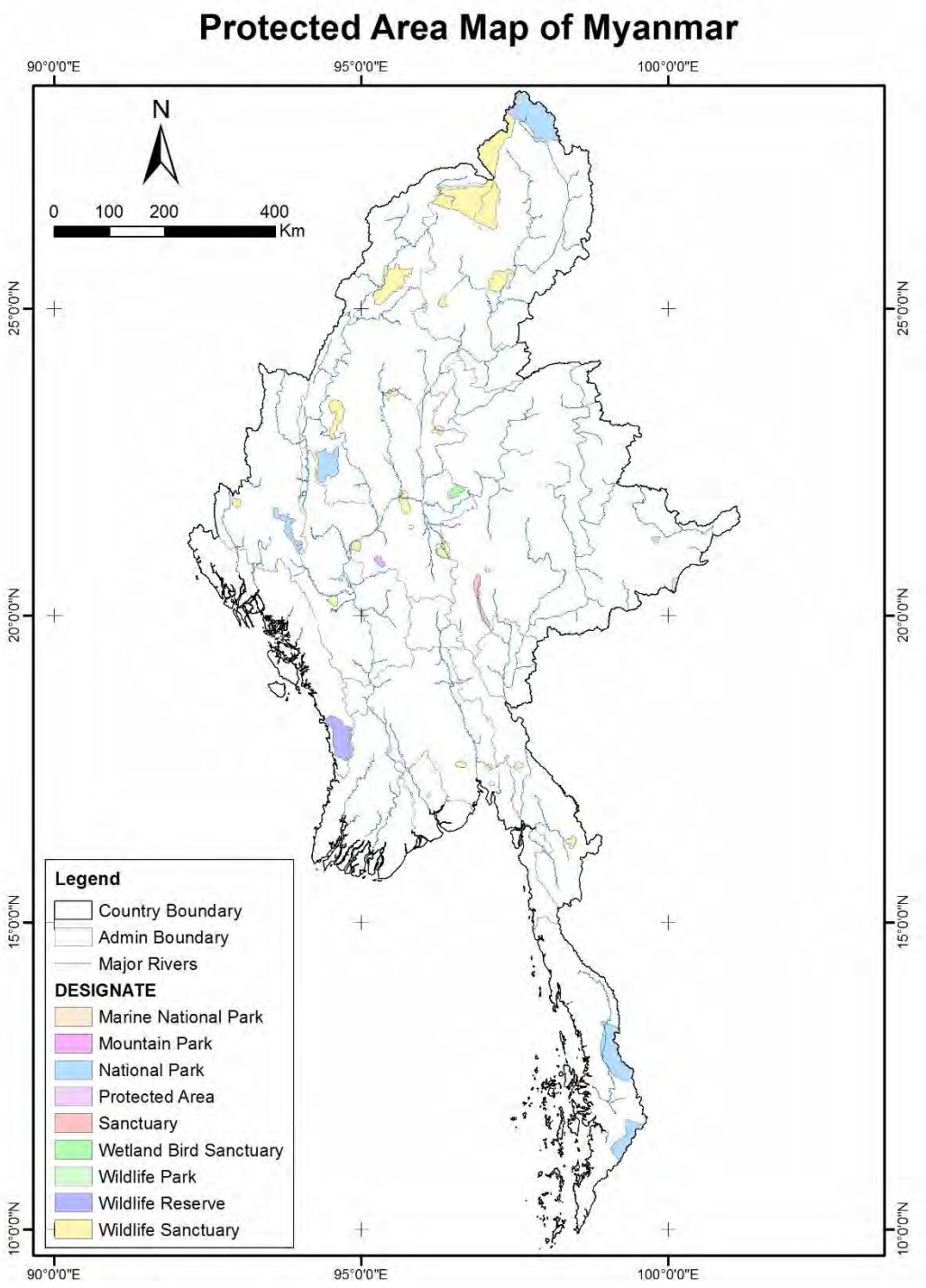
A significant number of the plant and animal species that occur in Myanmar have been assessed as globally threatened, following the global threat criteria of IUCN/SSC (1994). However, in the Indo-Myanmar (Indo-Burma) Hotspot, comprehensive global threat assessments are only available for mammals, birds, amphibians and some groups of reptiles. Baseline data on species diversity in Myanmar is incomplete for most, if not all, major taxonomic groups, and the available data of the current status of the country's diversity is mainly the globally threatened species that are currently listed in the IUCN Red List of Threatened Species version 2015.

Protected Areas

Conservation of nature and biodiversity is an ingrained habit of most people in Myanmar to conserve biodiversity; the Government enacted the Protection of Wildlife, Wild Plants and Conservation of Natural Area Law in 1994. There are now 40 protected areas in Myanmar including wildlife and bird sanctuaries, national parks and nature reserves. Myanmar is also a party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora; and Ramsar Convention on Wetlands of International Importance.

The policy context for the establishment of protected areas is given by the National Environment policy, formulated in 1990, one goal of which is to strengthen wildlife management through the establishment of a network of national parks wildlife reserves and sanctuaries. In addition, a further goal is to increase the coverage of protected areas to 5% in the first instance, and ultimately up to 10% of the area of Myanmar.

Protected areas in Myanmar are shown in **Figure-12.2.6**.



Source: MIMU

Figure-12.2.6 Protected Areas in Myanmar

12.2.1.7 Natural Hazard

There are nine main types of disasters in Myanmar: (1) Cyclone, (2) Drought/Dry zone, (3) Earthquake, (4) Fire, (5) Floods, (6) Forest Fire, (7) Land slide, (8) Storm, and (9) Tsunami. Some of the more severe natural hazard are described below.

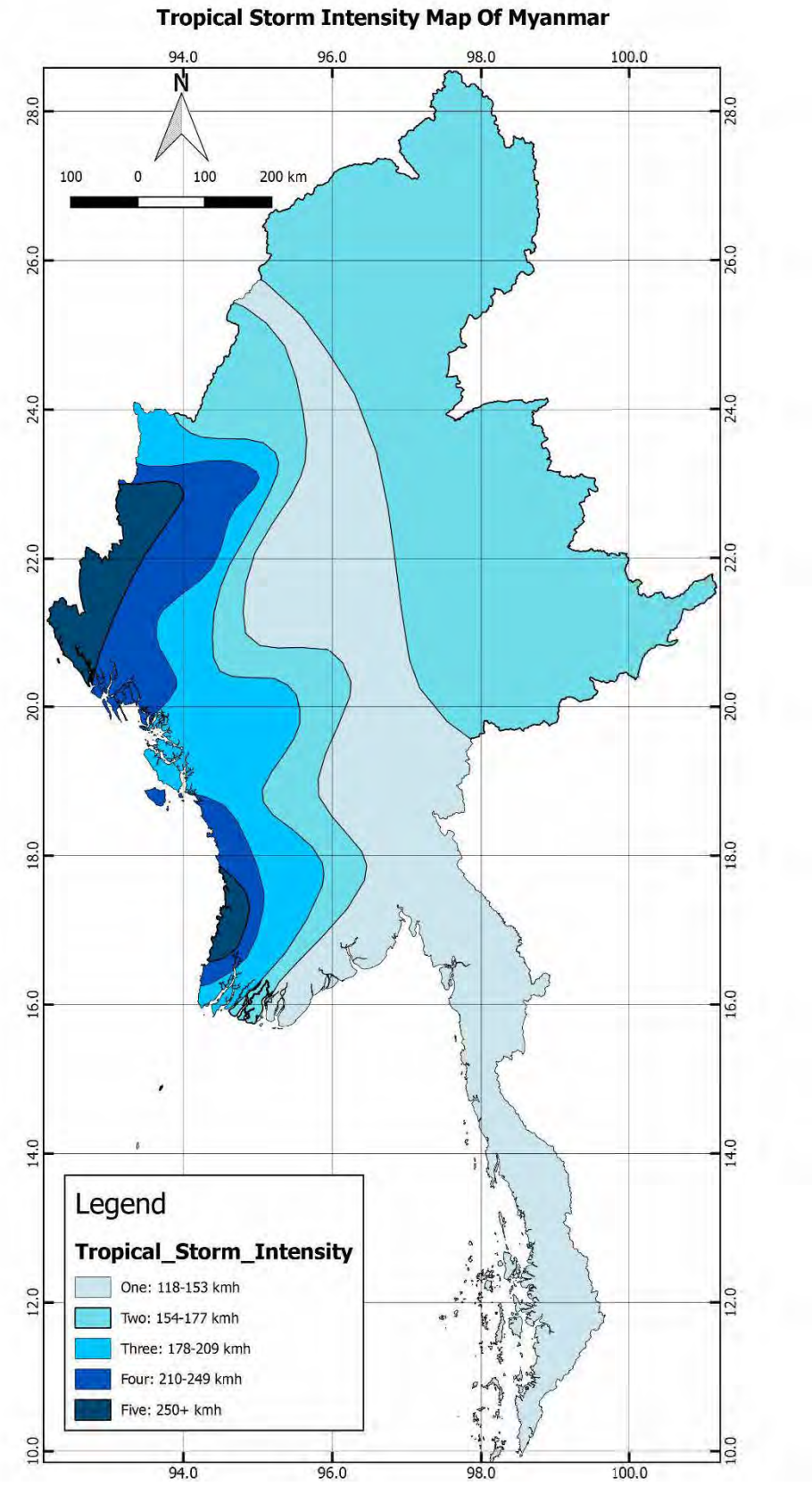
Tropical Storms (Cyclone)

Tropical storms that originate in the Bay of Bengal generally move westward heading for India and then turn towards Bangladesh and Myanmar. Severe cyclones tend to occur either during the pre-monsoon season from April to May or post-monsoon season from October to November.

Cyclones have three destructive forces, namely: (1) storm surge, (2) heavy rainfall and (3) strong winds. According to 'Hazard Profile of Myanmar', 1,248 tropical storms formed in the Bay of Bengal during the period from 1887 to 2005, of which 80 storms (6.4% of the total) hit the Myanmar coast. In all, 12 cyclones caused severe damage in Myanmar mainly due to the accompanying storm surge, and the maximum death or missing toll was 138,373 caused by Cyclone Nargis in May 2008.

The intensity of storm winds that affect Myanmar is classified in five categories. The maximum intensity is about more than 250 km per hour, striking some areas in the west coast, whereas some parts of central Myanmar and southern Myanmar are affected by minimum wind intensity as 118 - 153 km per hour.

Storm intensity in Myanmar is shown in **Figure-12.2.7**.



Source: UN Office for the Coordination of Humanitarian Affairs Myanmar: Natural Hazard Risks Map, 2011

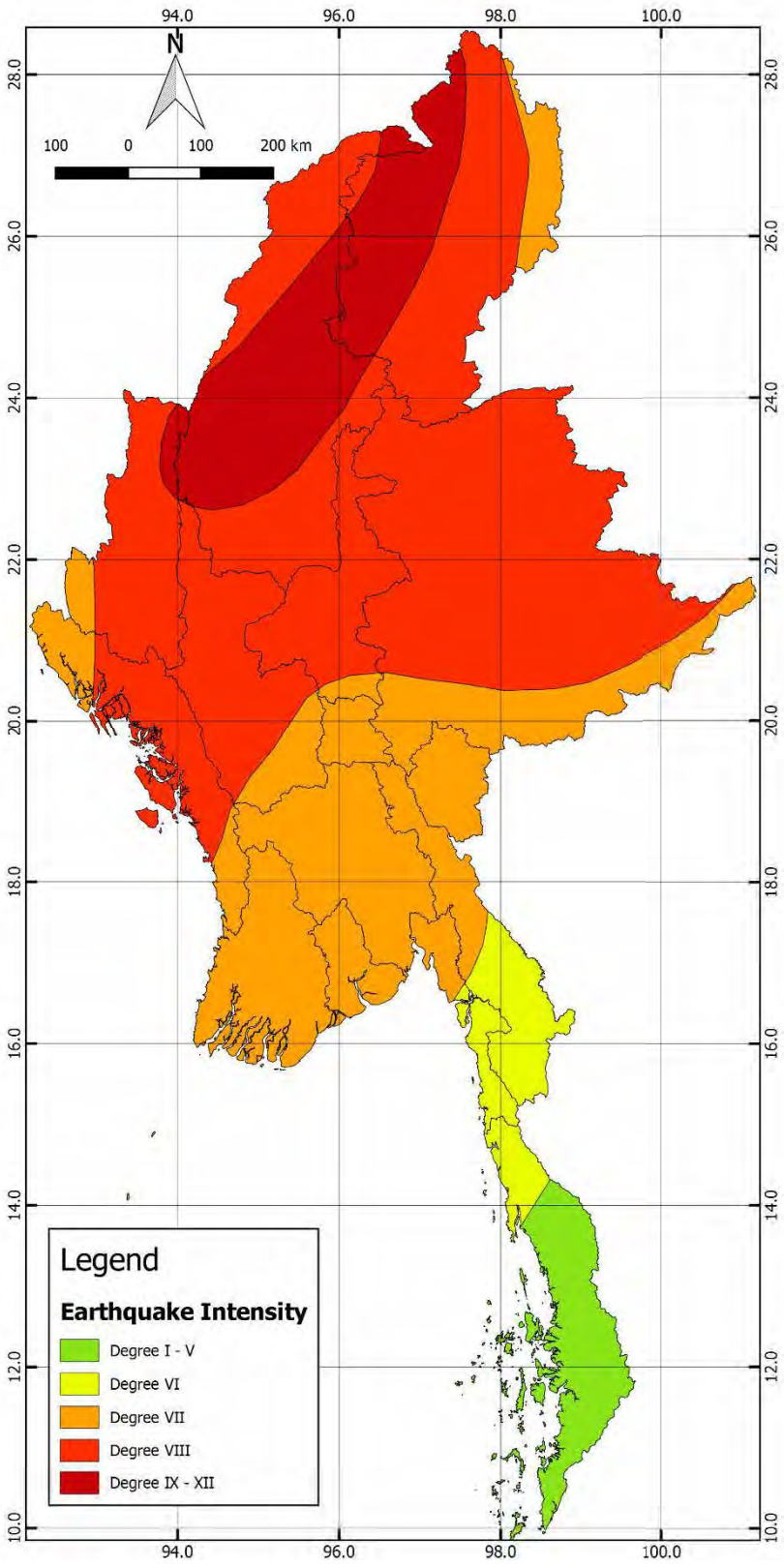
Figure-12.2.7 Storm Intensity in Myanmar

Earthquakes

In the west of Myanmar, there is the Andaman Trench where the Indian Plate is moving northward and sub-ducting underneath the Myanmar Plate from west to east; in east Myanmar, there is the Sagaing fault which is the boundary between Myanmar Plate and Sunda Plate. Hence, magnitude 7.0+ earthquakes occurred more than 16 times and six earthquakes of around magnitude 7.0 hit the main cities along the Sagaing fault such as Yangon, Bago and Mandalay from 1930 to 1956.

The earthquake intensity map is referred from the UN Office for the Coordination of Humanitarian Affairs (OCHA), 2011, where the earthquake intensity zone has a 20% probability that will be exceeded in 50 years. According to this intensity map, the degree of earthquake intensity gradually increases from southern part of Myanmar to northern part. The highest potential earthquake intensity is highest in some parts of Kachin and Chin States.

Earthquake intensity in Myanmar is shown in **Figure-12.2.8**.



Source: UN Office for the Coordination of Humanitarian Affairs Myanmar: Natural Hazard Risks Map, 2011

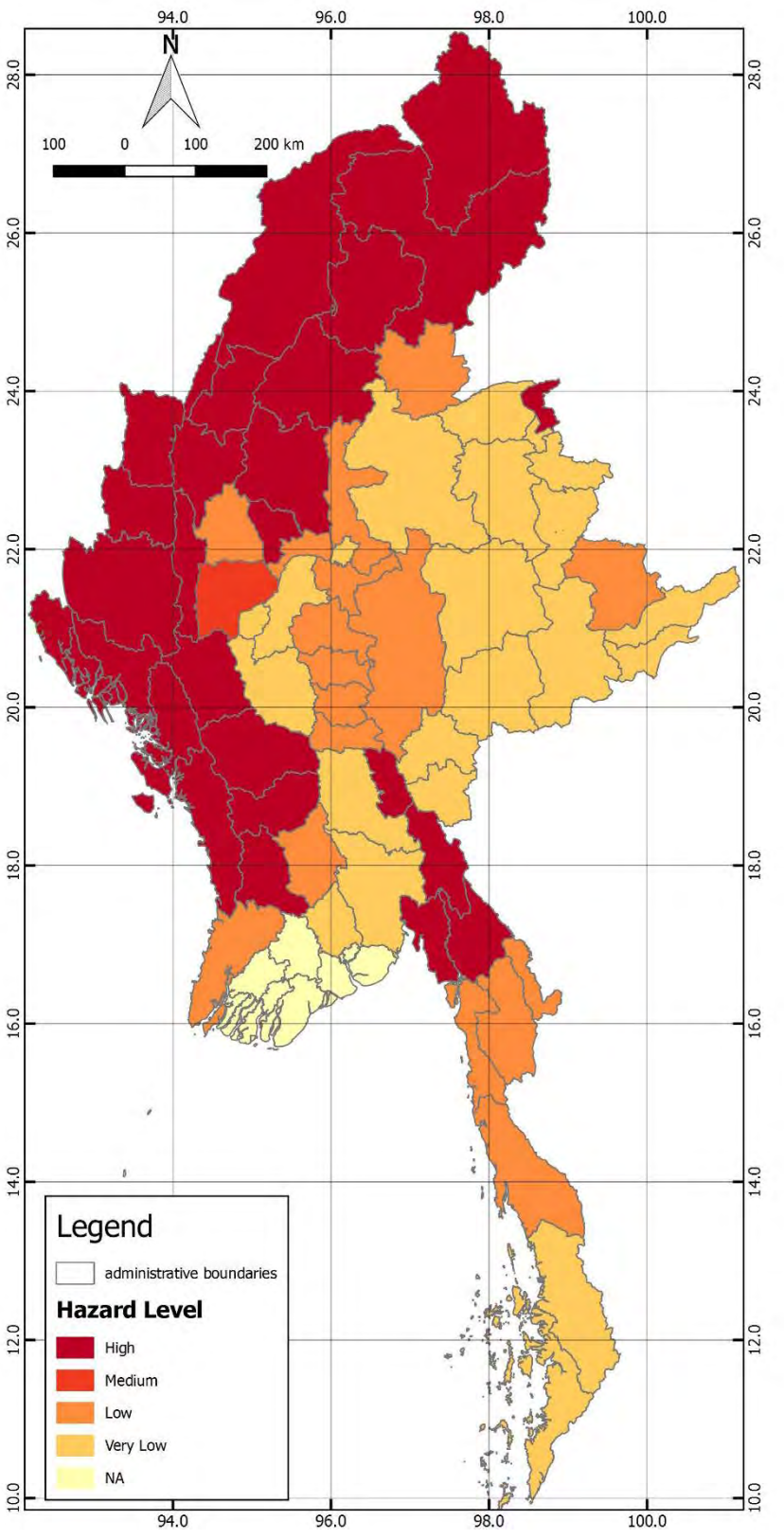
Figure-12.2.8 Earthquake Intensity in Myanmar

Land Slides

Over the recent years, especially in the monsoon season, flash floods make landslides in the mountainous and hilly regions in the northern and central areas of the country. Significant landslides occurred in July–October 2015 and May 2016.

There are no systematic records for past and recent landslide hazard in Myanmar. For the evaluation of landslides hazard map of Myanmar has been referenced and modified from Global Facility for Disaster Reduction and Recovery (GFDRR). The processing includes current available data sources such as rainfall patterns, slope factor, lithological (geological) conditions, soil, land cover, precipitation and seismic conditions (earthquakes) that make localized landslides a frequent hazard phenomenon. The classification has been summarized into four categories (1 = high, 2 = medium, 3 = low and 4 = very low), and unavailable data were encoded as Not Applicable (NA).

Landslide Hazard Map in Myanmar is shown in **Figure-12.2.9**.



Source: UN Office for the Coordination of Humanitarian Affairs Myanmar: Natural Hazard Risks Map, 2011

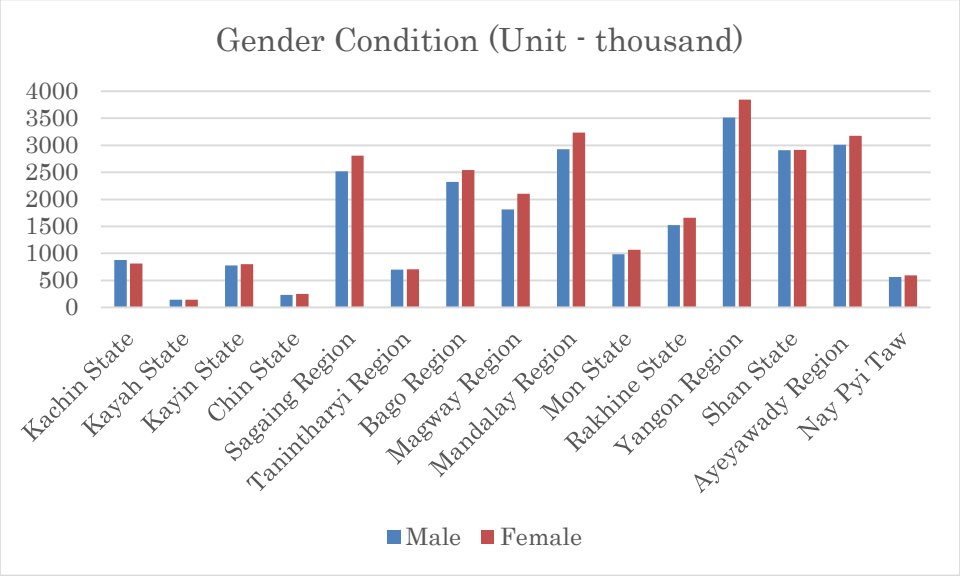
Figure-12.2.9 Landslide Hazard Map of Myanmar

12.2.2 Social Environment

12.2.2.1 Population

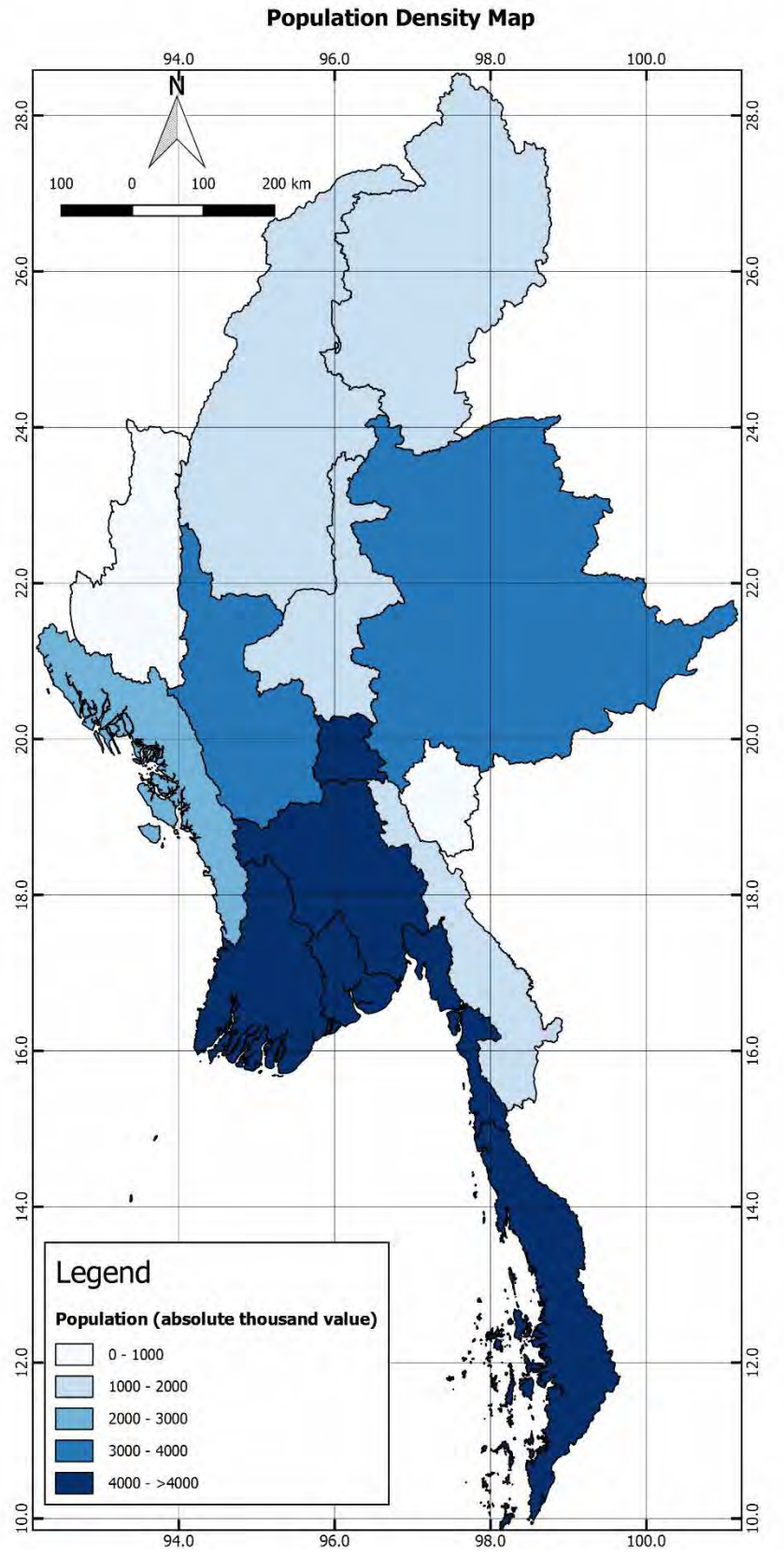
Myanmar covers a surface area of 676,553 km^2, divided into seven states, seven regions and one union territory. Statistical Yearbook of Myanmar (2016) which was published by the Ministry of Planning and Finance, describe the total population is about 52.440 million. The population density was 78 persons per km^2 in 2015-2016, with 70.79% living in rural areas and 29.21% in urban areas. Yangon Region has the largest population at around 7.6 million, while Kayah State the smallest at around 0.3 million.

Gender distribution of states and regions in Myanmar is shown in **Figure-12.2. 10,** and population density in Myanmar in **Figure-12.2.11**.



Source: Study Team

Figure-12.2.10 Gender condition of States and Regions in Myanmar

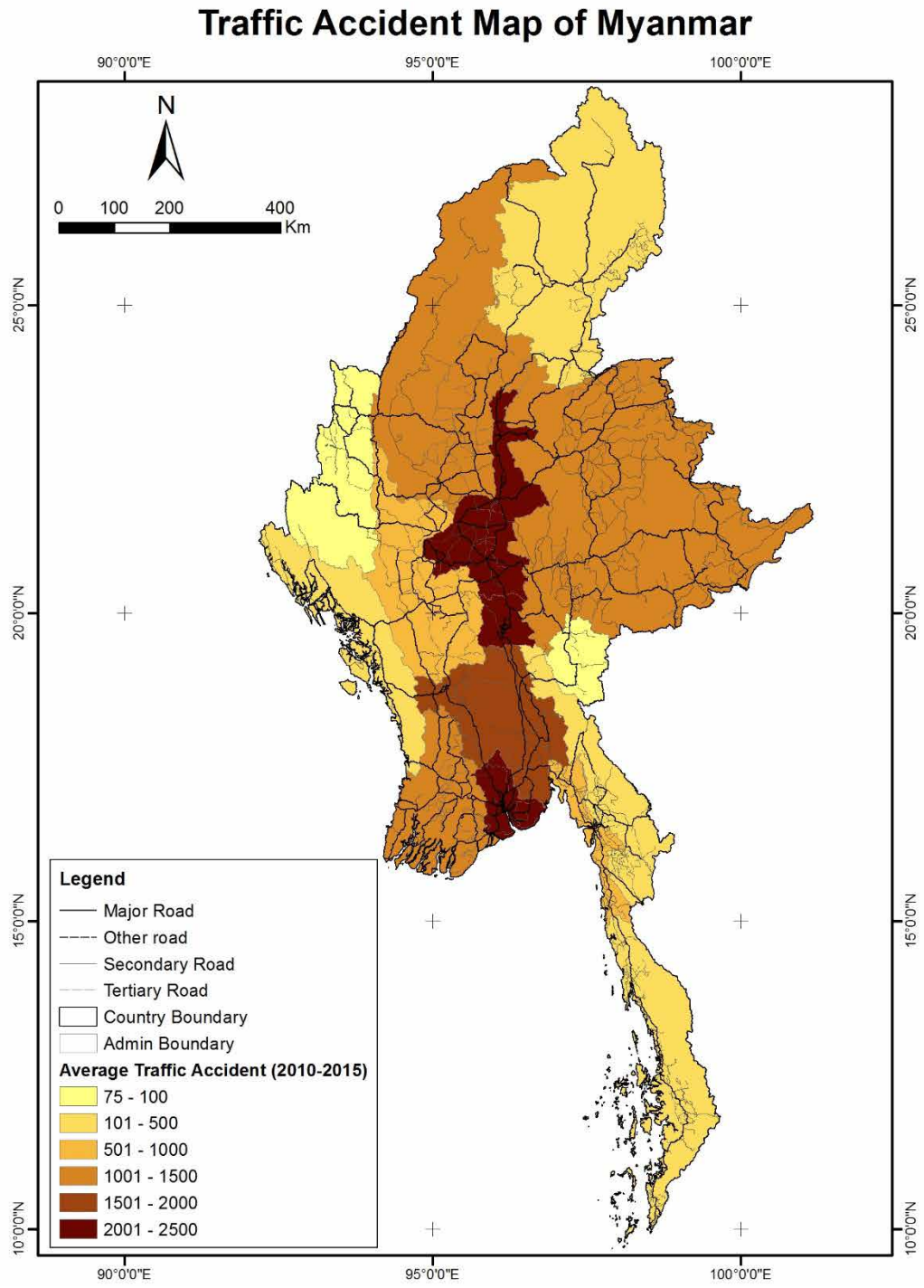


Source: Myanmar Population and Housing Census, 2014

Figure-12.2.11 Population Density in Myanmar

12.2.2.2 Traffic Accidents

Traffic accidents are a significant social problem in Myanmar. The Statistical Yearbook of Myanmar (2016) describes the annual traffic accidents from 2010 to 2015, for all regions and states. There are about five types of traffic accidents among them, and accidents of motor vehicles are the most common. Average annual traffic accidents during 2010 to 2015 are described in **Figure-12.2.12** whereas Yangon Region and Mandalay Region have the highest occurrence of accidents. During 2015, traffic accidents in Myanmar were 15,859, with 4,375 killed and 26,630 injured persons.



Source: Statistical Yearbook of Myanmar, 2016

Figure-12.2.12 Traffic Accident Map in Myanmar

12.3 Strategic Environmental Assessment (SEA)

12.3.1 Purpose of SEA for the Study on the Logistic System Development

This SEA study included environmental and social suitability analysis to grasp the potential impacts for each of the proposed projects in the study on the logistic system development, in order to mitigate negative environmental and social impacts in this earlier stage of the decision-making cycle. Besides, the results of these SEA studies do not evaluate the feasibility of the target projects. This SEA study is not aimed at approving or cancelling the proposed projects of the study on the logistic system development.

In order to achieve the above purpose, the following two studies are carried out.

- To review the potential negative impact on environmental and social issues from viewpoint of regional and sectoral characteristics.
- To consider the key potential impacts on environmental and social issues and the mitigation measures.

The results of study can be utilized for the preparation of environmental management plan in the implementation of each target project as preliminary study of EIA/IEE/EMP.

12.3.2 Target Project for SEA

48 of 162 proposed projects for the study on the logistic system development are studied for SEA. The following proposed projects were excluded from target projects.

- 98 projects, which were reviewed and evaluated by SEA of the National Transport Masterplan (NTMP).
- Within the proposed projects by the MYL-Plan, 16 projects are low maturity projects, for which "Project Profiles" are not prepared.

Moreover, the projects such as soft component development projects, in which it is not possible to identify the potential negative impacts of environmental and social issues from the outline of the project description, were also excluded from the target projects.

12.4 Reviewing the Potential Negative Impact on Environmental and Social Issues

12.4.1 Environmental and Social Suitability Analysis

12.4.1.1 Methodological Framework

Evaluation of the environmental suitability map includes two thematic maps, the protected area systems map and the land cover map of the whole country. Firstly, the analysis has been carried out by assigning a level of constraint to each thematic map layer. The level of constraints ranges from 0 to 3 and level 3 represents the highest constraint, taking account of the requirements, converted to raster images after developing the level of constraint maps. These raster maps were then integrated to develop final environmental suitability map. The final output map includes three classifications: low sensitive, medium sensitive, and high sensitive.

For making the natural disaster risks map, the analysis was carried out with four thematic maps that included average annual rainfall map, storm intensity map, probabilistic seismic hazard analysis map and geology map. All these maps were assigned to three levels of constraints and converted to raster images. Integration of all four constraint maps creates the final natural disaster risks map.

Social Impact risk was carried by township level population data, which falls in development projects areas. Risk level was categorized into three levels based on distribution of population. Some projects need to analyze detail social impact risk when they go beyond the planning stage.

The information of the type of data, data sources and classifications are shown in the following **Tables 12.4.1** to **12.4.4**.

Table-12.4.1 Parameter for Evaluating Potential Impact

Parameter	Type to Data and Data Sources
Environmental Sensitivity	
Protected area systems	Location of designated protected area, wildlife sanctuary, etc. (MONREC)
Land cover	Land cover map (FAO)
Natural Disaster Risk	
Rainfall	Average annual rainfall in methodological station between 2006 and 2010 (DMH)
Storm	Storm Intensity OCHA (2011)
Earthquake	Probabilistic Seismic Hazard Analysis by Myo Thant (2012)
Geology	Geology map of Myanmar, MGS (2014)
Social Impact Risk	
Town locations and Township Boundaries	Myanmar Information Management Unit (MIMU)
Population	Myanmar Population and Housing Census (2014)

Source: Study Team

Table-12.4.2 Environmental Sensitivity Analysis

Environmental Features	Level of Constraint				Weight	Remarks
	0	1	2	3		
a. Protected Area	others	-	-	Yes	1	Apply same weighted overlay for both features
b. Land Cover	others	Yes (Scrubland, waterbody)	Yes (Agriculture)	Yes (Evergreen Forest, Deciduous Forest, Mangrove, Dry Mixed Deciduous Forest)	1	

Environmental Sensitivity

Total Score	0 – 2	3 - 5	6
Constraint Level	Low Sensitivity	Medium Sensitivity	High Sensitivity

Source: Study Team

Table-12.4.3 Natural Disaster Risk Analysis

Environmental Features	Level of Constraint					Weight
	0	1	2	3	4	
a. Average Annual Rainfall (mm)	<2000	2000<X<3000	3000<X<4000	4000<X<5000	>5000	1
b. Storm Intensity (km/h)	Category One: 118-153	Category Two: 154-177	Category Three: 178-209	Category Four: 210-249	>250	1.5
c. Probabilistic Seismic Hazard Analysis (pga)	<0.125	0.125-0.25	0.25-0.375	0.375-0.5	>0.5	1.5
d. Geology	-	-	Hard rock	Soft rock	Very soft rock	1

Natural Disaster Risk

Total Score	0 - 10	11 – 13	14 - 20
Constraint Level	Low Risk	Medium Risk	High Risk

Source: Study Team

Table-12.4.4 Social Impact Risk Analysis

Environmental Features	Level of Constraint			Weight
	1	2	3	
Population	0-150,000	150,000- 300,000	>300,000	100

Social Impact Risk

Total Score	1	2	3
Constraint Level	Low Risk	Medium Risk	High Risk

Source: Study Team

12.4.1.2 Results of Spatial Analysis and Development Concept

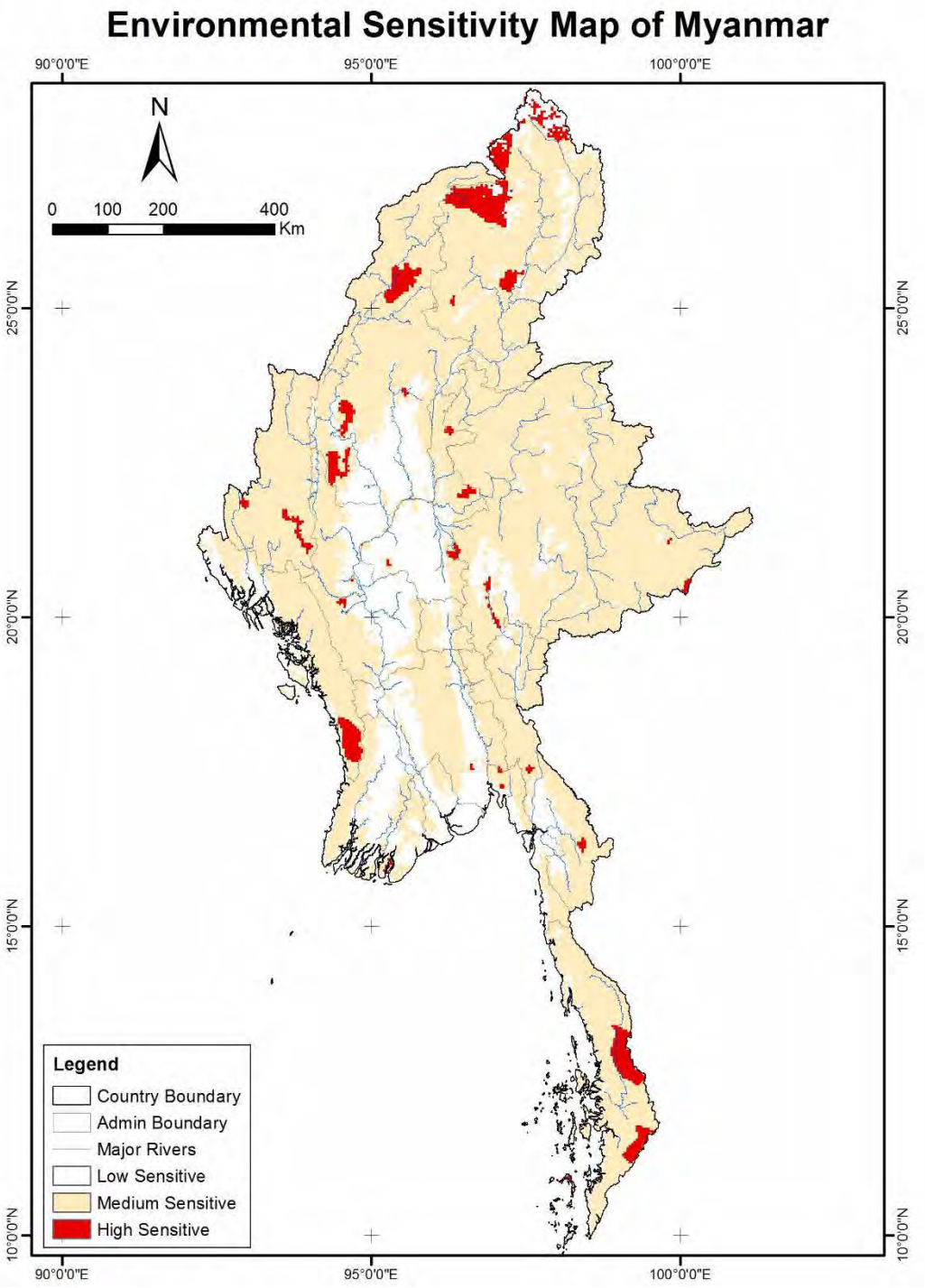
(1) Result of Environmental Sensitivity Analysis

SEA conducted environmental sensitivity analysis on Myanmar's natural resources, as shown in Figure-**12.4.1.** The study area was categorized into three categories of sensitivity. For each sensitivity category, **Table-12.4.5** indicates the relevant environmental sensitivity.

Table-12.4.5 Result of Environmental Sensitivity Analysis

	Low Sensitive	Medium Sensitive	High Sensitive
Percentage of sensitive Area	19%	71%	3%
Area Description	Low environmental sensitivity	Medium environmental sensitivity	High environmental sensitivity
Analysis	Not much restrictions for any development projects	- Need mitigation measure - Take care environmental sensitivity	- Development projects should not be implemented. - Designated protected areas are required.
Acceptability	Any project but require minimizing possibility of impact	- Consider reducing large-scale development projects as possible. - Selection of location with least environmental impact - Prepare specific EMP for every project	- Rehabilitation of existing infrastructure such as access roads/railways - Projects should not be conducted which will mostly change condition of land use.

Source: Study Team



Source: Study Team

Figure-12.4.1 Environmental Sensitivity Map of Myanmar

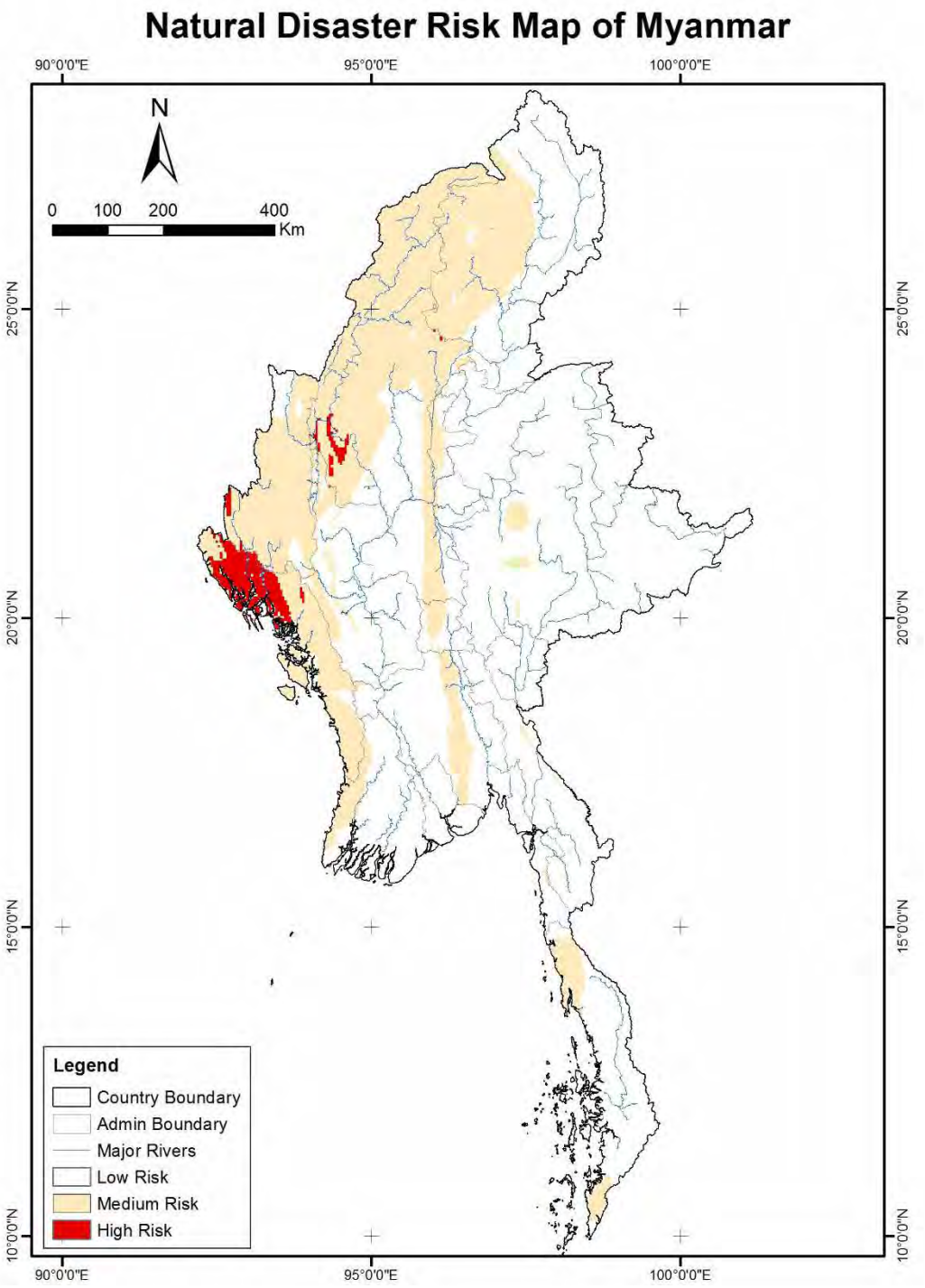
(2) Natural Disaster Risk Analysis

The risk analysis of natural disasters, as shown in **Figure-12.4.2**, was categorized into three risk zones (Low, Medium, High), each describing the planned zoning explained in **Table-12.4.6.**

Table-12.4.6 Result of Natural Disaster Risk Analysis

	Low Risk	Medium Risk	High Risk
Percentage of sensitive Area	67%	32%	2%
Area Description	Low risk of natural disaster	Moderate risk condition, even though these areas are prone to risks from natural disasters	Highly sensitive areas
Analysis	Less restrictions for the development projects	Disaster prevention plan should be required	Highly risk for the development projects.
Acceptability	Take care upon any condition of natural disaster for the development projects	Large-scale project should be considered on disaster management plan especially for national development projects	Necessary to implement for the rehabilitation of existing infrastructure within or around the development projects.

Source: Study Team



Source: Study Team

Figure-12.4.2 Natural Disaster Risk Map of Myanmar

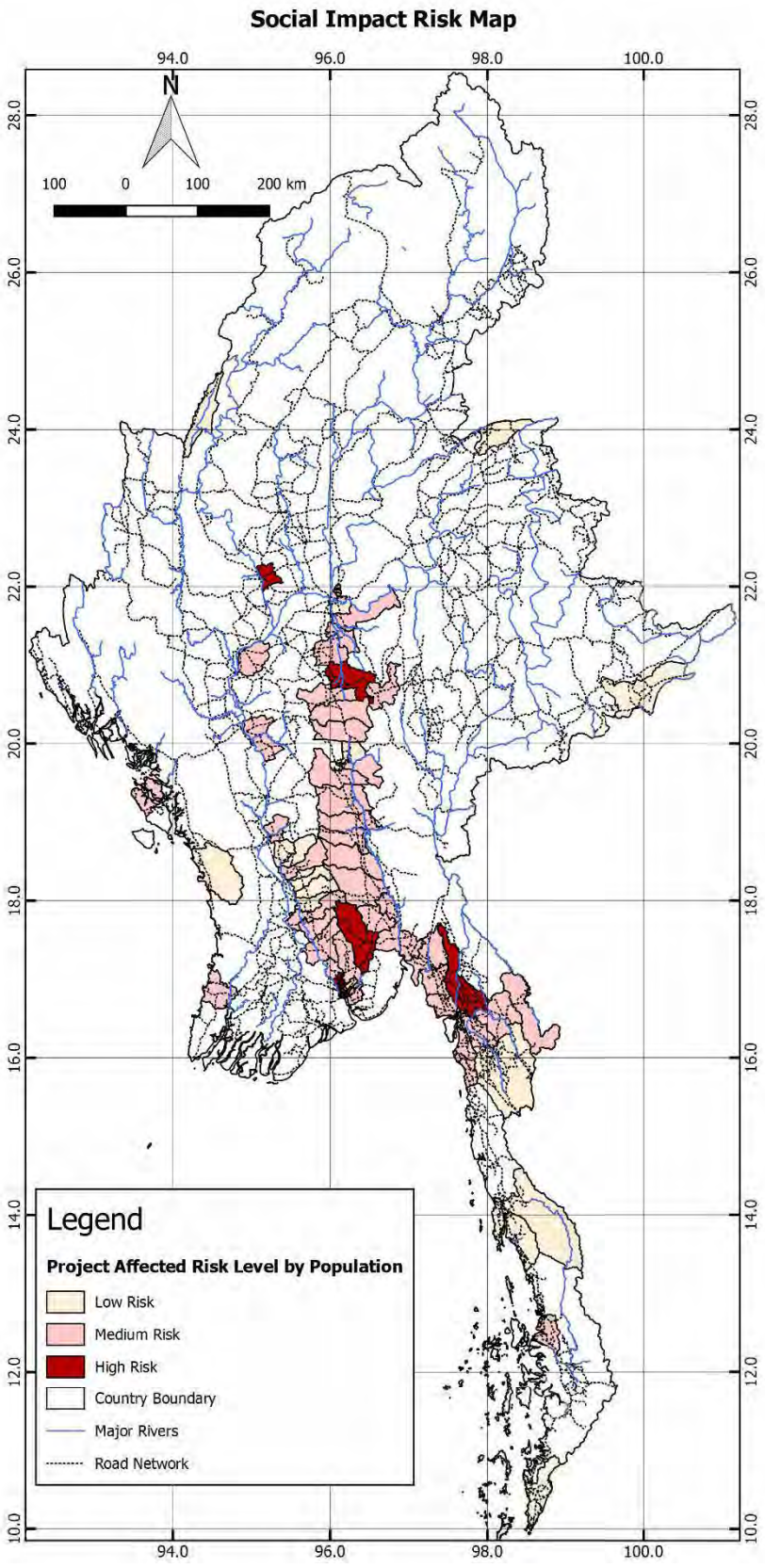
(3) Social Impact Risk Analysis

The risk analysis of social impact, as shown in **Figure-12.4.3,** was categorized into three risk zones (Low, Medium, High), each describing the planned zoning explained in **Table-12.4.7**.

Table-12.4.7 Result of Social Impact Risk Analysis

	Low Risk	Medium Risk	High Risk
Consideration of sensitive Area based on Township's population	0 – 150,000	150,000 – 300,000	> 300,000
Area Description	Social Impact Low Risk	Social Impact Low Risk	Social Impact High Risk
Analysis	Less restrictions for the development projects	Disaster prevention plan should be required	Highly risk for the development projects.
Acceptability	Take care upon any condition of social impact for the development projects	Large-scale project should be considered social Impact during or after any national development projects	Any development projects should be take care upon social impact around the projects which includes before, during and after projects activities.

Source: Study Team



Source: Study Team

Figure-12.4.3 Social Impact Risk Map of Myanmar

12.4.2 Result of Overall Evaluation

The approach of overall evaluation of the environmental and social factors for the target projects is described below.

Key Evaluation Factors

The following factors that are likely to cause negative impacts are identified for evaluation.

(1) Pollution
   1) Air pollution and noise disturbance
   2) Water quality
   3) Waste

(2) Natural Environment
   1) Ecosystem: including location of designated protected area, wildlife sanctuary, etc. The ecosystem impact may be evaluated by environmental sensitivity analysis.
   2) Disaster: evaluated through risk analysis of natural disasters.

Impacts on the natural environment (ecosystem and disaster) were spatially evaluated, based on the environmental suitability analysis (see section 1.4.1).

(3) Social Environment
   1) Land acquisition and resettlement
   2) Local issues, including local economy, community conflict.
   3) Rights, including access rights to water, children, women, disabilities.

Scoring Method

The above-noted impacts were evaluated using the following three evaluation factors, namely "magnitude", "duration" and "extent".

Table-12.4.8 Evaluation Factors

Evaluation Factor	Score			
	0	1	2	3
Magnitude	No or less	Small	Medium	Significant
Duration	-	During construction stage only	Several years	Long
Extent	-	At the construction site only	Local	Wide

Source: Study Team

Scoring and Overall Evaluation

An overall score is calculated by summation of the above 8 factors in the following formula:

Overall Score = (1) +(2) + (3) + (4) x 2 + (5) + (6) x 2 + (7) +(8)

It should be noted that values of "(4) ecosystem" and "(6) land acquisition and resettlement" are doubled. These factors are considered more important as they carry more risk of objection and greater potential for project delays.

Finally, the overall evaluation for each proposed project is rated in **Table-12.4.9** below:

Table-12.4.9 Classification of Evaluation Results

Classification	Score
A	Total score >= 50
B	49 >= Total score >=42
C	41 >= Total score but not 0
Not Applicable (N/A)	-

Note: Soft component development project and project with insufficient information for evaluation are classified as N/A
Source: Study Team

In the result of overall evaluation for target project, there is no project classified as Classification A. Therefore, it is expected that there are no projects that are expected to have a significant potential negative impact.

Based on the result of this SEA study, the expected key potential impact and mitigation measures for target project are prepared and attached to each project profile presented in Appendix-1 Project Profile. This information can be utilized for the consideration of project plan to minimize the environmental and social issues. Moreover, it can be referred to the preparation of the environmental management plan in the study stage of each EIA, IEE or EMP study for target project.

Table-12.4.10 Overall Evaluation of Target Project

Sector	Project ID	Project Name	Project Description	Pollution			Natural Environment		Social Environment			Total Score	Overall
				(1) Air Quality/ Noise Disturbance	(2) Water Quality	(3) Wastes	(4) Ecosystems	(5) Disaster	(6) Land Acquisition /Resettlement	(7) Local Issues	(8) Rights		
Railway	LFP-01	Development of Freight Railway Station / ICD at Yangon and Mandalay	New construction	6	4	4	5	6	7	3	2	49	B
	LFP-02	Freight Station Development Project in Thilawa with Thilawa Line Improvement	New construction	6	4	4	4	5	7	3	2	46	B
	LFP-04	Procurement of Locomotives and Container Wagons	N/A	-	-	-	-	-	-	-	-	N/A	N/A
	LFP-05	Bulk Cargo Railway Freight Improvement Project	N/A	-	-	-	-	-	-	-	-	N/A	N/A
	LFP-06	Yangon Outer Ring Freight Railway Development Project	New construction	6	4	4	4	5	7	3	2	46	B
	LFP-07	ICDs Development proposed by UNESCAP	N/A	-	-	-	-	-	-	-	-	N/A	N/A
	LFP-08	Intermediate Freight Station Improvement Project	New construction	6	4	4	4	5	7	3	2	46	B
	LFP-11	Tathon - Myaingkalay Track Improvement with Myaingkalay CFS	New construction	6	4	4	5	5	7	3	2	48	B
	LFP-12	Kyaikkami Freight Terminal Development and Upgrading of Bridges between Mawlamyine and Thanbyuzayat	New construction	6	4	4	4	5	7	3	2	46	B
	LFP-13	Improvement of Yangon CBD Freight Station	New construction	6	4	4	4	5	7	3	2	46	B
	LFP-14	Thilawa - Bago New Line Development Project	New construction	6	4	4	4	5	7	3	2	46	B
IWT	LIP-04	Rakhaine Coastal Vessels	N/A	-	-	-	-	-	-	-	-	N/A	N/A
	LIP-05	Replacement of Wooden Vessel to FRP Vessel with TA	N/A	-	-	-	-	-	-	-	-	N/A	N/A
	LIP-07	Improvement of Yangon River Water Transportation	New construction	4	5	4	5	5	7	3	2	47	B
	LIP-09	Kaladan Multi-Model Transit Transport Project (Vessels, Channel, Navigation)	New construction	4	5	4	5	7	7	3	2	49	B
	LIP-13	Container Vessel (Vessel modernization)	N/A	-	-	-	-	-	-	-	-	N/A	N/A
	LIP-14	Connectivity of Oversea, Coastal and Inland Water Transportation	N/A	-	-	-	-	-	-	-	-	N/A	N/A
	LIP-17	Pathein Port	New construction	4	5	4	5	5	7	3	2	47	B

Sector	Project ID	Project Name	Project Description	Pollution			Natural Environment		Social Environment			Total Score	Overall
				(1) Air Quality/ Noise Disturbance	(2) Water Quality	(3) Wastes	(4) Ecosystems	(5) Disaster	(6) Land Acquisition /Resettlement	(7) Local Issues	(8) Rights		
Logistic	LLP-01	Improvement of Bonded Transport / Warehousing	N/A	-	-	-	-	-	-	-	-	N/A	N/A
	LLP-02	Establishment of New Yangon Truck Terminal Project	New construction	6	4	4	4	5	7	3	2	46	B
	LLP-03	Container Switching Station Development at Myawaddy Trade Zone	New construction	6	4	4	4	5	7	3	2	46	B
	LLP-04	Container Switching Station Development at Three Pagoda Pass	New construction	6	4	4	4	5	7	3	2	46	B
	LLP-06	City Truck Terminal Improvement Project (6 cities)	New construction	6	4	4	5	6	7	3	2	49	B
	LLP-08	Establishment of Mandalay Multi-modal Logistics Park	New construction	6	4	4	4	6	7	3	2	47	B
	LLP-09	Establishment of Bago Multi-modal Logistics Complex Project	New construction	6	4	4	4	6	7	3	2	47	B
Road	LRP-02	Alternative Route of Mandalay - Muse Road	Improvement, New construction	6	5	4	5	5	7	3	2	49	B
	LRP-03	Myotar-Tada U Road	New construction	6	5	4	4	6	7	3	2	48	B
	LRP-04	Yangon Urban Expressway (YUEX) East Section	New construction	6	5	4	4	5	7	3	2	47	B
	LRP-05	Yangon Outer Ring Road (YORR) East Section	New construction	6	5	4	4	5	7	3	2	47	B
	LRP-06	Construction of Hanthawaddy Airport Access Road	New construction	6	5	4	4	5	7	3	2	47	B
	LRP-07	New Expressway between Bago-Kyakito	New construction	6	5	4	5	5	7	3	2	49	B
	LRP-08	Thaton Bypass Road	New construction	6	5	4	5	5	7	3	2	49	B
	LRP-09	Three Pagoda Pass Road (Upgrading)	Improvement	6	4	4	4	5	5	3	2	42	B
	LRP-10	Construction of Mawlamyine Peripheral Road	Improvement	6	4	4	4	5	5	3	2	42	B
	LRP-11	Pong Taung-Pone Nyar Tunnel between Magway and Sagain	New construction	6	5	4	4	5	7	3	2	47	B
	LRP-12	Fast Shan Plateau Access Road (Yin Mar Bin-Kalaw)	New construction	6	5	4	5	5	7	3	2	49	B
	LRP-13	Construction of bridges on AH 1 (Tamu-Kyigone-Kalewa Road)	New construction	6	5	4	4	5	7	3	2	47	B
	LRP-14	Ann-Kyaupyu Road	Improvement	6	5	4	5	6	5	3	2	46	B
	LRP-15	Improvement of Road Safety Program (TA + pilot project)	N/A	-	-	-	-	-	-	-	-	N/A	N/A

Sector	Project ID	Project Name	Project Description	Pollution			Natural Environment		Social Environment			Total Score	Overall
				(1) Air Quality/ Noise Disturbance	(2) Water Quality	(3) Wastes	(4) Ecosystems	(5) Disaster	(6) Land Acquisition /Resettlement	(7) Local Issues	(8) Rights		
Sea Port	LWP-02	Yangon Port (Domestic Port) Improvement Project	Improvement	4	5	4	4	5	5	3	2	41	C
	LWP-04	Dawei SEZ Port Development Project	New construction	4	5	4	4	6	7	3	2	46	B
	LWP-05	Kyaukphyu Port Improvement Project	New construction	4	5	4	4	6	7	3	2	46	B
	LWP-06	Thandwe Port Improvement Project	New construction	4	5	4	4	6	7	3	2	46	B
	LWP-07	Pathein Port Improvement Project	New construction	4	5	4	4	5	7	3	2	45	B
	LWP-08	Mawlamyine Port Improvement Project	New construction	4	5	4	4	5	7	3	2	45	B
	LWP-09	Kyaikami International Grain Terminal / Port Development Project	New construction	4	5	4	4	5	7	3	2	45	B
	LWP-11	Myeik Port Improvement Project	New construction	4	5	4	5	5	7	3	2	47	B
	LWP-12	Kawthaung Port Improvement Project	New construction	4	5	4	5	5	7	3	2	47	B

Note: Soft component development project and project with insufficient information for evaluation are classified as N/A
Source: Study Team

CHAPTER-13 FREIGHT TRANSPORT AND LOGISTICS INDUSTRIES

13.1 Present Situation of Players of Logistics Sector

13.1.1 Players of Transport Industry

The players of the logistics sector are composed of the private sector and the public sector. The outlines of both sectors are as follows:

Private Sector: The types of private entities as the players within the logistics sector are companies operating trucking, warehousing, inland water transport, coastal shipping, air cargo transport, freight forwarding businesses and logistics providers that undertake all necessary freight transport services for both domestic and international freight transport. At present, these companies operate in several fields related to freight transport and logistics forming their associations as follows:

1) Myanmar Highway Freight Transportation Service Association (MHTSA)
2) Myanmar International Freight Forwarders Association (MIFFA)
3) Myanmar Container Truck Association (MCTA)
4) GMS Freight Forwarding Association (GMS FFA)
5) Myanmar Transport Logistics Federation (MTLF)[1]

Public Sector: The public sector transport operators are State Owned Enterprise (SOE) except the Department of Civil Aviation under MOTC for operation and management of airport or the civil aviation sector as a whole. The railway transport, inland waterway transport, seaports and airports are operated by the following SOEs;

1) Railway transport – Myanma Railway (MR)
2) Inland waterway transport – Inland Water Transport (IWT)
3) Sea Port – Myanma Port Authority (MPA)

The public-private partnership type collaboration has been introduced and implemented in various forms by several SOEs and the Department of MOTC e.g. international airport by DCA, container terminal operation by MPA. Further, PPP type projects should be implemented for transport / logistics infrastructure where highly sophisticated management is required, such as logistics parks with the function of multimodal freight logistics hub.

[1] Myanmar Transport Logistics Federation was formed under UMFCCI in November 2017 to cooperate with other organizations for logistics sector development.

13.1.2 Present Situation of the Transport Industry

The transport industry in Myanmar is composed of road, rail, inland waterway transport, coastal shipping, maritime and air transport. Among these transport modes, railway transport is undertaken by Myanma Railway, which is a State Owned Enterprise (SOE), and a part of inland waterway transport is undertaken by the Inland Waterway Transport (IWT) both of these are SOEs under the MOTC. The development and management of commercial ports is undertaken by the Myanma Port Authority (MPA). The development and management of airports is undertaken by the Department of Civil Aviation (DCA). Road transport dominates at present the freight transport of Myanmar, however, the road transport (trucking) is solely undertaken by the private sector of which major players are private companies classed as Small and Medium Enterprises (SME).

(1) Present Situation of the Road Freight Transport (trucking) Industry

General: In Myanmar, the trucking industry is organized in so-called “gates”. Gates exist in each major city, and each gate specializes on one trunk route, e.g. Yangon-Mandalay. Every gate consists of a pool of operators. Membership in the gates is usually not obligatory. Newer and larger operators do not generally participate in the gate system. The gate manager also has the task of consolidating loads. The consolidated cargo is transshipped at a truck park adjacent to office areas. Full truckloads are collected directly at the shipper’s (e.g. factory) premises and do not go through the gate area. The number of trailer trucks for marine container transport plying between the international ports and the industrial estates is deemed to be sufficient at present.

Franchise by Link for Long-distance Hauls: The trucking companies registered as the members of “gates” are given franchises by link. The number of member trucking companies registered at Bayint Naung Truck Terminal in Yangon that is managed by YCDC is 367 in total. The number of trucking companies operating under such franchise agreement by link is as shown in **Table-13.1.1** and **Figure-13.1.1**.

Average Number of Trucks Operated by One Trucking Company: The number of trucking companies in Myanmar is estimated at around 400 in total in 2016. **Table-13.1.2** shows the average number of trucks by cargo loading capacity, owned by an average trucking company. As shown in this table, the average number of trucks owned by one company is 36. The total population of large trucks having a loading capacity of more than 11 tonnes is estimated to be around 10,800 units in 2016.

	Destination from Yangon	Nos.
1	Mandalay Region	81
2	Shan State	42
3	Ayeyarwaddy Region	40
4	Bago Region	38
5	Mon State	29
6	Rakhain State	27
7	Tanintharyi Region	22
8	Kayin State	21
9	Magway Region	19
10	Various	15
11	Nay Pyi Taw	14
12	Sagaing Region	13
13	Kayah Region	3
14	Yangon Region	3
	Total	367

Source: Study Team

Table-13.1.1 Number of Trucking Companies by Link

Source: Study Team

Figure-13.1.1 Number of Trucking Companies by Link

Table-13.1.2 Average Number of Trucks per Single Trucking Company

Loading Capacity	Unit
Over 25 tonnes	13
11-25 tonnes	14
Up to 11 tonnes	9
Total	36

Source: Study Team based on truck company survey

Growth of the Number of Trucks: After the Government allowed all Myanmar citizens to import cars in 2012, the number of vehicles grew sharply, registering a CAGR of 20% in 2014-2016, as shown in **Table-13.1.3.** The total number of trucks registered in 2016 reached to around 300,000 units. If the average number of trucks owned by a single trucking company is 36 units, then the total number of trucking companies operating in Myanmar can be estimated at around 8,300.

Table-13.1.3 Number of Registered Vehicles

(Unit: 1,000 unit)

Year	Passenger	Trucks	Buses	Motorcycles	Others	Total
2014	434	125	22	3,595	61	4,238
2015	495	194	27	4,277	86	5,078
2016	571	296	27	5,123	110	6,126
AGR						
2014-2015	14%	55%	21%	19%	40%	20%
2015-2016	15%	53%	0%	20%	28%	21%
CAGR						
2014-2016	15%	54%	10%	19%	34%	20%

Source: Study Team based on the CSO

As shown in this table, the CAGR of trucks registered is 54% in 2014-2016, which is remarkably high. This suggests that freight movements have increased sharply.

(2) Present Situation of Railway Transportation Industry

General: In Myanmar, railways form an important transport network especially for moving people in rural areas. Railways are suitable for the long-haul freight transport of bulky and low value products, such as farm products, farm inputs, construction materials (cement, reinforced steel bars, sand, bricks, etc.), liquid products (petroleum products, etc.). When the railway tracks of the major rail lines are improved, scheduled freight block train operation will commence for transport of containerized cargos and bulky cargoes by specialized freight wagons. Myanma Railway (MR) is the state-owned agency that operates the railway network, which is 5,403 km long with meter gauge track. The railway network consists of 858 railway stations.

Railway Track Improvement and ICD Development: The rehabilitation and improvement of the railway track linking Yangon and Mandalay is expected to be completed by 2023, with technical and financial assistance from Japanese ODA. Upon completion of the railway track on this line, scheduled railway freight transport operations by block trains are planned. In order to handle the containerized cargoes transported by this new railway freight transport system, railway freight handling concession agreements were concluded between MR and the international private logistics company. The Inland Container Depots (ICD) or dry ports are expected to be developed in line with this concession agreement. As the operation of the ICD is the responsibility of the concessionaire, thus human resources development is the responsibility of the private company.

(3) Present Situation of the Coastal Shipping Industry

General: In Myanmar, coastal shipping is an important freight transport mode especially for the long-haul transport of bulky and low value products along the coastal area, spanning from Sittwe at the western end of Myanmar to Kawthaung at the southern end of Myanmar. The total length of the coastline is approximately 2,800 km. The number of domestic ports under the MPA is nine. Most domestic ports are old and their cargo handling capacities are quite low and cargo handling is commonly undertaken manually. Due to such conditions, berthing times of coastal ships are quite long or the ship utilization ratio is very low. Most of the cities situated along the coast of Myanmar are not well connected with road and railway system; therefore many of them rely on coastal shipping for their daily life and economy.

Present Number of Vessels: The number of vessels under operation is 4,292 of different types (1,860 not including fishing vessels) as shown in **Table-13.1.4.**

Table-13.1.4 Number of Vessels

Type of Vessel	2012	2013	2014
Coastal Passenger	16	18	18
Inland Passenger	389	416	477
Coastal Cargo Ship	340	399	444
Inland Cargo Vessel	206	231	264
Fishing Vessel	2,267	2,377	2,432
Coastal Tug	12	13	14
Inland Tug Boat	352	283	494
Oil Barge	76	92	149
Total	3,658	3,927	4,292
Total Excluding Fishing Vessels	1,391	1,550	1,860

Source: Study Team based on Current Situation of Shipping Industries, Maritime Policy and Legislation in Myanmar

The average annual growth rate of the number of vessels of all kinds is computed at 16%, which is quite high and expected to grow continuously in future.

Number of Coastal Shipping Vessels: The coastal shipping is operated totally by the private sector in Myanmar. The number of vessels for coastal shipping whose sizes more than 1,000 DWT is 444 in 2016. The annual cargo volume transported by the coast shipping is around 7.0 million tonnes. The freight transport charge by coastal shipping is much lower than that of trucking and railway freight transport. **Table-13.1.5** shows the required number of vessels to be built / procured to meet with growing freight demand.

Table-13.1.5 Required Investment for Coastal Shipping Fleet by 2030

Vessels	Current Nos. As of 2016	Required Nos. in 2030	Unit Cost	Total Cost	Average Cost (15-years)
	Unit	Unit	(US$)	(US$ million)	(US$ million)
Coastal	444	1,400	500,000	700	103

Source: JICA Study Team

The number of coastal shipping vessels to be added on top of the present number of vessels is estimated at 1,400 for coastal shipping. As the above table suggests, around US$103 million is needed for the expansion of vessel fleets by procurement of new vessels. As the majority of the coastal shipping companies fall under SME in terms of size of company, it is quite difficult to provide such a large amount of money.

(4) Present Situation of the Inland Waterway Transport Industry

General: In Myanmar the inland waterway transport is an important freight transport mode especially for the long haul transport of bulky and low value products, such as farm products (rice, beans, sugarcane, etc.), farm inputs (fertilizer) construction materials (cement, reinforced steel bars, sand, bricks, etc.), liquid products (petroleum products, etc.) and for passengers with daily consumable products along Ayeyarwaddy River, Chindwin River and rivers in Mon, Karen and Rakhine. When the river ports are developed or improved with modern cargo handling systems, containerized cargoes and empty containers are expected to be transported by the inland waterway transport system.

Number of Inland Waterway Transport Vessels: Both SOEs and private companies operate the inland waterway transport system in Myanmar. The entity operating the inland waterway transport by SOE is referred to as IWT. IWT has a fleet of 170 power craft and 119 dump barges. IWT undertakes the transport of the considerable volumes of 15 million passengers and around 2 million tonnes of cargo annually. The freight transport charge by IWT is the lowest when compared to freight charges by other transport modes. The private sector operates inland waterway transport in the Ayeyarwaddy Delta area, mainly by small wooden vessels. The number of private wooden vessels is around 4,200. **Table-13.1.6** shows the required number of vessels to be built / procured to meet the growing freight demand.

Table-13.1.6 Required Investment for IWT Fleet by 2030

Vessels	Current Nos. As of 2016	Required Nos. in 2030	Unit Cost	Total Cost	Average Cost (15-years)
	Unit	Unit	(US$)	(US$ million)	(US$ million)
Inland Water	740	2,350	150,000	240	16

Source: JICA Study Team

The number of vessels needed in 2030 is projected to be 2,350 ships of average size ship currently operated by IWT assuming the annual growth rate is 8%; thus, the number of vessels to be added on top of present number of vessels is estimated at 1,610 for inland waterway transport. The above table suggests that around US$ 240 million is needed for the expansion of vessel fleets by procurement of new vessels. As the majority of inland waterway transport or coastal shipping companies are classed as SMEs, such a large amount of money needs to be provided for supporting SMEs operating in the domestic shipping sector.

Needed Expansion of Inland Waterway Transport Fleet: Most of the vessels within the inland waterway transport fleet are old and need to be replaced with new vessels, which are designed taking into account the shallow water depth of the main rivers during the dry season. The amount of investment needed is enormous, especially for the private inland waterway transport operators classed as SMEs. However, at present the annual bank interest rate is more than 15% per annum with an amortization period of around one year. In order to make investments viable for SME inland waterway transport companies, an institutional financial scheme whose interest rate is lower than that of commercial banks, with longer amortization period, may be needed.

(5) Forwarders and Logistics Companies

General: The total number of forwarding and logistics companies at present in Myanmar is around 160. Some of these companies are international companies. The international transport and logistics companies are linked with the worldwide network. The Government clearly set a policy for the enhancement and promotion of foreign direct investment (FDI) to lead economic development and growth. The establishment of an international standard logistics system will be considered as one of the important factors that foreign investors evaluate and consider in

their investments in Myanmar. Prior to the start of substantial FDI inflow, the development of both necessary infrastructure and operating companies should comply with international standards. The daily business activities of international logistics companies will influence the existing local freight forwarding companies to raise their business standards to the level of international standards.

Lack of Warehouses: Most of warehouses are owned by the traders or producers but not by logistics providers, transporters, and forwarders. The average space of warehouses located in the truck terminals is quite small. Most of their average floor area is less than 1,000 square feet. The frequency of shipment of goods is twice in a week day in an average. This means the warehousing performance or efficiency is very low. The function of warehouse is considered as storing only but not storing for inventory control.

13.2 Current Issues of Players in the Logistics Sector

(1) Issues of the Road Transport (Trucking) Industry

General: Trucking is the dominant freight transport mode in Myanmar. The number of heavy trucks alone is around 120,000 units, while most of them are aged and are second hand trucks, thus the fuel consumption ratio is quite high. As discussed in Chapter 7, the dwell time of trucks at truck terminals is quite lengthy (i.e. around 36 hours or half of the average truck turnaround time for the Yangon-Mandalay route) because return cargoes are not secured prior to the departure of the truck from its origin point. The average load factor in rural areas is 0.5, as no return cargoes are secured. Furthermore, the bank interest rate is around 15% per annum with an amortization period of around one year. These factors push up the transport cost whilst the prevailing transport charge of cargo per ton in the market fluctuates by season and is insufficient to cover costs. Thus, the profits gained by trucking companies are rather low. The trucking business is not a lucrative business but a hard one. Most of the commodity dealers have their own trucks for the transport of their commodities from production areas to the market and do not outsource the transport of their commodities, since there is a lack of a proper insurance system to cover the losses and damages of cargoes occurring to their commodities during transport and cargo handling until they are stored at designated locations. Under such circumstances, the number of trucking companies having a wide range of size of trucks and specialized for the trucking business is quite limited. Most of the trucking companies fall under the SMEs. Because of such conditions, the truck fleet cannot be expanded easily to meet with the ever-increasing demand for freight transport.

The age of the Myanmar trucking fleet varies from new trucks to old vehicles (30+ years). On long-haul routes, newer 22-wheel Chinese trucks as well as 7-15 year-old 12-14-wheel Japanese trucks are dominant. Older models are still used for rural and urban distribution. The Chinese trucks are left-hand drive whilst the Japanese imported trucks are right-hand drive vehicles.

High Operating Costs: Fuel efficiency varies greatly as it is strongly connected to the age of the truck. The general operating costs depend on the route. The variable costs such as fuel/lube as well as tires make up on average around 85% of all operating costs. However, the costs are much higher on the Mandalay-Muse route compared to the Yangon-Mandalay route due to the large difference of terrain. The Yangon-Mandalay route (1,500 km round-trip) leads through flat terrain and is therefore much cheaper to operate than the Mandalay-Muse route (900 km round-trip), that leads through mountainous countryside. Also the driver's wages differ widely between various road segments.

High Traffic and Freight Rates: The road transport sector in Myanmar can be divided into three segments: 1) distribution of cargo between the port and the greater Yangon area; 2) long-haul transport service, and 3) local services up-country. Most traffic in Myanmar occurs along the Yangon – Mandalay – Muse – Kunming corridor at present. Traffic volumes at the border amount to 1,000-1,500 trucks per day at Muse. Similarly, Yangon is the major traffic generator in Myanmar. With its port and airport, the Capital acts as the main gateway for both imports and exports, with the exception of international truck traffic through the cross-border facilities. Freight rates in Myanmar seem to vary greatly even on the same routes. Factors influencing the rates are:

1) Seasonal fluctuations (e.g. quantity of individual crops and their harvest times within the year),
2) The weather pattern (e.g. monsoon influencing the quantity harvested each year),
3) The permissible axle load (e.g. enforcement of axle load regulations), and
4) The number of trucks and their individual loading capacity (total fleet capacity).

Traffic Congestion: The truck ban has been imposed in Yangon City by YCDC from 06:00 morning to 21:00 evening since December 2016 aimed at preventing traffic congestion in Yangon City at noon-time, due to heavy traffic of large trucks which increase urban traffic congestion within Yangon. Due to the execution of the truck ban in Yangon city, the congestion at the Bayint Naung Truck Terminal worsened at nighttime, thus truck transport efficiency has reduced even further. The congestion of large size trucks or trailer trucks for transport of marine containers in and around Yangon Port, including the Thilawa Container Terminal Areas, is heavy and is expected to become heavier further when the new terminal in the Thilawa Container Terminal Area will be commissioned in coming years. This reduces transport efficiency further, due to the lengthy dwell times of trailer trucks in and around the Thilawa Container Terminal Area.

Needed Expansion of Truck Fleet by 2030: Myanmar's impressive economic performance is the result of strong Foreign Direct Investment (FDI) in-flow, increasing commodity exports, growing tourism, and rapid credit growth coupled with ambitious government reformation. If Myanmar will continue to reform, the economy is projected to grow at an average 7% in the coming years or toward 2030. Then, the annual growth rate of number of vehicles is around

2.8 times larger than that of the economic growth rate of Myanmar.

At present, the number of registered trucks is estimated at around 296,000 in total, of which heavy trucks account for 118,400 units and light trucks for 177,600 units, respectively. Assuming the required number of trucks for land freight transport will increase at 10% per annum up to 2030, the number of trucks will increase to around 830,000 units in total. **Table-13.2.1** shows the estimation of the required investment amount for procurement of trucks by trucking companies by 2030, based on the assumption that the annual growth in number of trucks is 10%.

The Table below suggests that around US$ 4.4 billion or MMK 5.8 trillion is needed for procurement of new trucks every year. As the majority of the trucking companies fall under SME in terms of size of company, such a large amount of money is to be provided for supporting SMEs operating in the transport sector.

Table-13.2.1 Required Investment for Truck Fleet by 2030

Truck	Current Nos. As of 2016	Required Nos. in 2030	Additional Nos. toward 2030	Unit Cost (US$)	Total Cost (US$ million)	Average Cost (15-years) (US$ million)
Heavy	118,400	330,000	211,600	180,000	38,088	2,539
Light	177,600	500,000	322,400	85,000	27,404	1,827
Total	296,000	830,000	534,000		65,492	4,366

1) The number of additional trucks is an assumption.
2) New trucks to be procured are assumed to be new units, but not second-hand trucks.
Source: JICA Study Team

Required Number of Truck Drivers by 2030: A significant issue concerning road freight transport is a lack of skilled or qualified truck drivers and a sharp increase of labor costs due to a current shortage of qualified truck drivers especially for the present long-haul freight transport by heavy trucks. Almost all heavy trucks are operated on long-haul freight transport. The number of drivers for long haul freight transport by heavy trucks is regulated, as 2 drivers per single heavy truck. Thus the number of heavy truck drivers can be estimated at around 240,000 and 180,000 for light trucks. Assuming the demand of freight transport by heavy trucks will increase at a higher growth rate than the GDP growth rate or 10% per annum, the required number of heavy trucks alone in 2030 can be estimated at some 660,000 - 1,000,000 (or 2.8 times larger than that of 2016), which is a large increase. This means that around 4,500 driving licenses for heavy truck driving need to be issued each year up to 2030. Taking this into consideration, railway transport for the long-distance freight transport is to be encouraged, so as to increase a shift from road transport to rail transport as far as possible. At any rate, the training of truck drivers is essential in order to ensure road safety and future road transport efficiency.

Investment Scale to Increase the Number of Trucks are Huge: Assuming that the average cost of a second-hand truck is around 9 million Japanese Yen (or US$ 84,000) the value of total assets of a trucking company is around US$ 300,000, just for trucks. The required number of trucks to meet with ever increasing freight transport demand by truck is around 330,000 units. Therefore, the required investment amount for trucks are around US$3.8 billion. Assuming the number of trucking companies will be 15,000 companies in 2030, the average investment amount required by one company can be estimated around US$ 250,000. As most of the trucking companies are classed as small-medium enterprises (SMEs), it may be difficult to finance this new investment for trucks only from revenues generated through business operations. The financial facility for trucking company needs to be provided to increase the number of trucks to meet freight transport demand. However, at present the annual rate of bank interest is more than 15% per annum. In order to make the investment viable for SME trucking companies, an institutional financial scheme whose interest rate is lower than that of commercial banks, with longer amortization period, may be needed.

(2) Issues of the Railway Freight Transport Industry

General: at present, Myanma Railway (MR) undertakes railway freight transport exclusively. It is operated randomly, with special arrangements between shippers and the MR. There is no scheduled railway freight operation, and so it is quite difficult to manage safe freight transport by rail at present time. The major railway business of the MR is passenger transport. However, railway fares are kept at quite low-level, to permit ordinary people to use the railway for their personal transport. Thus the financial revenue of the MR is quite limited, despite the fact that a large expenditure is needed to keep the passenger railway service running. Since the investment budget for freight services is limited, no significant improvement of the railway freight service can be expected unless some drastic measures are taken.

(3) Issues of the Coastal Shipping Industry

Long Turnaround Time: The coastal shipping vessel turnaround time is around five days per single trip. As cargo handling is operated manually at both loading and unloading ports, the berthing times of vessels at the ports is quite long, which increases transport costs as well. Therefore, the coastal shipping business is not a lucrative business. Therefore, transport charges are kept high.

Needed Expansion of Coastal Shipping Vessel Fleet: Most of the vessels composing the coastal shipping fleet are old and they are needed to be replaced with new one which is to be designed taking into account of shallow water depth of the berths of domestic port. The amount of investment needed is enormous for the coastal shipping companies who fall under SME companies. However, at present the annual bank interest rate is more than 15% per annum. In order to make investments viable for SME coastal shipping companies, an

institutional financial scheme whose interest rate is lower than that of commercial banks, with longer amortization period, may be needed.

Need of Human Resources Development: The captains and crews for operation and maintenance of coastal shipping vessels is necessary to cope with increased number of vessels to ensure a safe navigation of coastal shipping vessels. Government institutions, such as the Myanmar Maritime University (MMU) and the Myanmar Mercantile Marine College (MMC), undertake the human resources development for the shipping industry. There are 29 private organizations conducting education and training in shipping.

(4) Issues facing the Inland Waterway Transport Industry

Issue of Short Distance Haulage: The major freight transport means in the Ayeyarwaddy Delta is inland waterway transport, since the road and railway network systems do not cover the whole area of the delta, where small rivers and channel create a wide network of inland waterways. However, the inland waterway transport vessels are small and are owned and operated by SMEs. The number of inland waterway transport vessels in the Ayeyarwaddy Delta is estimated at around 4,000 units or more. Most of them are aged and their fuel consumption rate is quite high. Although the replacement of such vessels is needed to cope with an increase of cargo transport demand, the SMEs engaging with the inland waterway transport have in sufficient financial capability.

Issue of Long-distance Haulage: The average size of the inland waterway transport vessels plying between Yangon and Mandalay, or for long-distance transport using the main rivers, is around 1,000 DWT, with an average draft of around 2 meters. The major commodities transported by inland waterway transport vessels for long-distance haulage are fuel, construction materials, and agricultural products such as rice. As the value of these bulky cargoes is relatively low, therefore the transport charge is low as well. However, it account for almost 25 %– 30% of the market price of those commodities.

Long Turnaround Time: The vessel turnaround time is around 5 days per single trip. As cargo handling is operated manually at both loading and unloading ports, the berthing times of vessels at the ports is quite long, which increases transport costs as well. Therefore, the inland waterway transport business is not a lucrative business; and vessels cannot be operated for some months of the year, during the period of low water levels. Therefore, transport charges are kept high.

Needed Expansion of Inland Waterway Transport Vessel Fleet: Most of the vessels composing the inland waterway transport vessel fleet are old and they are needed to be replaced with new one which is to be designed taking into account of shallow water depth of some part of river navigation channel specially during the dry season when the river water level goes down to around 2.0 m. The amount of investment needed is enormous for the inland

waterway transport companies who fall under SME companies. However at present the annual bank interest rate is more than 15% per annum. In order to make investments viable for SME inland waterway transport companies, an institutional financial scheme of which interest rate is lower than that of commercial banks, with longer amortization period, may be needed. The long-term transport contract may form a basis for securing a lower rate / longer-term loan from the institutional financial institution or bank specialized for financing SMEs.

Need of Human Resources Development: The captains and crews for operation and maintenance of inland waterway transport vessels is necessary to cope with increased number of vessels to ensure a safe navigation of inland waterway transport vessels. Government institutions, such as the Myanmar Maritime University (MMU) and the Myanmar Mercantile Marine College (MMC), undertake the human resources development for the shipping industry. There are 29 private organizations conducting education and training in shipping.

13.3 Feasible Measures to Address These Issues

(1) Measures to Improve the Road Freight Transport (trucking):

1) **Shorten Truck Dwell Times:** The truck dwell times at truck terminals can be shortened, by expansion or development of the truck terminals exclusively designed as a genuine truck terminal but not mixture with the whole sale market as shown today; and the introduction of a cargo - truck matching systems to allow trucking companies to secure return cargoes from their destinations.

2) **Increase the Load Factor:** The higher the load factor the lower the transport cost. By the introduction of a cargo / truck matching system the return cargo for long hauling trucks will be arranged prior to the departure of trucks from origin place thereby the load factor can be increased without waiting for their return cargo in the truck terminal at destination. In order to introduce a cargo - truck-matching system, the logistics information should be shared by qualified and reliable freight transporters.

3) **Improvement to Increase Transport Service Quality:** The qualification or grading system for trucking companies may lead to the reform of the trucking system and increase trucking performance as well. The qualified trucking companies can be graded by the number of trucks owned and number of licensed drivers employed, a punctual trucking service record, the number of traffic accidents, and financial standing. Higher the grade larger the chance to sub-contract with the international logistics companies to make business through sub-contract system. If the companies of high grade intend to obtain favorable loan terms and conditions a collective repayment guarantee for loans can be organized by forming the association with other member companies who are graded at high level. Then a long-term with low interest loan could be made available from the institutional financial scheme designed to improve the performance of trucking

companies. Such a collective guarantee system may permit SME companies to obtain low interest and long-term loans, thus the expansion of the truck fleet will become possible. The FDI logistics companies will be able to sub-contract easily with such qualified trucking companies and this will enhance the improvement of transport quality by these qualified trucking companies.

4) **Capacity Development:** The skills and qualification of truck drivers is needed through proper training on driving techniques and road safety. The licensing system is to be reviewed. The driving school including the practical training of driving large size truck is to be established at strategic locations and operated by private companies who are authorized and licensed by the government agency concerned.

5) **Possible Public and Private Sector Collaboration:** As the number of trucks will increase the size and operation volume of the truck terminal needs to be expanded accordingly. The largest truck terminal in Myanmar is the Bayint Naung Truck Terminal. However, the handling capacity of Bayint Naung Truck Terminal is already saturated and is choked by traffic congestion within the terminal. Moreover, there is no land space for the expansion of the Bayint Naung Truck Terminal. A new truck terminal is needed to be developed in Yangon. The improvement and maintenance of road infrastructure is the responsibility of the MOC or the private sector, whoever is the project proponent under Build Operate and Transfer (BOT) Type concession agreements. Improved or developed roads will eliminate bottlenecks that hinder smooth road transport and will maximize the utilization ratio of trucks or in other words profit margins will increase to permit reinvestment in new trucks which will ensure a reduction of carbon emissions as well. The public sector needs to enhance the training of truck drivers as well as improvement of road safety. The development of truck terminals, highway, training of drivers can be undertaken in a form of public and private sector collaboration.

(2) Railway Transport

1) **Improvement of Railway Track:** First of all, the railway track needs to be improved in order to allow railway freight operation for heavy cargoes and container block trains on long haulage routes, such as between Yangon and Mandalay. When the railway track has been improved, container block train operations may be introduced. The development of railway ICDs, at both end terminals on the Yangon-Mandalay route segment has been already invested in by private FDI logistics Companies.

2) **Operation of Container Block Train:** Since the charges offered to shippers by the MR would be quite attractive for long haulage, a large number of containers will be transported between Yangon and Mandalay by container block trains. The users of such container block trains might be ready to pay MR if the freight system works well at a

much higher level than that of passenger transport. Therefore, a substantial increase of revenue for MR can be expected. In addition to this, the revenue from transit cargoes generated by Chinese traders will add to cash flows as well. The MR may be able to invest their development fund for the improvement of the national railway system. The operation such as container block train system can be invested by private FDI railway companies as well. In such case, the revenue for MR will be for the rights to use their tracks for such railway freight services.

3) **Possible Public and Private Sector Collaboration:** The MR is mandated for the improvement and maintenance of railway tracks, railway signals, and railway freight stations aside of railway passenger stations. Improved or developed railway freight stations and the Inland Container Depots will eliminate the bottlenecks that hinder smooth railway freight transport especially the railway container transport and maximize the utilization ratio of railway tracks that will be improved for heavier cargo traffic. In other words, the profit margins for operators will increase so as to permit reinvestment in new locomotives and wagons that will ensure the reduction of transport charges and emissions. The railway freight transport for specialized commodities such as cement, chemical, fuel etc. can be invested by the private railway freight operator upon agreement on the fees for using MR's railway track. Similarly the operation of container block train as a whole can be contracted out to a qualified private railway operation company.

(3) Coastal Shipping Industry

1) **Improvement of the Domestic Ports:** First of all, the domestic ports need to be improved to ensure shorter berthing time with the use of mechanized cargo handling systems at cargo handling terminals. A logistics data and information sharing system should be introduced, to permit long-term contracts for transport of certain commodities between coastal shipping company and shippers. In such a way, an improvement in the business will become possible, so that coastal shipping companies can obtain loans from commercial banks or from institutional financial schemes designed for the improvement of the coastal shipping transport system. The vessels themselves can be considered as collateral for loans, in such a case. Thus, the replacement of old vessels with new ones and an expansion of the coastal shipping fleet to meet increasing cargo demand will become possible.

2) **Port Operation and Maintenance:** The improvement and maintenance of domestic ports is the responsibility of the Myanmar Port Authority (MPA). The improvement of domestic ports can be realized by adopting the separation of port infrastructure (construction of port infrastructure including cargo handling terminals) and port operations (cargo handling by modern cargo handling machine). Improved domestic ports ensure the increased utilization ratio of coastal cargo ships, thereby lowering the freight transport cost and increasing the competitiveness of coastal shipping. Furthermore,

domestic ports will be able to play the role as core facilities of multimodal freight logistics hubs, by connecting with the road and/or railway networks.

(4) Inland Waterway Transport Industry

1) **Improvement of the River Ports**: First of all, the infrastructure for the inland waterway transport system needs to be improved, especially the inland waterway channels, to ensure the safe navigation of vessels; and the river ports to shorten berthing time with use of mechanized cargo handling systems at the river ports. A logistics data and information sharing system should be introduced, to permit long-term contracts for transport of certain commodities between inland waterway transporters and shippers. In such way, an improvement in the business will become possible, so that inland waterway transport companies can obtain loans from commercial banks or from institutional financial schemes designed for the improvement of the inland waterway transport system. The vessels themselves can be considered as collateral for loans, in such case. Thus, the replacement of old vessels with new ones and an expansion of the inland waterway transport fleet to meet increasing cargo demand will occur.

2) **Operation and Maintenance of the River Ports**: The MOTC is mandated for the improvement and maintenance of river ports, as well as navigation channels. Improved or developed ports will eliminate the bottlenecks that hinder smooth inland waterway transport and maximize the utilization ratio of inland waterway transport vessels. In other words the profit margins for operators will increase so as to permit reinvestment in new vessels that will ensure a reduction of transport charges and emissions. The public sector needs to enhance the training of ship operators, as well as in navigation safety.

13.4 Cross-cutting Issues of the Logistics Industry and Possible Feasible Measures

(1) Lack of Supply Chain Perspective

Government investments in the transport sector have largely concentrated on highways and new railways, whereas the operations of the transport network, including maintenance, have been neglected. Particularly the lower-level road network, inland waterway river ports, domestic ports for coastal shipping have been ignored or have not been studied sufficiently. Similarly, the private sector has invested little in the past. The transport industry has to cope with three challenges taking into consideration creating of a competitive supply chain:

1) Outdated fleets of trucks, inland waterway vessels, coastal shipping vessels, railway locomotives and wagons;
2) Under-utilization of freight transport equipment, and
3) Low profit margins for logistics operators (e.g. trucking companies, inland waterway transport companies, coastal shipping companies and freight railway operators).

With the further liberalization of Myanmar, both economically and politically, an increase in private sector investment can be expected. In fact, the first wave of investment has been already observed. This investment will have also a large impact on Myanmar's logistics, including the transport industry. A likely development example can be found in Thailand in the past and China in recent years.

(2) Competitiveness of Myanmar's Logistics Industry

As discussed in preceding section of this chapter, transport and logistics charges in Myanmar are kept at a high level just to enable the private transport business to survive, as most of the private companies engaged within the freight transport sector fall under SMEs, leading to long dwell times of transport equipment, due to a lack of cargo handling capacity at truck terminals, river ports and sea ports as well as low grade of the road network, especially in the rural areas. Thus, the competitiveness of logistics industry of Myanmar is rather low. Not only in terms of high transport costs, but also in terms of low punctuality and safe delivery of goods.

(3) Fragmentation of the Freight Transport Industry

In Myanmar, most of the cargo owners own their trucks and their cargoes are transported by owners themselves, as the transport of goods is one part of the traders' business. The traders own their own warehouses as well, and these warehouses are located at the truck terminal. The number of tenants who own the warehouse, office, and cargo unloading bay for different trade in one lot is around 980. Most of them own their trucks for the transport of their own goods. Although the way of business has been changing rapidly, the principle of doing business follow this way, since the insurance system is quite weak and the cost of insuring goods during transport over long-distances is quite high.

The coordination of trucking companies with the inland waterway transport companies, coastal shipping companies and MR is weak, as no business association has yet been formed. This implies that present freight transport industry is fragmented and not concentrated or coordinated.

(4) Fragmentation of Government Agencies

The coordination of government agencies concerned with the planning, designing and implementation of infrastructure development and project improvement is lacking.

13.5 Feasible Measures to Address Cross-cutting Issues

(1) Introduction of a Cargo / Truck Matching System

The expansion and improvement of truck terminals in major cities are essential to increase transport efficiency for domestic cargo traffic. However, the improvement of truck terminals cannot increase transport efficiency of domestic freight traffic. The issue of low load factors

can be rectified through the introduction of a cargo – Truck Matching System, in parallel with the development of the truck terminals. The operation and management of a cargo – truck-matching system is one of the business opportunities for the private sector or private logistics company.

(2) Sharing of Logistics Information and Data

The information exchange and cooperation among the member of the association formed by trucking and forwarding companies under the guidance of the UMFCC is to be enhanced. If the information of cargo arrival and dispatch at the port is shared by the forwarders and trucking companies, the arrangement of freight transport will become easier and speedier, so that both cargo and truck dwell times can be shortened, thereby increasing transport efficiency and reducing freight transport costs.

(3) Development of Warehousing Business

At present no large-scale warehouse exists, except at the Thilawa Terminal Area, which is operated by the FDI logistics providers. Warehouses are located in the industrial zones and truck terminals, however, the size of these is small and they are owned and operated by the cargo owner / trader individually. In an exceptional case at Mandalay, a common shared warehouse is used by traders contracted with the Mandalay Truck Terminal. One feasible measure to ensure punctual delivery of products is to use warehouses effectively. The development of the warehousing business by local companies, FDI companies, and by the relevant city government shall be enhanced, aimed at streamlining the supply chains and ensuring the punctual delivery of goods.

(4) Containerization and Palletization

The freight transport of domestic goods can be consolidated when a domestic container is made available at any time. In such a way, the transport efficiency of small lots of goods can be increased. The cargo consolidation operation may be done at the truck terminal by the logistics provider. The containerization and palletization may be enhanced by promoting the local manufacturing of standardized container and pallets. The pallets are recommended to be made of steel, and be a cage-type, equipped with casters at the bottom of the plate, so that the pallet can be loaded to and unloaded from the container manually, without using mechanized cargo handling equipment, such as forklifts.

(5) Creation of Multimodal Freight Logistics Hubs

Concerted efforts to increase the transport efficiency especially for long haulage can be exercised through creation of multimodal freight logistics hubs, as this will require substantial coordination amongst different government agencies responsible for different transport modes and the private sector that will play a role in the operation of the core logistics facility. The

multimodal freight logistics hub is composed of transport infrastructure of different transport modes (e.g. roads, railways, river ports, sea ports, airports – as 'spokes') that are linked firmly at the logistics facility (e.g. a truck terminal, a railway station, a river port – as a 'hub'). Therefore, the concerted efforts are required to coordinate the different types of freight transport infrastructure and function. The significant impacts of the development of and investment in multimodal freight logistics hubs are the optimization, rationalization and reduction of transport costs for long-distance haulage, as discussed in Chapter 11.

(6) Utilization of Public-Private Partnership Type Infrastructure Development Contracts

Infrastructure development projects in various fields such as roads, power, container terminals, industrial estates, etc. have been undertaken by large size private business groups in Myanmar, in various forms of investment such as BOO, BOT, etc. When the Public-Private-Partnership (PPP) types of investment are sought for the development of logistics-related infrastructure or integrated projects such as multimodal freight logistics hubs, ICDs, truck terminals, river ports, airports, etc. the business groups not limited to but presented in **Table-13.5.1** can be the project proponents.

Table-13.5.1 Candidates Project Proponents for PPP Type Projects

	Private Business Group	Representing Business
1	UMEHL	Myawaddy Bank, Myanmar Brewery, Myanmar Imperial Jade, etc.
2	MEC	Inwa Bank, Dagon Beverage, Myanmar Steel Mill, etc.
3	Htoo Group	AGD Bank, Air Bagan, Htoo Trading, etc.
4	Kanbawza Group	Kanbawza Bank, Air Kanbawza, etc.
5	Max Myanmar	Max Well Trading, Max Myanmar Construction, etc.
6	Asia World Group	Asia World Port Management, Asia World Industries, etc.
7	IGE Group	United Amara Bank, Grand Amara Hotel, etc.
8	Shwe Taung Group	Golden Tristar, Junction Center, Hydropower Project, etc.
9	SPA Group	Yoma Bank, FMI, Star City, etc.
10	Eden Group	Hilton Nay Pyi Taw, Marina Residence, etc.

Source: JETRO

13.6 Administrators

The administrators of the logistics sector act as the regulators, who formulate policies and prepare the development plan based on such policies / strategy and also guide the private sector to develop the infrastructure and manage the operation of the logistics sector to maintain levels of investment as high as possible. The responsible areas of each administrator are as follows:

1) Ministry of Transport and Communications (MOTC):
   Land, rail, shipping and air transport

2) Ministry of Construction (MOC):
   Construction and maintenance of national road and bridges

3) Yangon City Development Committee (YCDC):
   Urban transport and truck terminals

4) Mandalay City Development Committee (MCDC):
   Urban transport and truck terminals

The outline of above ministries and committees are presented in Chapter-11.

Capacity Building: The capacity assessment was carried out as discussed in detail in Chapter 14. As stated in the preceding chapter concerned with institutional development, the capacity building of administrative bodies is needed, especially for the following fields of activities to be the regulator and administrator in the logistics sector:

1) Latest concept of logistics business in the region and the world;
2) Latest technologies concerned with the development of logistics systems and private business in a competitive service market;
3) Formulation of policies and strategies that guide the logistics system development and improvement;
4) Financial mechanism for implementation of PPP type projects;
5) Regional and international framework agreement with regard to the logistics; and
6) Establishment of databanks concerned with logistics.

CHAPTER-14 INSTITUTIONAL DEVELOPMENT PLAN

14.1 Institutional Set-up

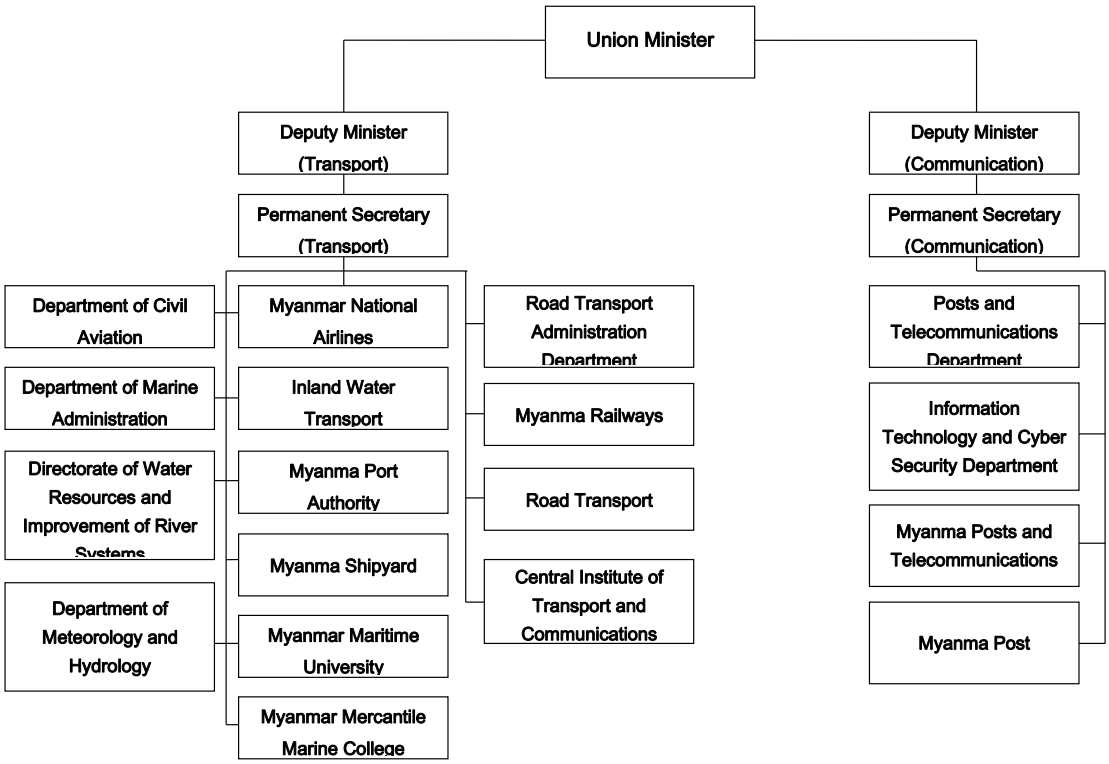
The administrative organizations mandated for transport and logistics developments in Myanmar are composed of the Ministry of Transport and Communications and the Ministry of Construction, as well as the City Development Committees. The organigrams for both Ministries and City Committees are as follows:

(1) Ministry of Transport and Communications

Figure-14.1.1 shows the organizational structure of the Ministry of Transport and Communications (MOTC). Administrative bureaus are organized under a Permanent Secretary of the Ministry as shown in this figure. The development policies and projects proposed by each Department are assessed by the Policy, Legal Procedure & Inspection Bureau and the Project & Statistics Bureau, respectively. MOTC will establish a new organization responsible for the planning of transport development.

The personnel which will be involved in establishing a new organization (department) in charge of the planning of the transport development do not have current sufficient knowledge, either of the process to prepare such plans or the evaluation of project components or programs. Training on transport planning, transport project evaluation and the method of monitoring necessary to follow up the implementation of the master plan properly is needed. It may not be necessary to organize personnel having necessary technical knowledge of transport / logistics development planning at the beginning, since the major role and function of the MOTC is in policy formulation; regulation and management of transport sector development in general. Therefore, the most important skill and knowledge required are those concerned with both management and coordination amongst all concerned ministries and agencies.

It may be required to sub-divide the “Project and Statistics Bureau” into two Bureaus: to undertake project planning and implementation in one Bureau and the compilation of statistics by a second Bureau.



Source: MOTC

Figure-14.1.1 Organizational Structure of MOTC

Figure-14.1.2 shows the existing MOTC bureaus and their roles.

Strong and constant coordination among the line departments of the MOTC and other ministries and agencies is needed to develop and manage the logistics system in Myanmar, since the logistics system is composed of four major elements – as discussed in Chapter-1 Logistics Sector Issue (See **Figure-7.1.2**). Unless four components / elements (Infrastructure, Institutional Framework, Shipper / Consignees and Service Providers) are harmoniously integrated, the performance level of the logistics sector cannot be maximized. The core ministry that can integrate such elements to develop and manage the logistics sector is the MOTC. Therefore, the major role of the MOTC for the development and management of logistics sector is the coordination of all concerned parties in the logistics sector. It may require another department to be established, in addition to the existing department within the MOTC. It will be designated to function as a coordinating body of the line department within the MOTC and other ministries concerned such as the MOC and others.

The coordination of various development plans relating to the logistics sector requires the constant and accurate monitoring of logistics sector performance. This function can be undertaken by the Central Institute of Transport and Communications as the research and development as well as monitoring units of all development plans and projects related to the logistics sector. This institute may function as the body to collect, sort and analyze data and information aiming at monitoring the implementation of relevant projects and formulating development and implementation plans in coordination with other ministries concerned, if it would be necessary.

Source: Study Team Modified from MOTC document

Figure-14.1.2 Administrative Bureaus and Tasks of each Bureau

(2) Ministry of Construction (MOC)

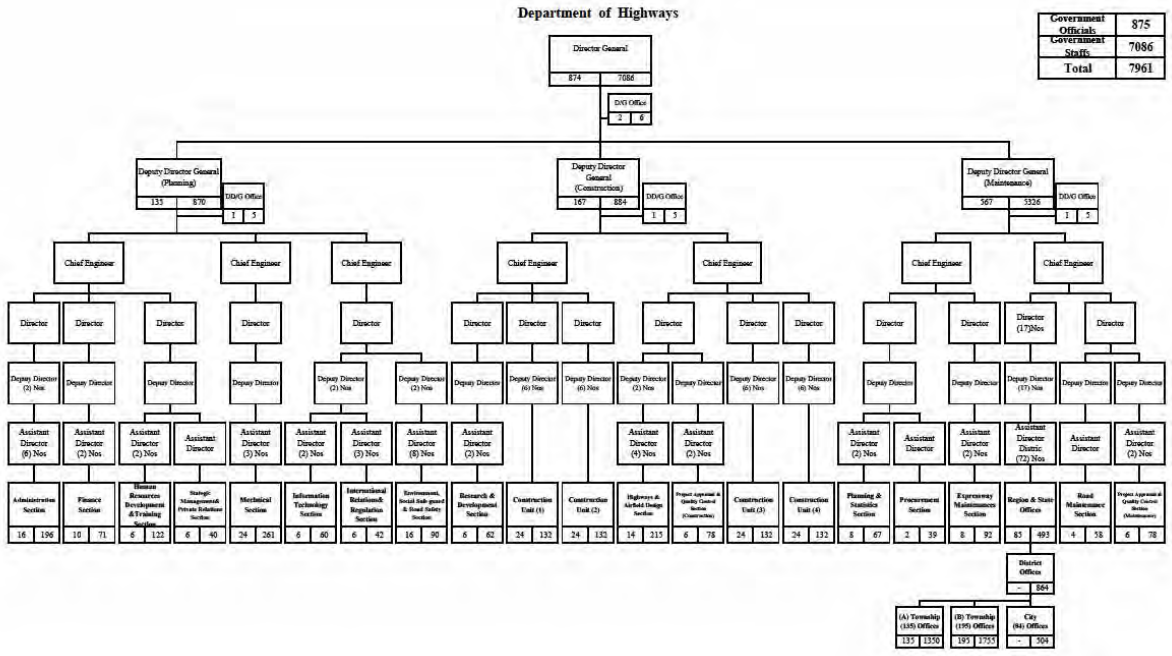
Department of Bridge (DOB) and the Department of Highways (DOH) under the Ministry of Construction (MOC) in Nay Pyi Taw, are responsible for the development of roads and bridges in the country for the stages of 1) planning, 2) design, and also 3) construction. The Ministry for Progress of Border Areas and National Races and Development Affairs (NATALA) or the Army Corps of Engineers assumes responsibility for roads in border areas, as a result of concern over security conditions, while the MOC is mainly responsible for the design, construction and maintenance of union highways and regional roads. In addition, the maintenance of roads in city areas falls under City

Development Committees. The divisions of planning, construction and maintenance are organized under each Department. DOB and DOH employ a total of 9,891 staff, including 1,227 officers. **Figure-14.1.3** shows the organigram of MOC.

Source: MOC

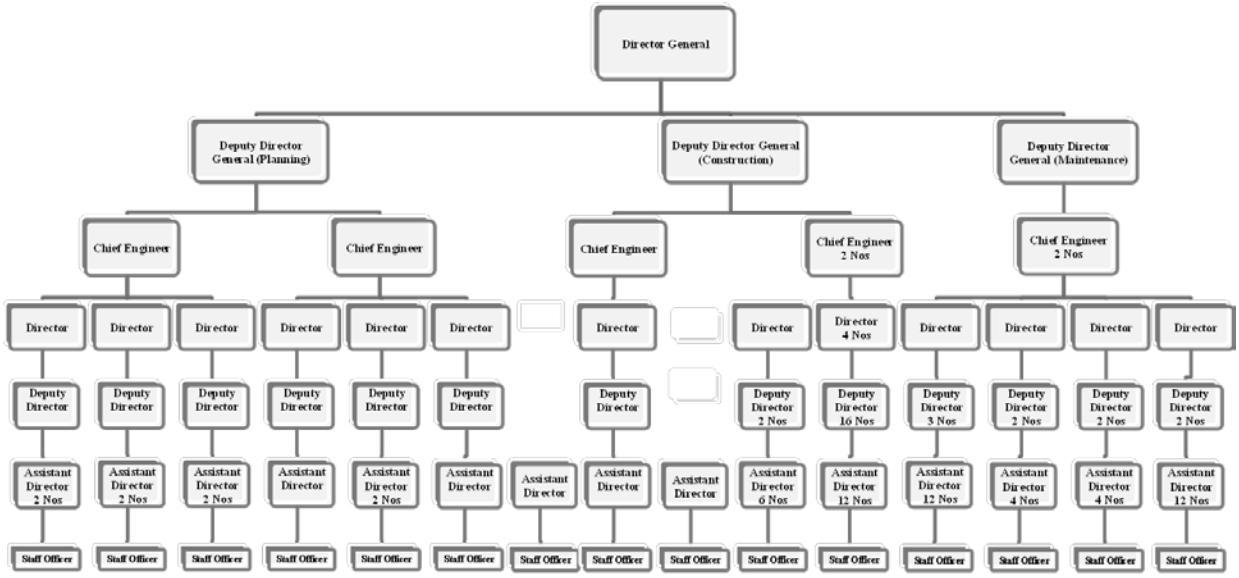
Figure-14.1.3 Organizational Structure of the MOC in Nay Pyi Taw

Figure-14.1.4 shows the organizational chart (organogram) of the DOH and **Figure-14.1.5** shows the organizational chart (organogram) of the DOB, respectively. Both Departments are responsible mainly for the execution of the projects and works planned and being implemented.



Source: MOC

Figure-14.1.4 Organizational Structure of Department of Highways



Source: MOC

Figure-14.1.5 Organizational Structure of Department of Bridges

One characteristic of road development in Myanmar is that the BOT scheme is broadly applied to the operation and maintenance of national roads (both for new construction and upgrading). As of March 2013, 29 private companies are executing a total of sixty-one (61) BOT contracts over a total length of BOT 'concession' roads amounting to approximately 5,585km (or some 15% of the total road length managed by the MOC). Most of the BOT concessions are operated on major roads where the sufficiently high volumes of traffic make the BOT contract approach viable. On the other hand, it appears that Government is not following a conventional BOT scheme. The BOT contract document does not mention the obligations of the Government or the Concessionaire, which should be stipulated in the BOT contract. In addition, there is difference in the conditions of the contracts, which are not standardized.

The budget for road and bridge development has been allocated by the central government according to the national annual budgetary plan, which is determined based on requests from each sector of government. Unlike other countries that collect certain taxes (like fuel tax and vehicle tax) specifically for road and bridge development, Myanmar covers such development costs using the general government budget.

(3) Yangon City Development Committee (YCDC)

The YCDC is a Municipal Authority in Yangon that plays a central role in urban planning, development and management through interacting with a variety of stakeholders/actors in the public and non-public sectors. It was established in 1990. The YCDC is responsible for service deliveries in Yangon City, which covers 33 out of the 45 townships in the Yangon Region. The YCDC has been constituted by the City of Yangon Development Act 1990 issued by the State Law and Order

Restoration Council and the Yangon City Municipal Law 2013 approved by the Yangon Region Hluttaw or Parliament. The YCDC is also responsible for duties stipulated in the Rangoon Municipal Act 1922. The Budget of the YCDC in FY2014/15 was around Kyats 238 billion and accounted for almost 70% of the budget of the Yangon Regional Government (YRG). The YCDC notably generated over 90 % of the total revenue by themselves.

Figure-14.1.6 shows the organizational chart (organogram) of the YCDC. There are 21 Departments and 2 organizations responsible for each assigned mandate. The Department directly responsible for managing Truck Terminal; one of the key infrastructure facilities related to logistics development and logistics performance in Yangon, is the "Revenue Department". The existing truck terminal has been planned and developed by the YCDC, however, all land lots and building lots (administration rooms, warehouses) have been sold out to users (in most cases these are the traders of commodities). The common area of the truck terminal that is used for the parking of trucks, the internal road network, etc. is owned and maintained by the YCDC. This means that the truck terminal of Yangon is operated by private companies individually, but not in collective way. This is a major cause of fragmentation of the transport / logistics business in dealing with domestic cargo transport and accounts for the low performance.

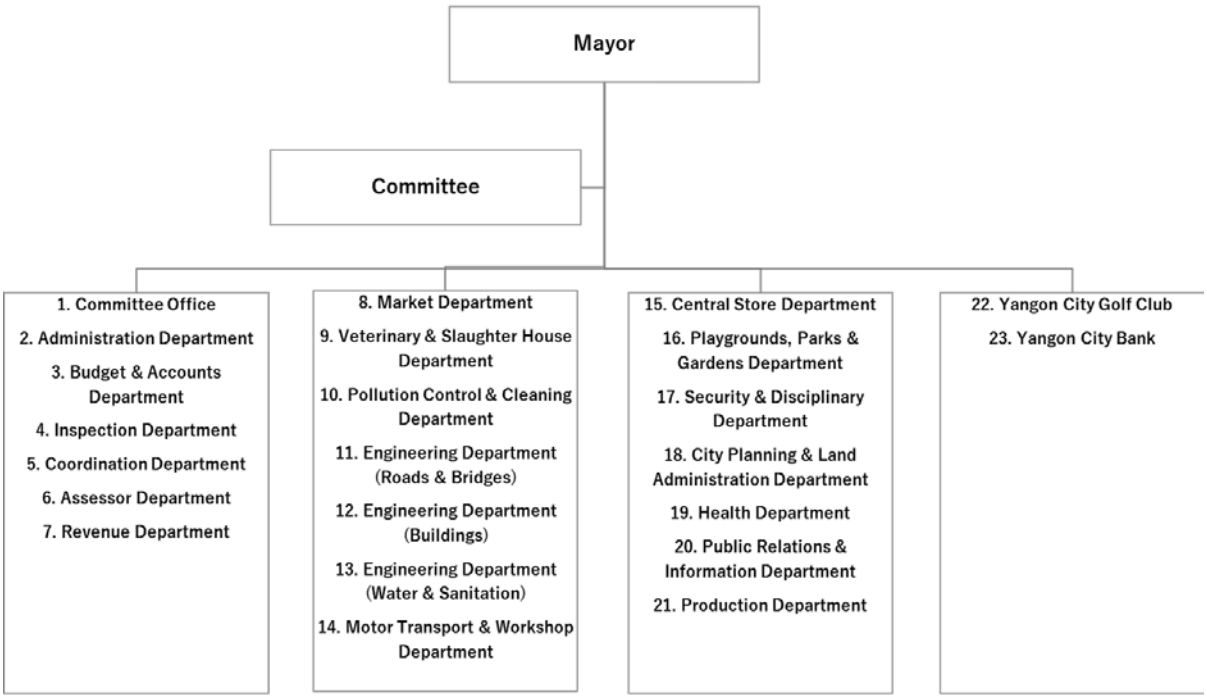
The Mayor is the head of the YCDC and also acts as the Minister of Development Affairs of the YRG. The members of the Committee include the Mayor, the Secretary, the Joint Secretary, and two Committee Members. The YCDC is supervised by the Ministry of Development Affairs of the YRG. YCDC provides public services in 33 townships of the Yangon Region, including regulatory services and service deliveries for roads, bridges and truck terminals.

In 2012, the Urban Planning Unit was newly established at the YCDC to deal with emerging urban development issues through enhancing a comprehensive planning approach. Later, the Unit was transformed to the Urban Planning Division under the Land Administration Department, now called the City Planning and Land Administration Department. The Urban Planning Division consists of 6 branches: including the Zoning & Land Use Planning Branch; Urban Design & District Planning Branch; Urban Socio-economic Studies Branch; Infrastructure & Urban Amenities Planning Branch; Urban Transportation & Road Network Planning Branch; and the Administration Branch.

As discussed in preceding Chapters, the major issues to be addressed to improve the logistics performance of the cargo transport of domestic goods include the overly long dwell times of trucks, long truck turn-around times, low load-factors, etc. Rectification can improve the management and improvement of truck terminals in major Cities. However, truck terminals are operated by private traders and transport companies individually, without proper management, because the main facilities are sold out to private companies, and their businesses are fragmented.

In order to improve the performance of truck terminals in general and cargo truck's operating performance, management by City or by other administrative organizations will be needed. Truck

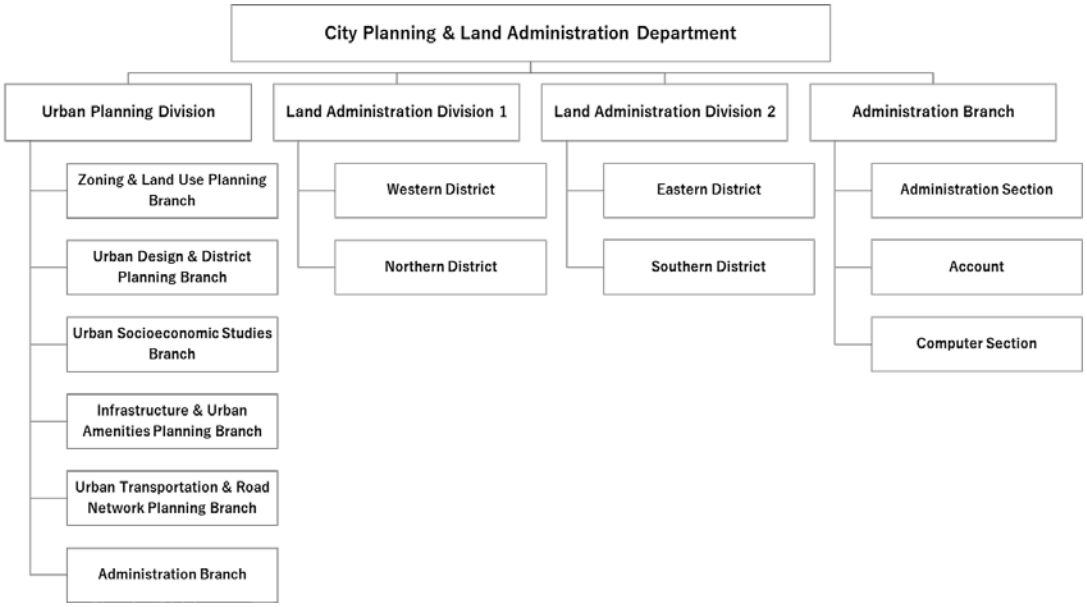
terminals are recommended to be operated in collaboration between public and private sectors, to maintain the dynamism of economic activities undertaken by the private sector together with the assistance of the public administration responsible for the management of truck terminals.



Source: Study Team Modified from YCDC Home Page. Sept. 2016. [http://www.ycdc.gov.mm/]

Figure-14.1.6 Organizational Structure of the YCDC

Figure-14.1.7 shows the organizational chart of the Department mandated for the planning and land administration in Yangon City.



Source: Study Team Modified from YCDC document

Figure-14.1.7 Organizational Structure of Urban Planning Division under City Planning & Land Administration Department, YCDC

Yangon City is considered as the most important gateway node of Myanmar from the logistics development point of view. The most important facilities for logistics development and management are urban truck terminals, however, at present the truck terminals are managed and controlled by the Revenue Department, as the truck terminal has been considered as a part of real estate development of Yangon City. When the role and function of the truck terminals are considered as important not only for smooth cargo transport in Yangon but for the national economic benefit, the management, control and planning should be undertaken by a specialized unit looking after the development and management of the truck terminals. As the major infrastructure needed for proper logistics sector development is transport infrastructure (roads, railways, sea ports, river ports, airports, truck terminals, warehouses, logistics parks, etc.), such a unit can be created and function in the existing Urban Transport and Road Network Division or otherwise a new Division specialized in development and management of truck terminals / logistics parks is recommended to be created. The personnel employed by the YCDC however, lack knowledge of the logistics business, including the trucking business. Thus, the training of such personnel is to be carried out with technical assistance from either the Government or from private bodies specialized in the field of the logistics business.

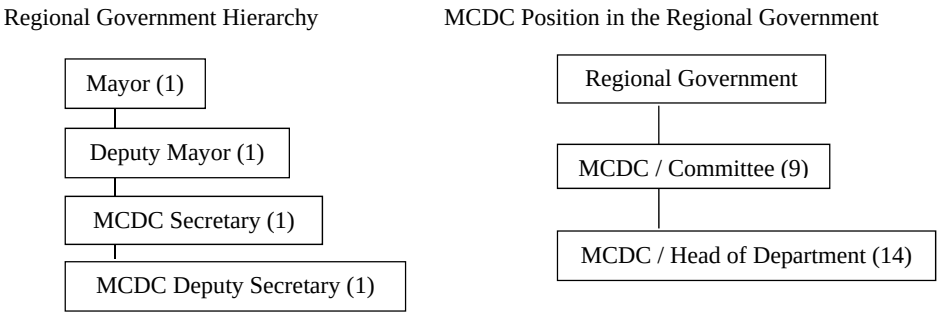
(4) Mandalay City Development Committee (MCDC)

Mandalay, consists of seven townships, and is managed by the Mandalay City Development Committee (MCDC), which is responsible for municipal service delivery and public works (waste management, water supply, roads and bridges, parks and sports grounds, street lighting, funeral services and firefighting), city planning, urban land administration, tax collection (including business licensing and registration), public health, and urban development. The current responsibility and powers belonging to the Municipality are rooted in the 1898 Municipal Law, which introduced provisions for new electrification, expanded the collection of fees for urban services in the Municipal area, as well as the publics works listed above.

These objectives are implemented by the following 14 Departments:

1) Administration Development;
2) Motor Transport and Workshop Department;
3) Market and Slaughter House Department;
4) Finance Department;
5) Revenue Department;
6) Cleaning Department;
7) Playgrounds, Parks and Gardens Department;
8) Building and Central Stores Department;
9) Roads and Bridges Department;
10) Water and Sanitation Department;
11) City Planning and Administration Department;
12) Public Relations and Information Department;
13) Inspection Department; and
14) Agriculture and Livestock Breeding Department

The MCDC has delegated administrative functions, under the authority of the Mandalay Region Government (MRG). Thus, it is not a fully autonomous Local Government. MCDC is now managed by Committees, consisting of nine members that are partly elected by the public. The head of the MCDC is the Mayor of Mandalay City, acting as a Chairman of the Committee. The Mayor also has a seat as the Minister of Development Affairs in the MRG. Thus, the Mayor's authority ranges within the activities covered by the MCDC, but at the same time the Mayor, as the Minister of Development Affairs, has authority over development planning within the region. The hierarchical order of the MCDC as an organization and within the Regional Government is shown in **Figure-14.1.8** below;



Source: Study Team

Figure-14.1.8 MCDC Hierarchal Order

The situation at MCDC concerned with the planning, development, improvement and management of truck terminals is the same as at YCDC. The establishment of one Department mandated for planning, development, management and regulation of the operations of truck terminals is necessary, to be able to operate and manage truck terminals in a collaborative manner between public and private sectors.

As in the case of the YCDC, the personnel employed by the MCDC that are organized to form such a Department should be trained by the government or private organizations having sufficient experience in training personnel to be experts in the logistics business in general, as well as in the operations and management of truck terminals, in particular.

14.2 Mechanism Concerned with the Development of Transport Infrastructure

Infrastructure related to the transport and logistics system is insufficient, from both a quantitative and a qualitative perspective. Prompt action needs to be taken to improve the mechanisms for the sustainable maintenance of infrastructure and for an increased service level in freight transport. Although the building of the following mechanisms is necessary for the development of infrastructure effectively and efficiently, it has not functioned well to date.

- Plan formulation mechanisms (data collection and management, as well as analysis)
- Inter-ministerial coordination mechanisms (amongst different ministries and transport modes)
- Public and private coordination mechanisms (roles, functions and legislation)
- Financial and fund raising mechanisms

Several transport development plans, such as the National Transport Master Plan and Yangon Urban Transport Master Plan, have been prepared, however, the Government administration and organs closely related to the preparation of such plans are still in a state of feeling on their way on how to follow up implementation of plans and how to arrange necessary budgets, funding and institutional support.

The implementation of plans and several projects funded by ODA has been ongoing, with technical assistance provided by donors. During the course of implementation of such projects from plan formulation, budget appropriation, execution of projects, operation and maintenance, etc. the skills and knowledge of staff responsible for management of such project can be built up, in the form of on-the-job-training. This will help support their independence for project management, from the administrative point of view. The considerations for the concrete development of the abovementioned mechanisms follow.

(1) Plan Formulation Mechanism (Building of data management capability)

It is imperative that Government staff mandated for project management and administration be qualified in scientific analytical ability based on data, with the aim of planning and implementing transport and logistics infrastructure development in an efficient and effective manner. It is important that staff mandated for project management participate actively in the process of preparation of development master plans, prepared with the technical assistance of donor countries, rather than mainly focus on master plan output. The Government staff mandated for project management must learn skills and adjust methods on how to follow up implementation of the master plan, formulate master plans and individual plans prepared by and for each sub-sector, and review those plans, and revise them, if revision is necessary. A concrete mechanism should be built for organization, institutional development and sourcing of talented persons for this.

Organization: The commissioning of the Department, whose main responsibility is the preparation of plans based on survey results and relevant data; and the management and analysis of such data has been delayed. It is necessary to improve the ability to accomplish the duty that staff has been assigned with.

Institution: No legal framework exists to formulate and approve plans, based on a certain laws and ordinances. The legal framework to revise the plans and to coordinate / adjust development plans amongst ministries does not exist.

Human Resources: This issue concerns the ability of staff to undertake logical-thinking and scientific analysis based on sound data sources. The basis for logical thinking is the management of data. The existence of staff qualified in the proper collection, accumulation, processing of relevant data is quite important. The basic method of collection and analysis of data can be learned from the truck driver interview surveys, truck terminal surveys, waterborne transport surveys, supply chain analysis, etc. as executed during formulation of this Study for logistics development system. It may be effective to utilize data from shipping documents sorted by HS code (available from the Ministry of Commerce)

for analysis of international / trade cargo movements by commodity and geographic code used for collection and sorting of data obtained through the surveys mentioned above, to keep consistency and maintain the continuity of the Study.

(2) Establishment of a Platform for Inter-ministerial Coordination

The inter-ministerial and inter-transport modal coordination is considered to be a bottleneck for discussion, negotiation, and examination and formulation of an integrated transport and logistics development plan. At present, the infrastructure development plans of each mode i.e. for roads, ports, railways, airports, truck terminals, cross-border facilities, etc. are prepared and formulated by line ministry and agency, i.e. by the Ministry of Construction, Myanma Port Authority, Inland Water Transport, Myanma Rail, YCDC and MCDC independently without consideration of the development of transport hubs or linking infrastructure at various nodes i.e. at gateway nodes, intersection nodes, commercial nodes, etc. The development of the multi-modal transport system is important for the modernization and rationalization of the logistics system, however, strong inter-ministerial or inter-organizational coordination is imperative to prepare a comprehensive plan extending over many different transport modes. For instance, there is a need to discuss in a comprehensive way with road and railway entities for the formulation of terminal infrastructure projects such as ports, inland waterway ports, and airports as access to such terminals. However, development plans are often prepared separately and independently.

There is no department or division mandated to deal specifically with the matter of logistics in the MOTC at present. The improved connectivity of different transport modes is a key in the plan to reduce or optimize total transport costs and lead times, which is an essential point for preparation of logistics development plans. This is one of the reasons why an effective mechanism for coordination is required. In the implementation of the present study, various relevant Ministries and Government agencies have participated in the Joint Coordination Committee Meetings. The design and organization of a platform for inter-ministerial and inter-transport modal coordination with the aim of continuous follow up, revision, operation and maintenance of development plans is recommended.

Ministry of Transport and Communications
- Department of Civil Aviation
- Myanma Railways
- Department of Marine Administration
- Myanmar Port Authority
- Inland Waterway Transport
- Directorate of Water Resources and Improvement of River Systems
- Directorate of Industrial Collaboration
- Road Transport Administration Department

Ministry of Construction
Department of Highways
Department of Bridge
Ministry of Commerce
Ministry of Industry
Ministry of Agriculture, Livestock and Irrigation
Yangon City Development Committee
Mandalay City Development Committee

In the 4th JCC meeting held on 10th August 2017, it was decided that the coordination function needed for the implementation of the Study for logistics development system is to be added on existing "National Transport Development and Project Implementation Committee".

(3) Public and Private Sector Collaboration Mechanisms

For the operation of the logistics system, the role of the Service Provider is to be undertaken by private entities, while administrative organizations will take the role of the Regulator, to prepare the conditions that will ensure a sound and competitive business environment in the private sector to maximize cargo transport efficiency. This is to be the basis for public – private role demarcation and collaboration. In Myanmar, state enterprises under various ministries have functioned as Service Providers for a long time, and the demarcation of roles between public and private sectors has not yet been made clear. The core infrastructures for physical distribution are truck terminals: these are needed as a core transport facility, especially for rural development purposes. At present, truck terminals are only utilized by private entities, however, they are unable to formulate expansion plans, funding arrangements, land acquisition, etc. to cope with ever an increasing cargo flow volume through truck terminals. The responsible body for the development and management of truck terminals is the local government where such truck terminals are located (e.g. local government, such as Yangon City Development Authority, etc.). The responsible department in the city government for the development and management of truck terminals is the *Revenue Department*. This Department currently manages the sale of land, buildings composed of office space, storage spaces and parking spaces developed at truck terminals to private entities operating at terminals. In order to modernize and expand truck terminals under such circumstances, the planning department of local Government need not only prepare the development plans but also to support private entities to guide them in the development of a modernized logistics system. To do so, a mechanism that enhances public – private sector collaboration needs to be established.

(4) Financial and Funding Mechanisms

The transport and logistics infrastructure in Myanmar is vulnerable and at a low level at present; thus, large-scale investment in infrastructure development is indispensable in order to accomplish stable future economic growth.

As the present financial status of the Government is constrained, it is not possible to implement all of the needed infrastructure projects as public works projects. The choice of financing will be either by Build-Operate-and-Transfer schemes (undertaken by the private sector) or by Government loans. In the past, Government has preferred infrastructure development under the BOT scheme as external financial aid was constrained by economic sanctions. Infrastructure development based on private sector funding is one method of financing, however, in the case of developing countries such as Myanmar, the problem of improper distribution of concessional rights to a limited number of wealthy private enterprises often occurs. A lack of transparency in an open bidding process is a common issue in developing countries.

Under the current situation, Government loans are considered the most effective financing source in order to implement infrastructure development. Myanmar just started real economic growth, and it is a good time to arrange Government loans. Ministries and government offices are the best executive organs concerned with development planning in logistics. The improvement of the skill of staffs assigned to oversee the development of the master plan, the strategic business plan and to enforce the development plan will lead to decisions that are appropriate, and rational. Trained staff will lead the development program and play an important role as a Regulator.

(5) Method of Monitoring Development Progress

The tools for monitoring of logistics performance in Myanmar could be carried out by using the same, or similar, surveys conducted for the preparation of the Study for logistics development system as follows:

1) Truck Driver Interview Surveys;
2) Truck Terminal Surveys;
3) Inland Water Transport Surveys;
4) Coastal Shipping Surveys;
5) Analysis of Production Volume of Selected Commodities;
6) Analysis of trade statistics based on HS code; and
7) Establishment of a data bank.

It is recommended to carry out such surveys every two years, so as to be able to monitor and measure the effects of investment for the implementation of relevant projects. The outlines of the survey carried out during the course of preparation of the Study for logistics development system are summarized in specific Technical Reports being attached to the Final Report.

14.3 Capacity Assessment

14.3.1 Need for Capacity Building

During the course of this Study, it is understood that the plan formulation, administrative management and actual operation of the logistics system in Myanmar are all exercised in rather a fragmented way. For example, no coordination mechanism exists which is exercised constantly among Ministries and agencies involved in the development and improvement of the logistics system in the field of administration. The trade, transport and storage of goods by private entities exercised independently. The function to coordinate or collaborate businesses among private entities does not exist, nor amongst private entities nor the relevant Ministries. The MOTC as the highest level entity (authority) concerned with the transport administration needs to take responsibility for coordination and management functions that could integrate both a fragmented administration system and the fragmented private business systems at present in the field of logistics. Such a coordination and management functions should be exercised by the Ministry from the stage of plan formulation onwards. The MOTC is centrally authorized for logistics administration and development of infrastructure and should have the capability to coordinate plans at the stage of plan formulation in an administrative way. The MOTC needs to supervise and guide plan formulation exercised by administrative organs or line agencies, and furthermore be involved in specific planning issues by themselves. For instance, the importance of the master plan is fully understood, however, the number of staff that recognizes which type of plan is needed, or how the plan is to be formulated, is quite limited within the Ministry. Understanding about formulation of the plan process (rather than the plan contents) is insufficient and is seen as a critical shortcoming.

14.3.2 Components of Capacity Assessment

In order to develop the capacity of administration for plan formulation, based on an analysis of the current situation and the strategies established, for implementing plans and monitoring the implementation of project and for evaluation of projects within the program management process, capacity assessment is an important process. Capacity Assessment (CA) is carried out with three main components as follows:

(1) **Technical capacity:** Techniques, management skills, knowledge of specific fields of activity, etc. of both individual persons and organizations including the following:
- Specialized knowledge
- Technical knowledge
- Accumulated knowledge of targeted organizations
- Ability to collect information required for plan formulation

(2) **Core capacity:** Management capacity, positive intention, and leadership to solve the issues identified by utilization of technical capacity including the following:
- Ability and sound judgment to understand needs or key issues

- Ability and sound judgment to formulate strategies meeting with needs
- Ability to implement activity by effective and efficient use of resources, taking into account the relevant development strategy
- Ability to solve conflicts of interest and skills in change of management
- Ability to build collaborative relationships with other groups or concerned parties
- Ability to monitor the progress of plan implementation
- Ability to modify the activities to achieve the objectives through the feedback of monitoring activities in a flexible manner
- Ability to gain needed skills to meet challenges from new issues on a continuous basis
- Positive will to gain skills and capacity to solve problems and issues

(3) **Enabling environment:** Conditions to enable to achieve the development objectives or targets by relevant organizations, such as policy framework, legal framework, market regime, etc. The physical assets, capital, social infrastructure, etc. can be considered as the enabling conditions of environment, including the following:

- Administrative systems ensuring that budget necessary for the execution of plans and projects is available
- Condition of basic infrastructure such as roads, railway, ports, electric power, etc.
- Political decision making function based on the democracy
- Moral ideas and social duties in general

In general, if the core capacity is insufficient, the level of technical capacity will be limited. It may be upgraded but this is not possible in sustainable manner. Even if both technical capacity and core capacity are provided, if an enabling environment is lacking, results will be limited. Unless these three kinds of capacity are integrated harmoniously, the desired results will not be fully obtained.

14.3.3 Program Management in General

Through the present study, the study for logistics development system has been prepared and formulated. To achieve the goal of an integrated development master plan, according to the implementation schedule and program, the development of the project management capacity is indispensable. A basic and common project management cycle is called PDS (Plan-Do-See).

Source: JICA Capacity Assessment Handbook

Figure-14.3.1 Identification of Capacity to be Reinforced

PDS might be effective to implement a particular project to attain the objectives and goals of the project in the field, however, this approach may be insufficient where substantial reform or improvement is required: those which involve collaboration or integration of programs with other organizations. **Figure-14.3.1** illustrates the PDS cycle.

Effective program management is necessary to implement the national logistics development master plan. The question arises as to who would undertake this task and take responsibility for it and how could such a management body with these specific objectives be properly organized. In order to organize such a program management body, capacity assessment is needed. It will prepare a proper and effective capacity development plan, especially necessary where such capacity is recognized as lacking or being insufficient, as at present.

In general, analytical findings about an organization identified by and external body pose challenges. Especially when such results include negative elements: often the concerned parties cannot accept such findings, and therefore problems identified cannot be seriously accepted. Additionally to this, it is difficult to identify characteristics of an organization by taking a snapshot or general view. Therefore, it is common to perform an organizational analysis, through application of the self-evaluation method called the Discussion-Oriented Organizational Self-Assessment (DOSA). How to conduct the self-evaluation of organizations is a question. It is important that relevant parties conduct an organizational analysis by means of a participatory analytical process, whilst referring to the following general organization analysis topics. In such a way the various parties will be able to understand the characteristics of the target organization and will be able to recognize their weak points or shortcomings in conducting effective program management.

(1) Relationship with external parties

Communications with concerned parties for the implementation of program or projects, policy makers and private sector. Evaluation of the capacity needed for budget appropriation, and ensuring funding resources are available.

(2) Financial resource management

Guidelines for actions, views on balancing accounts, budget distribution and monitoring the status budget implementation, practical use of various reports and plans, effectiveness of financing, etc.

(3) Human resource management

Employment and deployment of talented persons, fostering of human resources in general and management staff, setting pay levels, performance appraisal, provision of opportunities for enhancing expertise, treatment of dissatisfied staff, etc.

(4) Organizational learning

Horizontal and vertical flow of information, the quality of business, observation of time lines, setting the level of information sharing, supporting teamwork, productivity of staff meetings, etc.

(5) Provision of services

Level of participation on needs analysis and assessment, project formulation, program implementation, project implementation, monitoring and evaluation, effectiveness of the monitoring and evaluation system, checking the sustainability of projects, providing proper advice on field activities, etc.

(6) Strategic management

To provide a goal management system properly setting concrete goals, effective to achieve basic goals, and properly obtaining progress, managing goals meeting the organizational philosophy, responding to changing environments, etc.

14.3.4 Program Management in the Specific Field of Interest

Table-14.3.1 shows the result of the evaluation on the Capacity Assessment, in view of logistics sector development that has been carried out over the course of conducting discussions for the formulation of projects by ministries, line departments and agencies of such ministries and private sector companies as well as the Chamber of Commerce in Yangon and Mandalay.

The logistics system is rather a new concept in Myanmar. The logistics system has evolved based on a conventional physical distribution system through linkage with competitive global market. Before the development of the core capacity to undertake the program management properly and effectively, the technical capacity of staffs assigned to undertake such tasks should be developed first. Only six years have passed since Myanmar opened its economy to the world market and started to build linkages with the international supply chain. Only a few personnel in both public and private sectors understand about highly sophisticated logistics services.

Under such circumstances, the best way to gain the knowledge and to attain an understanding of the essence of logistics system is to observe examples from real logistical activities and facilities in Asian countries having more advanced logistics system development such as Japan and Thailand in Asia. Based on such experience shared by concerned parties, the DOSA is to be carried out to come up with effective plans designed for the capacity building program aimed at upgrading technical capacity, core capacity and providing an enabling environment as discussed in the preceding section.

Table-14.3.1 Capacity Assessment in View of Logistics Development

Aspect of Evaluation	Snap-shot Assessment on the MOTC
1. Coordination with both internal and external parties.	■ MOTC organizes five departments overseeing for different transport mode (road, railway, waterborne transport, inland waterway transport, aviation). The coordination among four departments is quite important to develop and manage the logistics sector development. More frequent or regular coordination meetings among these departments are needed, however, no specialized department for coordination exists. ■ MOTC needs effective communication with the donor agencies and foreign consultants frequently. Coordination skill is very much needed, however, knowledge concerned of logistics is lacking. ■ The number of staff undertaking coordination with external parties especially with foreign parties is lacking. A reinforcement of the coordination function is needed.
2. Financial resources management	■ Although the funding requirement for the implementation of the projects identified and prioritized is quite large, however, the national budget is limited, thus the dependency on Donor's financial assistance and the collaboration with private sector or enhancement of private investment is much needed. ■ However, the guidelines for proper funding have not been prepared and established especially in the case of enhancing private sector investment. ■ The private investment to infrastructures can be utilized for the benefits of population. The public-private partnership (PPP) type investments for transport and logistics infrastructure development and operation are to be formulated and promoted intensively since the national budget is limited. ■ However, the talented staffs that is capable to manage PPP projects within the MOTC is necessary.
3. Human resource management	■ Technical capacity needed for logistics development is insufficient. ■ Human resources development or employment of talented persons with sufficient knowledge about transport and logistics services is needed.
4. Organizational learning	■ The vertical flow of information in the administrative organizations in Myanmar is quite strong. ■ The horizontal flow of information not only among the line department within the MOTC but also with the other ministries and agencies is important for coordinating policies, strategies, plans, projects and actions. ■ It is imperative to be familiar with the horizontal flow of information. Frequent coordination meetings amongst the line departments within the MOTC are needed. However, the number staff undertaking such tasks is limited.
5. Provision of services	■ The level of needs analysis and assessment is low. The formulation of policies based on the analytical results of necessary elements for the formulation of projects / program needs to be carried out without foreign assistance. From this viewpoint, talented staff with high technical capacity should be developed or employed. ■ Monitoring of projects / program implementation is absolutely necessary to implement the development master plan properly and effectively: however, the way of collecting data and monitoring progress, status and effects of investment are not readily available.
6. Strategic management	■ A proper, effective and achievable goal of the development plan can be set when the current situation and issues are understood properly. To do so, a technical capacity is to be upgraded to understand the current situation, however, the means and ways to understand the situation is lacking.

Source: Study Team

Aspect of Evaluation	Snap-shot Assessment on the MOC
1. Coordination with both internal and external parties.	■ MOC needs effective communication with the donor agencies and foreign consultants frequently. Coordination skill is very much needed however, knowledge concerned of logistics is lacking. ■ The number of staff undertaking coordination with external parties especially with foreign parties is lacking. A reinforcement of the coordination function is needed especially with the MOTC.
2. Financial resources management	■ Although the funding requirement for the implementation of the projects identified and prioritized is quite large, the national budget is limited, thus the dependency on Donor's financial assistance and the collaboration with private sector or enhancement of private investment is much needed. ■ However, the guidelines for proper funding have not been prepared and established, especially in the case of enhancing private sector investment. ■ The private investment to infrastructures can be utilized for the benefits of population. The public-private partnership (PPP) type investments for transport and logistics infrastructure development and operation are to be formulated and promoted intensively since the national budget is limited. ■ However, the talented staffs that is capable to manage PPP projects within the MOC is necessary.
3. Human resource management	■ Technical capacity needed for road and bridge engineering and project management is sufficient however, the capacity for the logistics development planning is insufficient. ■ Human resources development is needed or employment of talented persons with sufficient knowledge about transport and logistics services is needed especially for linking different transport mode with the multimodal hubs.
4. Organizational learning	■ The vertical flow of information in the administrative organizations in Myanmar is quite strong. ■ It is imperative to be familiar with the horizontal flow of information. Frequent inter-ministerial coordination meetings amongst MOTC and MOC are needed. ■ However, the number staff undertaking such tasks is limited.
5. Provision of services	■ The level of needs analysis and assessment is low. The formulation of policies based on the analytical results of necessary elements for the formulation of projects / program needs to be carried out without foreign assistance. From this viewpoint, talented staff with high technical capacity should be developed or employed. ■ Monitoring of projects / program implementation is absolutely necessary to implement the development master plan properly and effectively: however, the way of collecting data and monitoring progress, status and effects of investment are not readily available.
6. Strategic management	■ A proper, effective and achievable goal of the development plan can be set when the current situation and issues are understood properly. To do so, a technical capacity is to be upgraded to understand the current situation, however, the means and ways to understand the situation is lacking.

Source: Study Team

Aspect of Evaluation	Snap-shot Assessment on the YCDC
1. Coordination with both internal and external parties.	■ YCDC needs effective communication with the ministries concerned with the transport and logistics development at national level. Coordination skill is very much needed, however, knowledge concerned of logistics is lacking. ■ YCDC needs effective communication with the donor agencies and foreign consultants frequently. Coordination skill is very much needed however knowledge concerned of logistics is lacking. ■ The number of staff undertaking coordination with external parties, especially with foreign parties is lacking. A reinforcement of the coordination function is needed especially with the MOTC.
2. Financial resources management	■ Although the funding requirement for the implementation of the projects identified and prioritized is quite large, the city's budget is limited, thus the dependency on Donor's financial assistance and the collaboration with private sector or enhancement of private investment is much needed. ■ However, the guidelines for proper funding have not been prepared and established, especially in the case of enhancing private sector investment. ■ The private investment to infrastructures can be utilized for the benefits of population. The public-private partnership (PPP) type investments for transport and logistics infrastructure development and operation are to be formulated and promoted intensively since the national budget is limited. ■ However, the talented staffs that is capable to manage PPP projects within the YCDC is necessary.
3. Human resource management	■ Technical capacity needed for transport infrastructure project management is sufficient however the capacity for the logistics development is insufficient. ■ Human resources development is needed or employment of talented persons with sufficient knowledge about transport and logistics services is needed.
4. Organizational learning	■ The vertical flow of information in the administrative organizations in Myanmar is quite strong. ■ It is imperative to be familiar with the horizontal flow of information. Frequent inter-ministerial coordination meetings amongst MOTC and MOC are needed. ■ However, the number staff undertaking such tasks is limited.
5. Provision of services	■ The level of needs analysis and assessment is low. The formulation of policies based on the analytical results of necessary elements for the formulation of projects / program needs to be carried out without foreign assistance. From this viewpoint, talented staff with high technical capacity should be developed or employed. ■ Monitoring of projects / program implementation is absolutely necessary to implement the development urban development and spatial development master plan properly and effectively: however the way of collecting data and monitoring progress, status and effects of investment are not readily available.
6. Strategic management	■ A proper, effective and achievable goal of the development plan can be set when the current situation and issues are understood properly. To do so, a technical capacity is to be upgraded to understand the current situation, however, the means and ways to understand the situation is lacking.

Source: Study Team

Aspect of Evaluation	Snap-shot Assessment on the MCDC
1. Coordination with both internal and external parties.	■ MCDC needs effective communication with the ministries concerned with the transport and logistics development. Coordination skill is very much needed, however, knowledge concerned of logistics is lacking. ■ MCDC needs effective communication with the donor agencies and foreign consultants frequently. Coordination skill is very much needed, however, knowledge concerned of logistics is lacking. ■ The number of staff undertaking coordination with external parties, especially with foreign parties is lacking. A reinforcement of the coordination function is needed especially with the MOTC.
2. Financial resources management	■ Although the funding requirement for the implementation of the projects identified and prioritized is quite large, the city's budget is limited, thus the dependency on Donor's financial assistance and the collaboration with private sector or enhancement of private investment is much needed. ■ However, the guidelines for proper funding have not been prepared and established, especially in the case of enhancing private sector investment. ■ The private investment to infrastructures can be utilized for the benefits of population. The public-private partnership (PPP) type investments for transport and logistics infrastructure development and operation are to be formulated and promoted intensively since the national budget is limited. ■ However, the talented staffs that is capable to manage PPP projects within the MCDC is necessary.
3. Human resource management	■ Technical capacity needed for transport infrastructure project management is sufficient, however, the capacity for the logistics development is insufficient. ■ Human resources development is needed or employment of talented persons with sufficient knowledge about transport and logistics services is needed.
4. Organizational learning	■ The vertical flow of information in the administrative organizations in Myanmar is quite strong. ■ It is imperative to be familiar with the horizontal flow of information. Frequent inter-ministerial coordination meetings amongst MOTC and MOC are needed. ■ However, the number staff undertaking such tasks is limited.
5. Provision of services	■ The level of needs analysis and assessment is low. The formulation of policies based on the analytical results of necessary elements for the formulation of projects / program needs to be carried out without foreign assistance. From this viewpoint, talented staff with high technical capacity should be developed or employed. ■ Monitoring of projects / program implementation is absolutely necessary to implement the development urban development and spatial development master plan properly and effectively: however, the way of collecting data and monitoring progress, status and effects of investment are not readily available.
6. Strategic management	■ A proper, effective and achievable goal of the development plan can be set when the current situation and issues are understood properly. To do so, a technical capacity is to be upgraded to understand the current situation, however, the means and ways to understand the situation is lacking.

Source: Study Team

14.4 Institutional Development Policy and Plan

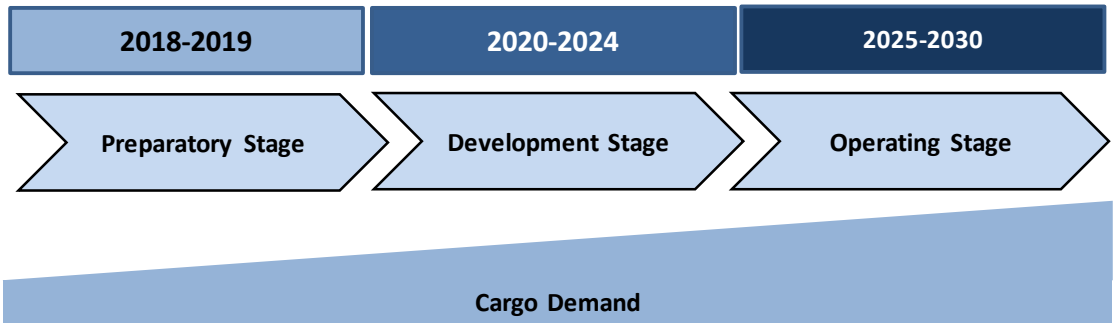
Although the capability of relevant ministries and city development committees was assessed only by snap-shot assessment but not by in-depth assessment, the result of assessment can be summarized as follows:

The understanding of the concept of modern physical distribution or logistics systems that focus on the optimization of cargo transport along the concept of the supply chain by the administration staff s as a whole is shallow at present. These days, one of the key factors to make a country competitive through the creation of appropriate business or investment environment is the logistics system. The benefit derived from the modernization and optimization of the logistics system of a country should be understood clearly first by the administrative staffs that would guide the private sector and administer the system as a whole. In this viewpoint, the capacity building and human resources development of concerned ministries and city development administration are imperative especially in these days because the operationalization of AEC has already started.

CHAPTER-15 LOGISTICS SECTOR DEVELOPMENT ROAD MAP

15.1 Logistics Sector Development Road Map

The improvement and development of the logistics system in Myanmar cannot be fully realized or the planned objectives achieved if the effort is concentrated only on the development of infrastructure, which requires considerable volume of investment. The foundation to kick-start the development of an effective logistics system should be prepared beforehand and then implementation of the actions should be followed in strategic manner. **Figure-15.1.1** suggests the conceptual roadmap for logistics development in a step-wise concept.



Source: Study Team

Figure-15.1.1 Step-wise Development Program of the Logistics Sector

The major actions to be taken by the management body of the Study are as shown in table below.

STAGE	Period	Major Actions
Stage-1 Foundation Building Stage	2018-2019	➢ Legislation of needed logistics related regulations ➢ Preparation and execution of capacity building program and its execution ➢ Organizing management and regulatory bodies ➢ Human resources development to foster logistics experts in the private sector ➢ Preparation of implementation program for top priority projects ➢ Funding arrangement for top priority projects ➢ Oversee project implementation for top priority projects
Stage-2 Plan Execution Stage	2020-2024	➢ Coordinating among concerned ministries and agencies ➢ Overall project management ➢ Evaluation and arrangement of PPP type projects ➢ Funding arrangement and oversee project implementation ➢ Establish system for maintenance of infrastructures
Stage-3 Development and Full Operation Stage	2026-2030	➢ Oversee project implementation ➢ Revision, modification and adjustment of the Study ➢ Preparation and formulation of the master plan beyond 2030

Source: Study Team

15.2 Sequential Order of the Action Plans

A set of comprehensive policies relevant to all modes of transport, as well as development strategies for specific modes like logistics, road, rail, airport, seaports, marine and inland waterways, as well as associated projects and activities that can help these modes achieve the Vision and its Objectives were formulated and proposed. The sub-sectoral Vision and the title of strategic objectives formulated are as tabulated in **Table-8.2.1** Logistics Development Visions and Strategy of the Study in details. The basic sequential orders of actions to be taken are planned in systematic order based on the following strategies:

(1) Soft Components

1) Prepare necessary laws and regulations as a foundation of creating modern and competitive logistics system in the region and the world;

2) Organize or appoint the division that will undertake the formulation, oversee the process of implementing the project identified and monitor the progress of projects under implementation in the MOTC;

3) Regulate the “National Transport Development and Project Implementation Committee” to undertake and responsible for the coordination and arrangement of the implementation programs of those projects require the inter-ministerial or inter-agencies coordination and agreement such as the establishment of multi-modal freight logistics hubs; and

4) Prepare the capacity building and human resources development programs and execute such programs aiming at fostering the skills ability of administrative officers and professionals of private sector undertaking the operation, management and develop the modern and competitive logistics system.

(2) Hard Components

1) The order of sequence for the development of the logistics corridors is as discussed in Chapter-10. The order of sequence for the actions to implement the master plan is therefore to follow this order basically:
   (i) South – East Logistics Corridor
   (ii) North – South Logistics Corridor
   (iii) Main River Logistics Corridor
   (iv) Coastal Marine Logistics Corridor
   (v) Myanmar – India Logistics Corridor
   (vi) Trans Myanmar Logistics Corridor

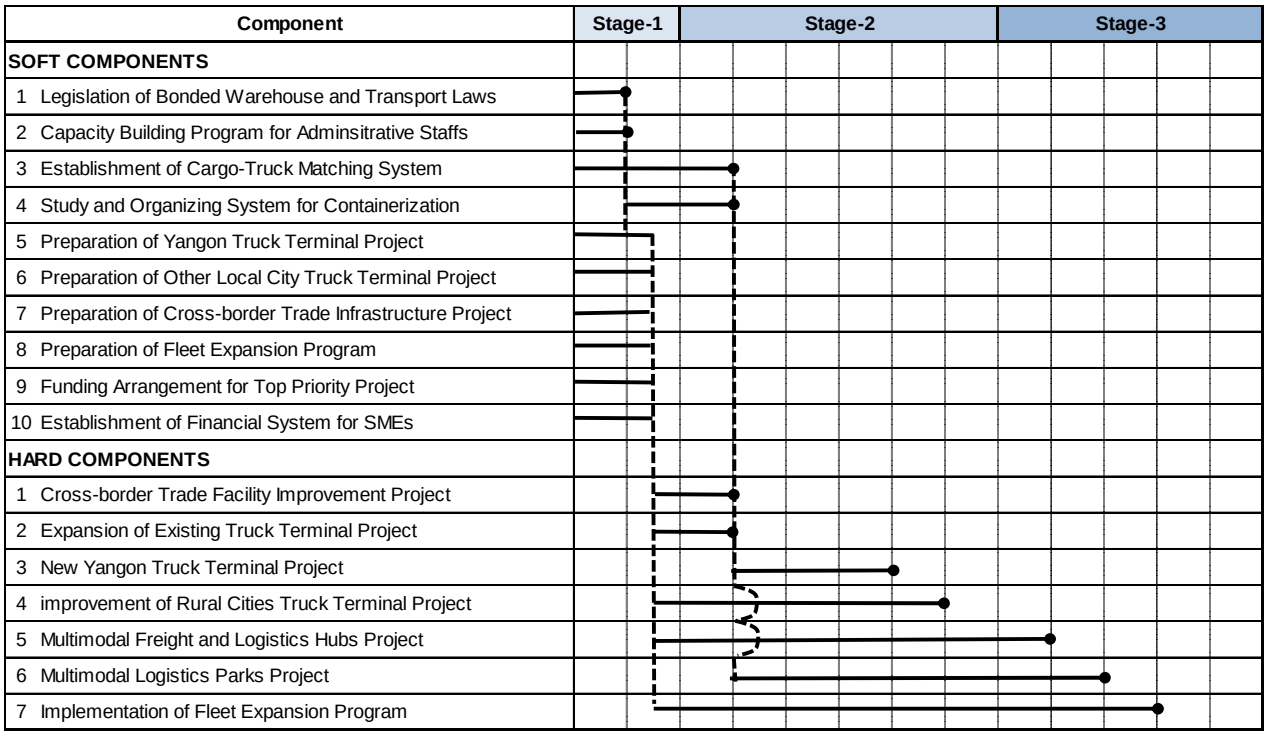
2) The order of the development of nodes of major links composing these corridors where the multimodal freight logistics hubs are planned to be established is as follow:
   (i) Gateway and border nodes as the gates that ensure an expansion of trade and international freight traffic equipped with proper facilities and equipment for smooth, seamless, and highly efficient freight transportation;
   (ii) Multimodal nodes where roads, railway, airports and / or seaports are situated;
   (iii) Commercial nodes where major cities and industrial zones are situated; and
   (iv) Interchange nodes where interchange of highways where many links cross each other.

15.3 Road Map by Sub-sector

The road map by sub-sector is as follows. The road map presented herein is to be considered as an indicative schedule of execution of actions in terms of sequencing.

(1) Logistics Sub-sector

The road map for the development and improvement of the logistics system relevant to the logistics sub-sector (logistics facilities, logistics industry) is as shown in **Figure-15.3.1.**



Source: Study Team

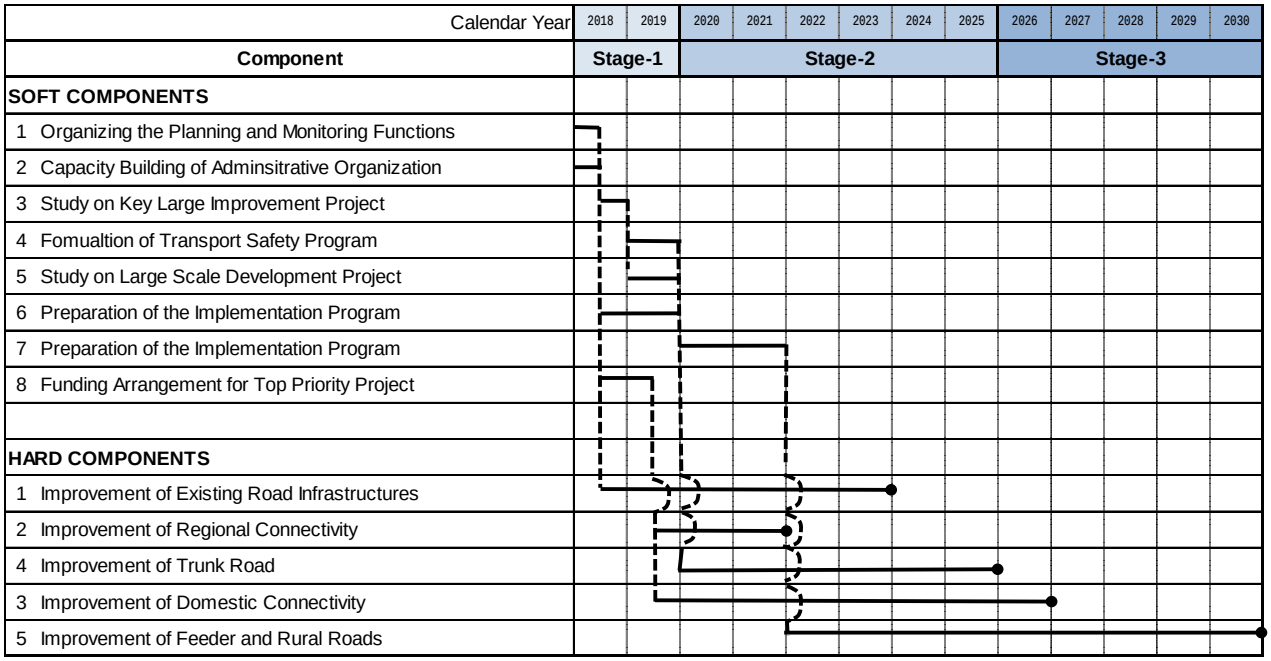
Figure-15.3.1 Road Map for the Logistics Sub-sector Development

As shown in the above figure, the study of the promotion of containerization and palletization in parallel with the introduction of the cargo / truck matching system, as well as the fostering of the logistics providers together with the expansion of truck fleets, are essential to prepare the foundation for the development and improvement of the logistics system of Myanmar. As for

the facilitation of trade, the preparation and improvement of cross-border facilities is to be emphasized. The development of multimodal freight logistics hubs is to be implemented in harmony with the implementation of the relevant infrastructure.

(2) Road Freight Transport Sub-sector

The road map for the development and improvement of the logistics system relevant to the road sub-sector is as shown in **Figure-15.3.2.**



Source: Study Team

Figure-15.3.2 Road Map for the Road Freight Transport Sub-sector

As shown in the above figure, the improvement of the existing road infrastructure is to be implemented as top priority project, in parallel with the reinforcement of road safety, as well as the fostering of professional truck drivers. The regional connectivity is to be prioritized, aimed at facilitating trade. The domestic connectivity and improvement of the rural roads is to be implemented in parallel with the reinforcement of trunk roads linking major cities throughout Myanmar.

(3) Railway Freight Transport Sub-sector

The road map for the development and improvement of the logistics system relevant to the railway freight transport sub-sector is as shown in **Figure-15.3.3.**

As shown in the figure below, the commencement of the container block train operation is to be given priority so as to prepare an alternative means of long-distance haul of containers to ease the burden on the road freight traffic and rationalize the transport cost, especially for long-distance hauling. The Railway freight stations and the ICDs are regarded as core facilities to form the “hub and spoke” structure and as a core of the multimodal freight logistics hubs that

are planned to be established at major gateway nodes, intersection nodes and commercial nodes throughout Myanmar aimed at optimization of the freight transport cost.

Calendar Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Component	**Stage-1**		**Stage-2**						**Stage-3**				
SOFT COMPONENTS													
1 Operation Program of Scheduled Freight Train (SFT)													
2 Preparation of the implementation program for SFT													
3 Study on the Missing Links of SKRL with China and Thailand													
4 Preparation of YGN-MDL Track Improvement Project													
5 Preparation of Thilawa Container Terminal Link Project													
6 Preparation of BGO-MLM Track Improvement Project													
7 Funding Arrangement for Top Priority Project													
8 Funding Arrangement for Project Implementation													
9 Operation Program of Container Block Train													
HARD COMPONENTS													
1 Operation of Scheduled Freight Train (SFT)													
2 Construction of Thilwa Railway Freight Terminal													
3 Purchase Locomotive and Wagons													
4 YGN-MDL Railway Track Improvement													
5 YGN-MDL Railway Containter Block Train Operation													
6 BGO-MLM Railway Track Improvement													
7 BGO-MLM Railway Container Block Train Operation													
8 MDL-Muse Railway Development Project													
9 BGO-MLM Railway Container Block Train Operation													

Source: Study Team

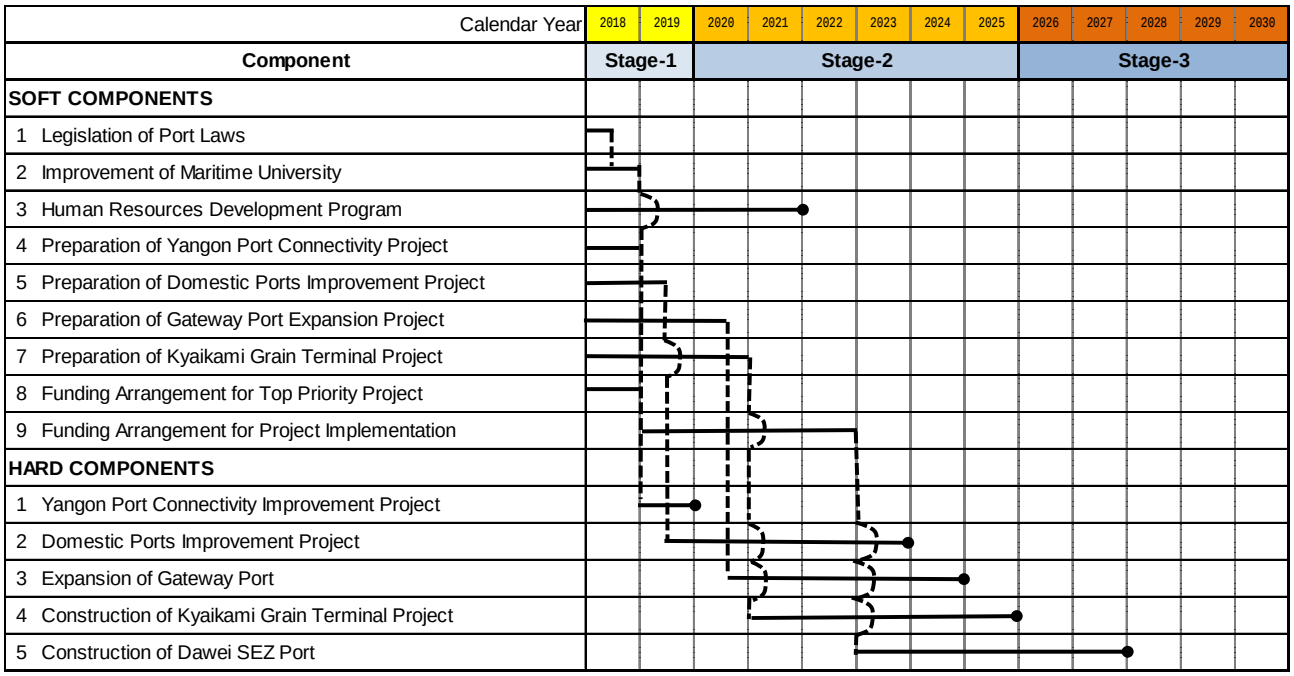
Figure-15.3.3 Road Map for the Railway Freight Transport Sub-sector Development

The missing links of the SKRL (e.g. Mandalay – Muse (China), Mandalay – Tamu (India), Thanbyuzayat – Kanchanaburi (Thailand) are to be studied carefully, to enable these routes for future container block train operation to meet the increased international container traffic volume.

(4) Marine Freight Transport Sub-sector

The road map for the development and improvement of the logistics system relevant to the marine freight transport sub-sector is as shown in **Figure-15.3.4.**

As shown in the figure below, the expansion of the container terminal at Yangon is to be given the highest priority to meet with the rapidly growing international container traffic. In the Yangon area, the connectivity between the marine transport, coastal shipping and inland waterway freight transport is to be reinforced. The domestic ports along the Coastal Marine Logistics Corridor are to be implemented in parallel with the improvement of maritime transport for international container traffic, so as to optimize the transport cost for low-value and bulky cargoes, especially along the coast. The study is to be carried out first for establishment of the grain terminal at Kyaikami aimed at enhancement of rice exports to the world market.

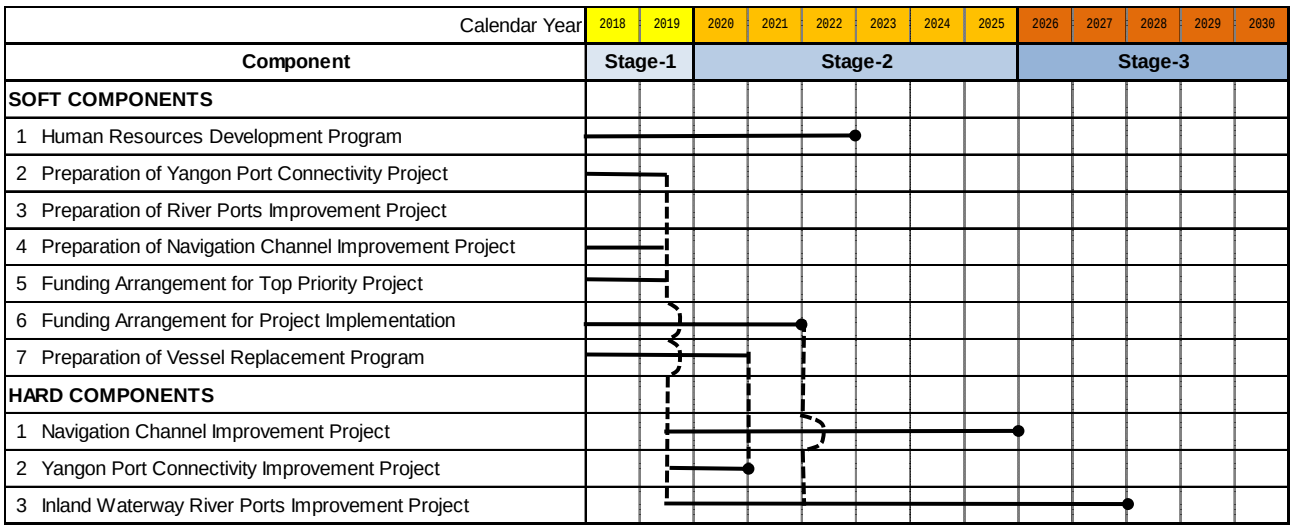


Source: Study Team

Figure-15.3.4 Road Map for the Marine Freight Transport Sub-sector Development

(5) Inland Waterway Transport Sub-sector

The road map for the development and improvement of the logistics system relevant to the inland waterway freight transport sub-sector is as shown in **Figure-15.3.5.**



Source: Study Team

Figure-15.3.5 Road Map for the Inland Waterway Freight Transport Sub-sector Development

As shown in the above figure, the improvement of navigation channels is to be completed first between Yangon and Mandalay, which is the major route for inland waterway freight transport. The inland waterway transport is a key transport mode for low-value and bulky commodities along the main rivers that run through rural areas where agricultural activities are concentrated. The river port improvement will take place in conjunction with the establishment of the

multimodal freight logistics hubs and the river ports will play the role of core facilities of such hubs, aimed at rationalizing and optimizing the transport cost, especially for the long-distance transport of low-value and bulky commodities.

(6) Aviation Sector Sub-sector

The road map for the development and improvement of the logistics system relevant to the airfreight transport sub-sector is as shown in **Figure-15.3.6.**

Calendar Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Component	**Stage-1**		**Stage-2**						**Stage-3**				
SOFT COMPONENTS													
1 Preparation of Local Airport Improvement Program													
2 Preparation of Air Traffic Management System													
3 Preparation of Air Safety Program													
4 Preparation of Hanthanawaddy Airport Project													
5 Funding Arrangement for Top Priority Project													
6 Funding Arrangement for Implementation of Projects													
HARD COMPONENTS													
1 Local Airport Improvement Project													
2 Hanthawaddy International Airport Project													

Source: Study Team

Figure-15.3.6 Road Map for Air Freight Transport Sub-sector Development

The development, improvement as well as the operation and maintenance of the major international airports, such as Yangon and Mandalay, are vested by the private sector and the Hanthawaddy International Airport will be developed by the private sector under a PPP contract as well. The improvement and expansion of local airports is essential for the promotion of both tourism development and trade of commodities produced in the rural areas, where local airports exist.

The rural areas do not have access to the world market, however, if local airports are developed well and the linkages between local airports and the major international airport in Myanmar improved, rural areas in Myanmar will have almost direct links with the world market, especially for fresh and perishable commodities such as cut flowers and high-value marine products (e.g. crabs, lobsters, abalone, etc.)

15.4 Action Plans

The outlines of the action plans are as presented in the following tables as basic plans. The detailed action plans are to be prepared for each project identified from time to time.

Table-15.4.1 Action Plans (Overall Logistics System)

Sub-sector	**Sub-sector's Vision of the Study**		
Logistics (Overall)	Sub-sector Development Vision in view of Logistics Development		
	"To eliminate bottlenecks for collection, storage and distribution of cargoes by improvement of connectivity and introduction of modern cargo transport means, and to enhance containerization in an integrated and collective way to make the Country competitive and enhance inclusive growth."		
	Strategic Objectives		
	LOS-1	Attain higher cargo transport efficiency through competition in the market	
	LOS-2	Facilitate trade to enhance industrialization by providing proper and efficient logistics system in the form of logistics corridors	
	LOS-3.	Strong and wide connectivity of cargo transport links to be created not only for regional connectivity but also for the domestic arterial network	
	LOS-4	Enhance containerized cargo transport for both international and domestic cargoes	
	LOS-5	Develop logistics system that support agriculture and manufacturing activities, thereby generating a variety of quality job opportunities, including the jobs related to logistics services	
	LOS-6	Develop human resources to help the logistics system function properly	
	Action Plans		
	Timeframe	Project ID: LGP-01	Action Plan: APO-01
	2018-2019	Improvement of Laws and Regulations for Transport of International Freight	■ Review relevant laws and regulations to enable bonded transport of trade cargo as well as international containerized cargo to legislate appropriate and workable laws and regulations.
	Timeframe	Project ID: LGP-02	Action Plan: APO-02
	2018-2019	Improvement of Laws and Regulations for Customs Clearance, etc.	■ The legal framework of customs clearance, bonded transportation, warehousing, etc. to be established.
	Timeframe	Project ID: LGP-03	Action Plan: APO-03
	2018-2019	Capacity building program for administrative officers assigned for logistics system development and management	■ Foster the administrative officers in charge of development and management of logistics development and operation system including a PPP arrangement where applicable. ■ Organizing private sector association for logistics operation including trucking, forwarding, logistics management, etc.

	Timeframe	Project ID: LGP-04	Action Plan: APO-04
	2018-2019	Training for Trainers of MOTC Aiming at Guiding Private Sector to Improve the Performance of the Logistics Industry	■ Foster the administrative officers in charge of development and management of logistics development and operation system. ■ Promote FDIs, local investment and / or joint venture companies in the field of logistics services including warehousing services. ■ Foster professional staffs assigned for operation / management of logistics services.
	Timeframe	Project ID: LGP-05	Action Plan: APO-05
	2018-2019	Promotion of FDI / Domestic Investments for Integration and Modernization of Logistics Service Sector	■ Review relevant laws and regulations to enable bonded transport of trade cargo as well as international containerized cargo to legislate appropriate and workable laws and regulations. Review FDI laws and regulations.
	Timeframe	Project ID: LGP-06	Action Plan: APO-06
		Enhance containerization and palletization	■ Form the Logistics Providers Association in the Union of Myanmar Federation of Chamber of Commerce and Industry (UMFCCI). ■ Enhancement of provision / manufacturing the international size steel containers and pallets for logistics operation in general and domestic logistics operation in particular.
	Timeframe	Project ID: LGP-17	Action Plan: APO-07
	2018-2019	Strengthen Organization of IWT	■ Prepare the institutional development program including capacity building program
	Timeframe	Project ID: LGP-18	Action Plan: APO-08
	2018-2019	Improvement of University Relevant to Maritime Transport	■ Prepare the institutional development program including capacity building program
	Timeframe	Project ID: LGP-19	Action Plan: APO-09
	2018-2020	Improvement of Statistics Compilation System	■ Prepare the institutional development program including capacity building program
	Timeframe	Project ID: LGP-20	Action Plan: APO-10
	2018-2021	Enhancement of Ship Registration and Categorization	■ Prepare the institutional development program including capacity building program
	Timeframe	Project ID: LGP-21	Action Plan: APO-11
	2018-2020	Enhancement of Captains and Helmsmen Education System	■ Prepare the institutional development program including capacity building program

Table-15.4.2 Action Plans (Logistics Sub-sector)

Sub-sector	Sub-sector's Vision of the Study		
Logistics Sector (facilities)	Sub-sector Development Vision for Logistics Development		
	"To establish and develop an efficient and modern cargo collection, storage and distribution system in collaboration with public and private sector, optimize the cargo transport cost and shorten lead time, by fostering professional logistics providers including trucking, warehousing and forwarding companies."		
	Strategic Objectives		
	LLS-1	Improvement of truck terminals at major cities throughout the Country	
	LLS-2	Improvement and modernization of the logistics service level	
	LLS-3.	Enhancement of containerization and palletization	
	LLS-4	Enhancement of multimodal freight logistics hub	
	LLS-5	Develop the logistics system practical for Myanmar	
	LLS-6	Institutional financial system to meet with the demand of SMEs	
	Action Plans		
	Timeframe	Project ID: LLP-01	Action Plan: APL-01
	2018-2022	Expansion and Improvement of Yangon Truck Terminal (Bayint Naung)	■ Prepare the implementation program of APL-11 ■ Conduct engineering survey ■ Coordinate with urban road projects for creation of multimodal logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LLP-02	Action Plan: APL-02
	2018-2022	Establishment of New Yangon Truck Terminal	■ Determine and location (Adjacent to the MR's ICD at Iwatagyi) ■ Conduct engineering survey ■ Coordinate with urban road projects ■ Conduct technical and financial viability study based on demand forecast ■ Prepare implementation program and oversee its execution
	Timeframe	Project ID: LLP-03	Action Plan: APL-03
	2018-2020	Container Switching Station Development in Myawaddy Trade Zone	■ Prepare the implementation program of APL-03 ■ Conduct engineering survey ■ Coordinate with regional road projects ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LLP-04	Action Plan: APL-04
	2018-2020	Container Switching Station Development in Three Pagoda Pass	■ Prepare the implementation program of APL-04 ■ Conduct engineering survey ■ Coordinate with road project

Sub-sector	Sub-sector's Vision of the Study		
			■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LLP-05	Action Plan: APL-05
	2018-2020	Establishment of Yangon Multimodal Freight Logistics Park Development	■ Prepare the implementation program of APL-05 ■ Coordinate with road, railway and IWT projects for creation of the multimodal freight logistics hub ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LLP-06/12	Action Plan: APL-06 / 12
	2018-2023	Local Truck Terminal Development / Improvement	■ Prepare the implementation program of with relevant regional / state government ■ Conduct engineering survey ■ Coordinate with road, railway, IWT and coastal shipping projects where applicable for creation of the multimodal freight logistics hub ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LLP-13	Action Plan: APL-13
	2018-2020	Establishment of Mandalay Multimodal Freight Logistics Park Development	■ Prepare the implementation program of APL-13 ■ Coordinate with road, railway and IWT projects for creation of the multimodal freight logistics hub ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LLP-14	Action Plan: APL-14
	2018-2020	Establishment of Bago Multimodal Freight Logistics Park Development	■ Prepare the implementation program of APL-14 ■ Coordinate with road, railway and IWT projects for creation of the multimodal freight logistics hub ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program

Table-15.4.3 Action Plans (Road)

Sub-sector	Sub-sector's Vision of the Study		
Road	Sub-sector Development Vision for Logistics Development		
	"To develop safe, efficient, internationally standardized, road infrastructure systematically integrated with all modes of transport to support the economic development of Myanmar in a sustainable manner"		
	Strategic Objectives		
	LRS-1	Development of high-standard highways as the fundamental backbone of the cargo transport network	
	LRS-2	Determine to use the Yangon-Mandalay Expressway for major freight transport route and implement project LRP-01 Upgrading Yangon-Nay Pyi Taw-Mandalay Expressway.	
	LRS-3.	Development of by-pass routes to detour congested areas, reduce transport time and the number of traffic accidents in urban areas	
	LRS-4	Provision of redundancy and robustness for the main logistics corridors to strengthen national logistics lifelines	
	LRS-5	Improvement of awareness of traffic safety and upgrading of road infrastructure to reduce traffic accidents	
	LRS-6	Improvement of accessibility to promote effective use of primary logistics facilities	
	LRS-7	Execute LRP-04 in the south eastern part of Myanmar	
	LRS-8	Execute LRP-02 and LRP-03 in the northern part of Myanmar	
	LRS-9	Upgrading of rural road networks to strengthen the cargo transport network and to provide market access for rural areas	
	Action Plans		
	Timeframe	Project ID: LRP-13	Action Plan: APR-01
	2018-2021	Construction of Bridges on India-Myanmar-Thailand Trilateral Highway (Tamu – Kyigone – Kalewa Road)	■ Prepare the implementation program of LRP-13 Land acquisition arrangement
	Timeframe	Project ID: LRP-01	Action Plan: APR-02
	2019-2020	Upgrading of Yangon – Nay Pyi Taw - Mandalay Expressway	■ Amend the rules and regulation on the use of subject expressway to enable the operation of heavy loaded vehicles for freight transport. ■ Improve the expressway meeting with the international design standards
	Timeframe	Project ID: LRP-04	Action Plan: APR-03
	2018-2024	Construction of Yangon Urban Expressway (YUEX)	■ Prepare the implementation program of LRP-04 ■ Land acquisition arrangement
	Timeframe	Project ID: LRP-05	Action Plan: APR-04
	2018-2022	Construction of Yangon Outer Ring Road (YORR) East Section: Thilawa Area to NH-1	■ Prepare the implementation program of LRP-05 ■ Coordinate linking with Yangon and Thilawa Area Terminal ■ Coordinate establishment of Multimodal Freight Logistics Hubs at Ywathargyi ICD and Truck Terminal planned ■ Land acquisition arrangement

Sub-sector	Sub-sector's Vision of the Study		
	Timeframe	Project ID: LRP-15	Action Plan: APR-05
	2019-2020	Road Safety Improvement Program	■ Prepare the implementation program of LRP-15 ■ Preparation of necessary facility and materials
	Timeframe	Project ID: LRP-08	Action Plan: APR-06
	2019-2022	Construction of Thaton Bypass Road	■ Prepare the implementation program of LRP-08 ■ Land acquisition arrangement
	Timeframe	Project ID: LRP-07	Action Plan: APR-07
	2019-2023	Construction of the New Expressway between Bago and Kyaiktiyo	■ Prepare the implementation program of LRP-07 ■ Land acquisition arrangement
	Timeframe	Project ID: LRP-09	Action Plan: APR-08
	2019-2023	Upgrading of Three Pagoda Pass Road	■ Prepare the implementation program of LRP-09 ■ Land acquisition arrangement
	Timeframe	Project ID: LRP-10	Action Plan: APR-09
	2019-2023	Construction of Mawlamyine Peripheral Road	■ Prepare the implementation program of LRP-10 ■ Coordinate with the establishment of container switching yard ■ Land acquisition arrangement
	Timeframe	Project ID: LRP-02	Action Plan: APR-10
	2019-2023	Construction of Alternative Route of Mandalay-Muse Road	■ Prepare the implementation program of LRP-02 Land acquisition arrangement
	Timeframe	Project ID: LRP-03	Action Plan: APR-11
	2019-2023	Construction of Myota – Tada U Road	■ Prepare the implementation program of LRP-03 Land acquisition arrangement
	Timeframe	Project ID: LRP-06	Action Plan: APR-12
	2020-2023	Construction of Hanthawaddy Airport Access Road	■ Prepare the implementation program of LRP-06 Land acquisition arrangement
	Timeframe	Project ID: LRP-11	Action Plan: APR-13
	2021-2024	Pong Taung – Pone Nyar Tunnel between Magway and Sagaing Region	■ Prepare the implementation program of LRP-11 Land acquisition arrangement
	Timeframe	Project ID: LRP-12	Action Plan: APR-14
	2022-2024	Construction of Fast Shan Plateau Access Road (Yin Mar Bin – Kalaw)	■ Prepare the implementation program of LRP-12 Land acquisition arrangement
	Timeframe	Project ID: LRP-14	Action Plan: APR-15
	2022-2025	Ann – Kyaukpyu Road	■ Prepare the implementation program of LRP-14 Land acquisition arrangement

Table-15.4.4 Action Plans (Railway)

Sub-sector	**Sub-sector's Vision of the Study**		
Railway	Sub-sector Development Vision for Logistics Development		
	"To establish railway freight transport services having advantages of punctuality, rapidity and accessibility focusing on container transport. Strengthen the foundation of management system for railway freight related services to make railway mode a transport mode to be chosen by customers."		
	Strategic Objectives		
	LFS-1	Enhancement of railway transport on the Yangon-Mandalay axis	
	LFS-2	Improvement of freight railway transportation services for customers satisfaction	
	LFS-3.	Stepwise station development	
	Action Plans		
	Timeframe	Project ID: LFP-01	Action Plan: APF-01
	2018-2021	Development of Freight Stations / ICDs at Yangon and Mandalay	■ Prepare the implementation program of LFP-01 ■ Coordinate with urban road developments in both Yangon and Mandalay ■ Plan and design freight station and ICD as one components of the Multimodal Freight Logistics Hubs ■ Land acquisition arrangement
	Timeframe	Project ID: LFP-13	Action Plan: APF-02
	2018-2021 2020-2023 2022-2025	Improvement of Yangon CBD Freight Station	■ Prepare the implementation program of LFP-13 ■ Coordinate with urban road developments in Yangon ■ Plan and design freight station as one components of the Multimodal Freight Logistics Hubs ■ Land acquisition arrangement
	Timeframe	Project ID: LFP-10	Action Plan: APF-03
	2018-2019	Study on the Myanmar – Thailand Railway	■ Prepare the terms of reference for the study ■ Conduct soil, geographical, geological, hydraulic survey ■ Engineering study ■ Conduct technical and financial viability study
	Timeframe	Project ID: LFP-02	Action Plan: APF-04
	2019-2022	Freight Station Development Project at Thilawa Area with Thilawa Line Improvement	■ Prepare the implementation program of LFP-02 ■ Coordinate with urban road developments of Yangon and Thilawa international terminal ■ Plan and design freight station as one components of the Multimodal Freight Logistics Hubs ■ Land acquisition arrangement

Sub-sector	**Sub-sector's Vision of the Study**		
	Timeframe	Project ID: LFP-04	Action Plan; APF-05
	2019-2022	Procurement or Lease Arrangement of Locomotives and Container Freight Wagons	■ Prepare the implementation program of LFP-04 taking into consideration of public and private collaboration ■ Contract arrangement with private sector either for operation concession or leasing of locomotives / container wagons
	Timeframe	Project ID: LFP-06	Action Plan: APF-06
	2020-2026 2022-2029	Yangon Outer Ring Railway Development	■ Prepare the implementation program of LFP-06 ■ Coordinate with the ICD project at Ywathargyi ■ Land acquisition arrangement
	Timeframe	Project ID: LFP-08	Action Plan: APF-07
	2018-2021 2023-2026	Intermediate Freight Station Improvement	■ Prepare the implementation program of LFP-08 ■ Implementation of program
	Timeframe	Project ID: LFP-11	Action Plan: APF-08
	2018-2021	Thaton – Myaingkalay Track Improvement with Myaingkalay CFS	■ Prepare the implementation program of LFP-11 ■ Land acquisition arrangement ■ Implementation of program
	Timeframe	Project ID: LFP-12	Action Plan: APF-09
	2018-2021	Kyaikami Railway Freight Terminal Development	■ Prepare the implementation program of LFP-12 ■ Coordinate with Kyaikami Port Project ■ Implementation of program
	Timeframe	Project ID: LFP-14	Action Plan: APF-10
	2025-2031	Thilawa – Bago New Line	■ Prepare the implementation program of LFP-14 ■ Conduct soil, geographical and geological survey ■ Conduct technical and financial viability study ■ Implementation of program
	Timeframe	Project ID: LFP-09	Action Plan: APF-11
	2025-2031	Pyay Line Improvement	■ Prepare the implementation program of LFP-09 Implementation of program

Table-15.4.5 Action Plans (Maritime Transport)

Sub-sector	Sub-sector's Vision of the Study		
Waterborne transport	**Sub-sector Development Vision for Logistics Development**		
	"To develop and maintain a proper and effective international port system to meet with increasing container traffic demand and refurbish local ports to provide and maintain the least cost transport means for bulky goods for the local cities situated along the coastal route, where transport connectivity by other modes is weak, to enhance the development of areas that lag behind in national economic development."		
	Strategic Objectives		
	LWS-1	Legislation of the "Port Act"	
	LWS-2	Enhance improvements to domestic ports along the Coastal Corridor	
	LWS-3.	Securing navigation safety	
	Action Plans		
	Timeframe	Project ID: IWP-01	Action Plan: APW-01
	2018-2026	Yangon Port (Post Thilawa) Development	■ Prepare the implementation program of LWP-01 ■ Conduct soil and geological survey ■ Coordinate with road, railway and IWT projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: IWP-02	Action Plan: APW-02
	2018-2024	Yangon Port (Domestic Port) Development	■ Prepare the implementation program of LWP-02 ■ Conduct soil and geological survey ■ Coordinate with road and IWT and coastal shipping project for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: IWP-07	Action Plan: APW-03
	2018-2024	Pathein Port Improvement	■ Prepare the implementation program of LWP-07 ■ Conduct soil and geological survey ■ Coordinate with road, IWT and coastal shipping projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program

Sub-sector	**Sub-sector's Vision of the Study**		
	Timeframe	Project ID: IWP-03	Action Plan: APW-03
	2019-2024	Sittwe Port Improvement	■ Prepare the implementation program of LWP-03 ■ Conduct soil and geological survey ■ Coordinate with road and IWT projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: IWP-08	Action Plan: APW-04
	2019-2024	Mawlamyine Port Improvement	■ Prepare the implementation program of LWP-08 ■ Conduct soil and geological survey ■ Coordinate with road, IWT and coastal shipping projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: IWP-09	Action Plan: APW-05
	2019-2024	Kyaikami Port Development	■ Prepare the implementation program of LWP-09 ■ Conduct soil and geological survey ■ Coordinate with road, railway, IWT, coastal shipping and IWT projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: IWP-10	Action Plan: APW-06
	2019-2024	Dawei (Local) Port Development	■ Prepare the implementation program of LWP-10 ■ Conduct soil and geological survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: IWP-11	Action Plan: APW-07
	2019-2023	Myeik Port Improvement	■ Prepare the implementation program of LWP-11 ■ Conduct geological survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program

Sub-sector	**Sub-sector's Vision of the Study**		
	Timeframe	Project ID: IWP-11	Action Plan: APW-08
	2019-2023	Myeik Port Improvement	■ Prepare the implementation program of LWP-11 ■ Conduct soil and geological survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: IWP-12	Action Plan: APW-09
	2019-2023	Kawthaung Port Improvement	■ Prepare the implementation program of LWP-11 ■ Conduct soil and geological survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: IWP-05	Action Plan: APW-09
	2020-2024	Kyaukpyu Port Improvement	■ Prepare the implementation program of LWP-05 ■ Conduct soil and geological survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: IWP-06	Action Plan: APW-09
	2020-2023	Thandwe Port Improvement	■ Prepare the implementation program of LWP-06 ■ Conduct soil and geological survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program

Table-15.4.6 Action Plans (Inland Waterway Transport)

Sub-sector	**Sub-sector's Vision of the Study**		
Inland Waterway Transport	Sub-sector Development Strategy for Logistics Development		
	"To promote inland water transport as the least-cost transport means especially for bulky cargo transport along the major river systems and to play an important role for sustaining rural development along the major river systems."		
	Strategic Objectives		
	LIS-1	Expansion of utilization of inland waterway transport in main channels	
	LIS-2	Development of sustainable and balance transport networks	
	LIS-3.	Sustainable utilization of waterway transport connecting villages along small rivers	
	LIS-4	Improvement of organization and related laws	
	Action Plans		
	Timeframe	Project ID: LIP-01	Action Plan: AIP-01
	2018-2020	Mandalay Port Development	■ Prepare the implementation program of LIP-01 ■ Conduct engineering survey ■ Coordinate with road, IWT and railway projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-02	Action Plan: AIP-02
	2018-2020	Yangon – Mandalay Navigation and Channel Improvement	■ Prepare the implementation program of LIP-02 ■ Conduct engineering survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-10	Action Plan: AIP-03
	2018-2021	Yangon Port Improvement including Connectivity	■ Prepare the implementation program of LIP-10 ■ Conduct engineering survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-14	Action Plan: AIP-04
	2018-2021	Improvement of Connectivity (Overseas, Coastal shipping and Inland Waterway Transport)	■ Prepare the implementation program of LIP-14 ■ Conduct engineering survey ■ Coordinate with road, railway, IWT and coastal shipping projects for reinforcement of connectivity ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program

Sub-sector	Sub-sector's Vision of the Study		
	Timeframe	Project ID: LIP-07	Action Plan: AIP-05
	2018-2021	Improvement of Yangon River Water Transport	■ Prepare the implementation program of LIP-07 ■ Conduct engineering survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-03	Action Plan: AIP-06
	2018-2020	Vessel Safety Improvement	■ Prepare the implementation program of LIP-03 ■ Conduct technical and financial viability study ■ Implementation of program
	Timeframe	Project ID: LIP-04	Action Plan: AIP-07
	2018-2020	Rakhine Coastal Vessel	■ Prepare the implementation program of LIP-04 ■ Evaluate design of vessels ■ Implementation of program
	Timeframe	Project ID: LIP-05	Action Plan: AIP-08
	2018-2020	Replacement of Wooden Vessels with FRP Vessel	■ Prepare the implementation program of LIP-05 ■ Evaluate design of vessels ■ Implementation of program
	Timeframe	Project ID: LIP-06	Action Plan: AIP-09
	2018-2020	Replacement of Wooden Vessels with FRP Vessel	■ Prepare the implementation program of LIP-05 ■ Evaluate design of vessels ■ Implementation of program
	Timeframe	Project ID: LIP-08	Action Plan: AIP-10
	2018-2020	Dala Shipyard Modernization	■ Prepare the implementation program of LIP-08 ■ Conduct technical and financial viability study ■ Implementation of program
	Timeframe	Project ID: LIP-13	Action Plan: AIP-11
	2018-2020	Container Transport Vessel (Vessel Modernization)	■ Prepare the implementation program of LIP-13 ■ Evaluate design of vessels ■ Implementation of program
	Timeframe	Project ID: LIP-18	Action Plan: AIP-12
	2018-2020	Navigation Safety and Maintenance Improvement	■ Prepare the implementation program of LIP-18 ■ Conduct technical and financial viability study ■ Implementation of program
	Timeframe	Project ID: LIP-18	Action Plan: AIP-13
	2018-2020	Ayeyarwaddy Delta Navigation and Channel Improvement	■ Prepare the implementation program of LIP-18 ■ Conduct technical and financial viability study ■ Implementation of program

Sub-sector	Sub-sector's Vision of the Study		
	Timeframe	Project ID: LIP-12	Action Plan: AIP-14
	2018-2020	Magway Inland Waterway Hub Port Development	■ Prepare the implementation program of LIP-12 ■ Conduct engineering survey ■ Coordinate with road, IWT and railway projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-11	Action Plan: AIP-15
	2018-2021	Monywa Port Improvement	■ Prepare the implementation program of LIP-11 ■ Conduct engineering survey ■ Coordinate with road and IWT projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-29	Action Plan: AIP-16
	2018-2024	Thanlwin River Navigation and Channel Improvement	■ Prepare the implementation program of LIP-29 ■ Conduct engineering survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-34	Action Plan: AIP-17
	2018-2021	Pathein Port Improvement	■ Prepare the implementation program of LIP-11 ■ Conduct engineering survey ■ Coordinate with road and coastal shipping projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-19	Action Plan: AIP-18
	2018-2021	Pyay Port Improvement	■ Prepare the implementation program of LIP-19 ■ Conduct engineering survey ■ Coordinate with road and railway projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program

Sub-sector	**Sub-sector's Vision of the Study**		
	Timeframe	Project ID: LIP-20	Action Plan: AIP-19
	2018-2021	Hinthada Port Improvement	■ Prepare the implementation program of LIP-20 ■ Conduct engineering survey ■ Coordinate with road, IWT and railway projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-25	Action Plan: AIP-20
	2018-2021	Kalewa Port Improvement	■ Prepare the implementation program of LIP-25 ■ Conduct engineering survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-09	Action Plan: AIP-21
	2020-2025	Kaladan Multimodal Transit Transport (Vessel, channel, navigation)	■ Prepare the implementation program of LIP-09 ■ Conduct engineering survey ■ Coordinate with road, IWT and coastal shipping projects for creation of multimodal freight logistics hub. ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program
	Timeframe	Project ID: LIP-27	Action Plan: AIP-22
	2022-2025	Chindwin River Navigation and Channel Improvement	■ Prepare the implementation program of LIP-27 ■ Conduct engineering survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program

Table-15.4.7 Action Plans (Civil Aviation)

Sub-sector	**Sub-sector's Vision of the Study**		
Civil Aviation Sector	Sub-sector Development Vision for Logistics Development		
	"To prepare the freight transport system so it is possible to transport the value of goods at the fastest means to international as well as domestic markets."		
	Strategic Objectives		
	LAS-1	Strengthen international air cargo facilities	
	LAS-2	Enhancement of logistics safety awareness in the civil aviation sector	
	LAS-3.	Strengthen domestic air cargo handling facilities	
	Action Plans		
	Timeframe	Project ID:	Action Plan: LAP-01
	2019-2025	Domestic Airport Improvement / Development	■ Prepare the implementation program ■ Conduct engineering survey ■ Conduct technical and financial viability study based on demand forecast ■ Implementation of program

CHAPTER-16 FINANCIAL SCHEME

16.1 Financing for Transport / Logistics Infrastructure Development / Improvement Projects

16.1.1 Financial Requirements

The total initial capital investment cost required for the implementation of the Study up to 2030 is estimated at around MMK 41 trillion (or US$ 30 billion) of which around 30% is expected to be covered by the Private Financial Initiatives (PFI) type financial scheme. The estimated cost for the infrastructure development / improvement in the short-term timeframe (2018-2020) is MMK 7.4 trillion (or US$ 5.4billion) of which around 40% is expected to be covered by the PFI. Remaining 60% or MMK 4.4 trillion (or US$ 3.3 billion) is to be met by Government budget and by the Official Development Assistance from the donor countries and international financial institutions.

The estimated investment cost mentioned above covers only the need of development / improvement of necessary transport / logistics infrastructure identified in the Study 2030. This means that the investment cost for replacement of aged vehicles, ships, IWT vessels, warehouses, etc. belonging to the private sector is not included. The cost estimated for replacement of aged transport / logistics equipment and the expansion of the fleets through procurement of new equipment (trucks, vessels, warehouses, etc.) to meet with the future freight transport demand is estimated at around MMK 6.5 trillion (or US$ 5.0 billion) every year on average toward 2030. This means that the investment cost required for expansion of the fleets for both trucking and domestic shipping is much larger than that for development / improvement of related infrastructure.

16.1.2 Public-Private Partnership in General

(1) Rationale of Utilizing the Public-Private Partnership (PPP) in General

Public–private partnerships (PPPs) change how governments work. They introduce competition into the provision of public services, mobilize additional expertise and financial resources, adopt life-cycle asset management within a results-based approach, base payments to service providers on performance, and allow governments to reduce the risks they bear. These innovations can help deliver public services faster, at a lower cost and at higher quality. To achieve these benefits, however, the right projects need to be identified, and PPPs need to be developed and implemented effectively.

(2) Current Situation of Public-Private Partnership (PPP) in Myanmar

Since 2011, when the Myanmar changed the course of economic and political system by adopting the market oriented and open economy system, the Government of Myanmar has been making efforts to prepare the framework for implementing PPP projects since the development and improvement of various key infrastructure is very much needed to achieve the goal of economic development in the shortest possible timeframe, whilst the national budget for the development of infrastructure alone is insufficient to cover the needed investment costs. The government has been seeking the mobilization of resources from both donors and private sectors to fill the gaps between the financial requirement and the national budgets. The issues and challenges of Myanmar for implementation of the PPP projects to date can be summarized as shown in the **Table-16.1.1**below.

Table-16.1.1 Issues and Challenges of Myanmar for Implementation of the PPP projects

Issue	Challenge
Lack of Plans	● Sector and resource planning lags ● Cross-sectoral coordination is lacking
Lack of Frameworks	● Only partial means for mobilizing private sector investment; very few on a true competitive tender basis (i.e. Telecom, Myingyan, international airports, etc.)
Lack of Technical Capacity	● Reliance on private sector to undertake studies and propose commercial terms. ● Difficulty to judge fair terms of contracts, assessing value, determining price and performance Challenges in ability to manage process

Source: ADB, Support for PPP and Development Partner Cooperation 27 November 2014

Many ministries and states/regions are already pursuing PPPs, such as in the fields of power, energy, aviation, roads, water, waste treatment, government accommodations. PPP has been a part of the national development strategy – make best use of limited development monies – capitalize on the interest of the private sector. But there have been challenges for the Government in actually achieving closure and success. The “unknowns” at the time of starting policy guidelines for PPPs were as follows:

- Not knowing what a “good deal” is in the PPPs context
- Not knowing what the “market price” for goods is
- Not knowing what it is possible to ask from private sector
- Not knowing what the private sector will demand from government

The Government of Myanmar has been making efforts to prepare the framework and policies needed for proper exercise of arranging and implementing PPP projects taking into account the need of clarification of unknowns and changing the situation to potential environment as summarized in **Table-16.1.2** below:

Table-16.1.2 Current Situation and Potential Environment of PPP Arrangement

Current Situation		Potential Environment
Government responds to private proposals	⇒	Government prioritizes development
Private sector defines the project	⇒	Government defines projects on offer based on plan and need
MOU-driven - open to one	⇒	Competitive bidding – open to all
Individual terms from private sector party	⇒	Standardized terms set by Government
Results in individual projects	⇒	Creates a portfolio of projects
Private sector driven	⇒	Government controlled
Overburdens staff, decision-makers	⇒	Maximizes efficiency of human resources
Yields uneconomic outcomes or outcomes difficult to benchmark	⇒	Maximizes efficiency of financial resources Competitive bidding creates benchmarks
First come-first serve approach to allocating best sites, limited natural resources	⇒	Maximizes efficiency of land use and natural resource allocation taking control over the PPP development

Source: UNESCAP Workshop on Public-Private Partnerships for Infrastructure Development in Myanmar, 2014

(3) PPP Guidelines

The Government of Myanmar is committed to improving the level and the quality of economic and social infrastructure services across the country and is seeking to develop a substantive role for PPP as a means of promoting private sector investment and utilizing private sector expertise, innovation and management ability in the provision of public infrastructure and public services.

(4) PPP Policy Paper

The Government of Myanmar formulated a PPP policy document that seeks to develop the use of PPP approach, outline where its use is appropriate, and instigate a consistent and effective approach to their identification, development, procurement and management. The policy documents also clarifies the current roles and responsibilities of institutions and bodies in the Government at each stage of infrastructure projects. The Ministry of Planning and Finance has prepared the policy document on the PPP in Myanmar including legal review of PPP related issues in 2016 with the technical assistance of Transport Division of UNESCAP referring to "Building capacity and facilitating private sector involvement for infrastructure development for less developed countries in the Asia-Pacific region", which focuses on four selected countries, including Myanmar. Such the laws and regulation or PPP laws are under preparation at present in Myanmar. However, the formulation of the projects appropriate for their development under the PPP scheme can commence. Some of the key transport infrastructure projects have been already realized, in line with the policies set out by the Government to date.

As of November 2017, the PPP guidelines and policy papers have been completed with the technical assistance from the Asian Development Bank and other international financial and technical institutions, including JICA. The policy papers have been waiting for the

Government approval for legislation. Once it is approved, the policy document will be made available online. http://www.pppmyanmar.gov.mm/policy-and-guidelines

(5) Projects Implemented as PPP projects

The Government of Myanmar has already significant experience with PPP projects. In particular, projects have been implemented in the energy sector (pipelines and power plants) and in the transport sector. In the transport sector for example, a concession agreement was signed in 2014 for the operation, rehabilitation and maintenance of airport facilities at Mandalay International Airport. In addition, a 30-year PPP contract was awarded the same year to construct a new airport approximately 70 km northeast of Yangon (Hanthawaddy International Airport). Roads have also been developed under BOT schemes for many years.

With regulatory framework and capacity-building initiatives in place, a competitive, transparent licensing issuance process was launched by the Government of Myanmar for selected bidders. A number of PPP projects have already been implemented or are under implementation in Myanmar, the outlines of some of these are presented below.

(1)	Myingyan Independent Power Producer Project
Status	Concession agreement was made.
Sector	Power
Public Sector	Ministry of Electric Power (MOEP)
Private Sector	Selected qualified Independent Power Producer (IPP)
Mode of Investment	Build, Operate and Transfer (BOT)
Location	Myingyan Township, Mandalay
Key Facts	
The project cost is expected to be around US$ 250 million and comprises a 250MW Combined Cycle Gas Turbine Power Plant. The project combines financial advisory support from IFC and an IDA Guarantee to mitigate selected risks facing private sector lenders and investors to Myanmar. This project will utilize high efficiency CCGT (Combined Cycle Gas Turbine) technology, which is the least cost approach to rapidly increase electricity production from natural gas, while minimizing CO_2 emissions.	

(2)	Hanthawaddy International Airport Project
Status	Concession agreement was made and the condition of construction stage is under negotiation between the DCA and the Concessionaire.
Sector	Transport
Public Sector	Ministry of Transport and Communications (MOTC). Department of Civil Aviation (DCA)
Private Sector	JGC Corporation, Yongnam Holdings Limited, and Changi Airports International
Mode of Investment	Framework Agreement was signed in January 2016 for concessional operation of Hanthawaddy International Airport with DCA
Location	Hanthawaddy, Bago
Key Facts	
The airport project is planned for completion by 2022 and the airport is expected to have an initial capacity of 12 million passengers a year.	

(3)	Mandalay International Airport Projects – Concession Contract Made
Status	Concession agreement was made and under execution.
Sector	Transport
Public Sector	Ministry of Transport and Communications (MOTC). Department of Civil Aviation (DCA)
Private Sector	JALUX Inc. (JALUX), Mitsubishi Corporation (MC), and Myanmar's SPA affiliated group-company Yoma Development Group Limited.
Mode of Investment	Agreement was signed in November 2014 for concessional operation of Mandalay Airport for 30 years. Concession agreement was signed in March 2015 with DCA
Location	Mandalay
Key Facts	
Operation and management of the Mandalay International Airport for 30 years from March 2015	

(4)	Telecommunications
Status	Concession agreement was made and under execution.
Sector	Telecommunications
Public Sector	Ministry of Transport and Communications (MOTC).
Private Sector	Telenor from Norway obtained their licenses in January 2014 and launched commercial services later that year.
Location	Throughout the country
Key Facts	
At US$1.0 billion, Telenor Myanmar was the largest new deal in 2014. The 15-year paid spectrum license was granted by Myanmar's Federal Government to Norway's Telenor Group, which committed US$500 million toward the project. Payments were done at 50% in 2014, 25% in 2015 and 25% in 2016.	

(5)	Telecommunications
Status	Concession agreement was made and under execution.
Sector	Telecommunications
Public Sector	Ministry of Transport and Communications (MOTC).
Private Sector	Ooredoo from Qatar obtained their licenses in January 2014 and launched commercial services later that year.
Location	Throughout the country
Key Facts	
The second largest new project was also in Myanmar—the US$500 million Ooredoo Myanmar. Ooredoo paid US$500 million to the government for the license and has pledged a total of US$15 billion to help develop Myanmar's telecom sector. Ooredoo is targeting a rapid roll-out of its network and expects to cover the vast majority of the population with LTE-ready infrastructure within five years from 2015.	

(6) Projects in the Pipeline

Table-16.1.3 below presents current projects in the pipeline. These projects will be disseminated through the official website operated by the Ministry of Planning and Finance in the future.

Table-16.1.3 PPP Projects in the Pipeline

Month/Year (Published)	Title of PPP Project	Situation	Value (US$ million)	Sector
2017	Yangon Bus Public Company		10	Transport
August 2017	Mawlamyine Airport PPP Project	In tender process		Transport
August 2017	Kawthaung Airport PPP Project	In tender process		Transport
August 2017	Heho Airport PPP Project	In tender process		Transport
April 2017	Myanmar Industrial Port	In tender process	220	Transport
February 2016	Yangon Central Rail Station Upgrading (DBOM) Project	In tender process	2,500	Transport

Source: Study Team

(7) Partnership Agreement with the International Financial Institutions (IFI) and Donors

The IFIs such as the World Bank (WB), Asian Development Bank (ADB), European Bank for Reconstruction of Development (EBRD), etc. are promoting financial assistance for PPP projects worldwide. IFIs recognize that public–private partnerships can play an important role in addressing the massive need for funds for developing and/or improvement of needed infrastructure in the World and Asian region; and that involvement of the private sector has the potential to improve efficiency, as well as asset and service quality. The agreement on the advisory services for the arrangement of PPP projects between MOTC and ADB was concluded in February 2017.

=The PPP funds from several IFIs, aside from national budgets allocated for the execution of development projects, are ready for the formulation and implementation of PPP projects in the form of the following:

(i) Viability gap funds
(ii) Lending facilities, and
(iii) Guarantee funds.

The details of PPP guidelines of IFIs and the application of these varieties of funds can be referred to via the following websites.

Source	Website
JICA	https://www.jica.go.jp/english/our_work/social_environmental/id/asia/countries/asian_countries/c8h0vm00009pqx7j.html
	http://open_jicareport.jica.go.jp/pdf/12014874_03.pdf
World Bank	http://www.worldbank.org/en/topic/publicprivatepartnerships/brief/ppp-tools#T3
	http://pubdocs.worldbank.org/en/217281498617774364/Guidance-on-PPP-Contractual-Provisions-2017-edition.pdf
ADB	https://www.adb.org/sites/default/files/publication/202486/eawp-06.pdf
	https://www.adb.org/sites/default/files/publication/157741/oppp-flyer-2016.pdf

Source: Myanmar Public-Private Partnership, http://www.pppmyanmar.gov.mm/

16.1.3 Potential PPP Projects in Transport / Logistics Sector

PPP is a funding model for the development of infrastructure in the transport / logistics sectors, such as container terminals, truck terminals, airports or power plants. The public partner is represented by the government at a local, state and or national level. The private partner can be a privately-owned business, FDI enterprises, public corporation or consortium of business with a specific area of expertise.

PPP is a broad term that can be applied to anything from a simple, short-term management contract (with or without investment requirements) to a long-term contract that includes funding, planning, building, operation, maintenance and divestiture. PPP arrangements are useful for large scale projects that require highly-skilled workers and a significant cash outlay to get started. They are also useful in countries that require the state to legally own any infrastructure that serves the public benefit.

Different models of PPP funding are characterized by which partner is responsible for owning and maintaining assets at different stages of the project. Examples of PPP models include:

Operation and Maintenance Contract (O&M): The private-sector partner, under contract, operates a publicly-owned asset for a specific period of time. The public partner retains ownership of the assets.

Design-Build-Finance-Operate (DBFO): The private-sector partner designs, finances and constructs a new infrastructure component and operates / maintains it under a long-term lease contract. The private-sector partner transfers the infrastructure component to the public-sector partner when the lease if up.

Build-Own-Operate (BOO): The private-sector partner finances, builds, owns and operates the infrastructure component in perpetuity. The public-sector partner's constraints are stated in the original agreement and through on-going regulatory authority.

Build–operate–transfer (**BOT):** BOT is a form of project financing, wherein a private entity receives a concession from the private or public sector to finance, design, construct, own, and operate a facility stated in the concession contract. This enables the project proponent to recover its investment, operating and maintenance expenses in the project. Due to the

long-term nature of the arrangement, the fees are usually raised during the concession period. The rate of increase is often tied to a combination of internal and external variables, allowing the proponent to reach a satisfactory internal rate of return for its investment.

Build-Own-Operate-Transfer (BOOT): The private-sector partner is granted authorization to finance, design, build and operate an infrastructure component (and to charge user fees) for a specific period of time, after which ownership is transferred back to the public-sector partner.

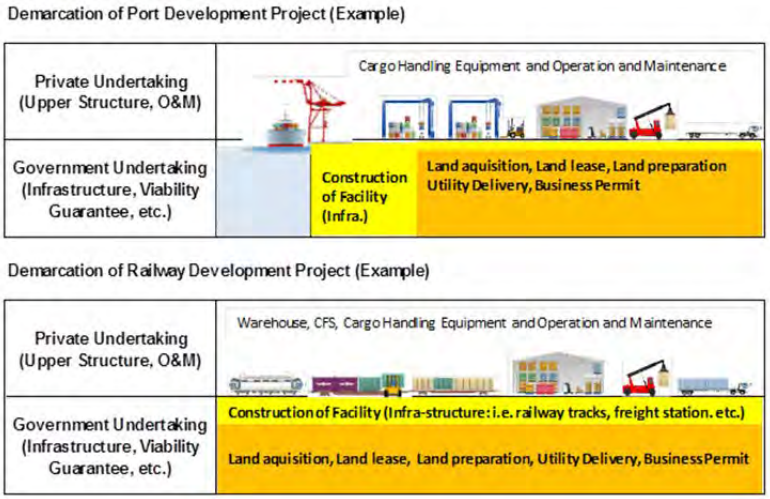
Buy-Build-Operate (BBO): This publicly-owned asset is legally transferred to a private-sector partner for a designated period of time.

Build-Lease-Operate-Transfer (BLOT): The private-sector partner designs, finances and builds a facility on leased public land. The private-sector partner operates the facility for the duration of the land lease. When the lease expires, assets are transferred to the public-sector partner.

Finance Only: The private-sector partner, usually a financial services company, funds the infrastructure component and charges the public-private partner interest for use of the funds.

Due to the financial constraints of the Government of Myanmar, the financing for infrastructure development often tries to rely on PPP type project financing. Various projects proposed and listed in the Study for logistics development system are identified as projects that are appropriate to apply Private Finance Initiatives (PFI) type project. The typical PFI project for the transport / logistics development project is PPP type project financing. As discussed in above paragraph, the form of PPP varies depending on the characteristics of each project identified for application of PFI type financing. Therefore, the form of PPP agreement should be studied carefully. As a whole, the Government administration as a guide and supervisor for the development of the related infrastructure requires the proper management of each PPP agreement. From this viewpoint, the administration requires capacity building of this field. Such administrative capability is considered essential for the smooth and effective implementation of the Study for logistics development system.

Figure-16.1.1 illustrates the typical concepts of delineation of undertakings between the private-sector partner and the government, for projects related to logistics infrastructure development.



Source: Study Team

Figure-16.1.1 Typical Demarcation of Undertaking for PPP Arrangement

Benefits and Risks of Public and Private Partnership (PPP): The PPP project is considered as an additional source of funding to meet the funding gap. While recent attention has been focused on fiscal risk, the government needs to look to the private sector for various reasons. The benefits attainable from the application of PPP and associated potential risks are as follows: (Source: World Bank)

(1) Benefits

- Exploring PPPs as a way of introducing private sector technology and innovation in providing better public services through improved operational efficiency
- Incentivizing the private sector to deliver projects on time and within budget
- Imposing budgetary certainty by setting present and the future costs of infrastructure projects over time
- Utilizing PPPs as a way of developing local private sector capabilities through joint ventures with large international firms, as well as sub-contracting opportunities for local firms in areas such as civil works, electrical works, facilities management, security services, cleaning services, maintenance services
- Using PPPs as a way of gradually exposing state owned enterprises and government to increasing levels of private sector participation (especially foreign) and structuring PPPs in a way so as to ensure transfer of skills leading to national champions that can run their own operations professionally and eventually export their competencies by bidding for projects/ joint ventures
- Supplementing limited public sector capacities to meet the growing demand for infrastructure development

- Extracting long-term value-for-money through appropriate risk transfer to the private sector over the life of the project – from design/ construction to operations/ maintenance

(2) Potential Risks of PPP

There are a number of potential risks associated with PPP:

- Development, bidding and ongoing costs in PPP projects are likely to be greater than for traditional government procurement processes - the government should therefore determine whether the greater costs involved are justified. A number of the PPP and implementation units around the world have developed methods for analyzing these costs and looking at value for money.

- There is a cost attached to debt. While private sector can make it easier to get funding, finance will only be available where the operating cash-flows of the project company are expected to provide a return on investment (i.e., the cost has to be borne either by the customers or the government through subsidies, etc.)

- Some projects may be easier to finance than others (if there is proven technology involved and/ or the extent of the private sectors obligations and liability is clearly identifiable), some projects will generate revenue in local currency only (e.g. water sector projects) while others (e.g. ports and airports) will provide currency in dollars or other international currencies and so constraints of local finance markets may have less impact

- Some projects may be more politically or socially challenging to introduce and implement than others - particularly if there is an existing public sector workforce that fears being transferred to the private sector, if significant tariff increases are required to make the project viable, if there are significant land or resettlement issues, etc.

- There is no unlimited risk bearing – private firms (and their lenders) will be cautious about accepting major risks beyond their control, such as exchange rate risks/risk of existing assets. If they bear these risks then their price for the service will reflect this. Private firms will also want to know that the rules of the game are to be respected by government as regards undertakings to increase tariffs/fair regulation, etc. Private sector will also expect a significant level of control over operations if it is to accept significant risks.

- The Private sector will do what it is paid to do and no more than that – therefore incentives and performance requirements need to be clearly set out in the contract. Focus should be on performance requirements that are out-put based and relatively easy to monitor.

- Government responsibility continues – citizens will continue to hold government accountable for quality of utility / public services. Government will also need to retain sufficient expertise, whether the implementing agency and/ or via a regulatory body, to be

able to understand the PPP arrangements, to carry out its own obligations under the PPP agreement and to monitor performance of the private sector and enforce its obligations.

- The private sector is likely to have more expertise and after a short time will have an advantage in the data relating to the project. It is important to ensure that there are clear and detailed reporting requirements imposed on the private operator to reduce this potential imbalance.
- A clear legal and regulatory framework is crucial to achieving a sustainable solution.
- Given the long-term nature of these projects and the complexity associated, it is difficult to identify all possible contingencies during project development and events and issues may arise that were not anticipated in the documents or by the parties at the time of the contract. It is more likely than not that the parties will need to renegotiate the contract to accommodate these contingencies. It is also possible that some of the projects may fail or may be terminated prior to the projected term of the project, for a number of reasons including changes in government policy, failure by the private operator or the government to perform their obligations or indeed due to external circumstances such as force majeure. While some of these issues will be able to be addressed in the PPP agreement, it is likely that some of them will need to be managed during the course of the project.
- Some concession given to project operators may lead them to monopolize the market, and reduce the competitiveness of the services.
- Government needs to guarantee the viability gap for some PPP projects.

16.2 Financing SMEs Operating in Transport / Logistics Sector

16.2.1 Introduction

Myanmar economy is in transition. It has gone through dramatic changes in recent years. From a closed economy operating in isolation, Myanmar has now opened its doors for foreign investment across sectors. Small and medium-sized enterprises (SMEs) account for 99% of all enterprises in Myanmar. With 70% of the total workforce in Myanmar employed by SMEs, SMEs play an important role in socio-economic development. The SME Development Law of 2015 has re-defined the SME sector, which has led to the development of several committees to promote the development of SMEs. But to date, SMEs face multiple challenges on all fronts – weak infrastructure, lack of skilled manpower, cumbersome bureaucratic processes, and limited access to finance. Evidently the key to the overall development of Myanmar will lie in the government's capacity to that ensure the benefits of liberalization and investments will reach the 70% of the population living in rural areas. The poverty rate in the rural areas is high, with 78% of the rural population living under the poverty line, while in urban areas it reaches 34.6%. Thus, the Government has to work in parallel to improve the conditions in both rural

and urban regions (World Bank 2014). To achieve this, employment generation and equal access to energy and basic infrastructure, such as mobile and Internet communication systems and paved road networks, are necessary. SMEs have played a key role in employment generation, as SMEs form an overwhelming majority of enterprises in Myanmar, including the SMEs in the transport / logistics sectors. The approximate number of total registered businesses (formal sector) is 127,000, of which 99.4% are SMEs, as shown in **Table-16.2.1**.

Table-16.2.1 Formal and Informal Businesses

Business Form	Number of Enterprises	Percentage of Total Enterprise
Large Enterprise (formal sector)	721	0.1%
SMEs (formal sector)	126,237	16.9%
SMEs (informal sector)	Approx. 620,000	83.0%

Source: ARTNeT 2014

SMEs account for 96% of the total economic activities in Myanmar, where 92% of the activities take place in the manufacturing sector and employ 70% of the total workforce (Hlaing 2011; Hlaing 2013). Still, even these figures probably underestimate the importance of SMEs in Myanmar since the majority of SMEs operate in the informal sector and are not registered. The SMEs definition itself varies according to the type of industry. The Small and Medium Enterprise Development Law, enacted in April 2015, defines SMEs in Myanmar as shown in below **Table-16.2.2**.

Table-16. 2.2 Size of Formal and Informal Businesses

Type	Sector	Capital Investment	Annual Turnover	Nos. of Workers
Small	Manufacturing	<500 million MMK (US$ 364,000)		<50
	Labor Intensive	<500 million MMK (US$ 364,000)		<300
	Wholesale Business		<100 million MMK (US$ 73,000)	<30
	Retail Businesses		<50 million MMK (US$ 36,500)	<30
	Services		<100 million MMK (US$ 73,000)	<30
	Other		<50 million MMK (US$ 36,500)	<30
Medium	Labor Intensive	<500-1,000 million MMK (US$ 364,000-730,000)		<600
	Wholesale Business		<300 million MMK (US$ 218,000)	<60
	Retail Businesses		<100 million MMK (US$ 73,000)	<60
	Services		100-200 million MMK (US$ 73,000-146,000)	<60

Note: SMEs operating transport and logistics businesses are deemed under wholesale business.
Source: An Overview of Finance Trends and Barriers in Myanmar, Switchasia Network Facilities, 2016

16.2.2 Policy and Institutional Support System

The Government has established a number of initiatives and organizations to support SMEs in their general development. Multiple parallel ministries regulate the business sector in Myanmar yet lack coordination by themselves. The governmental organizations which were created to support SMEs have formed an elaborate bureaucratic structure. The Central Committee for Development of SMEs was established under the Ministry of Industry (MOI) in 2013. The committee with its 27 members is chaired by the President and is tasked with laying down policies that promote development and offer guidance to SMEs on all fronts (Sustainable Business Myanmar). The MOI also set up the SME Development Service Centre that is responsible for data collection, recording SME history, financial management, marketing advisory, and to serve as a credit guarantee corporation.

The SME Development Law is a recent addition – it was promulgated in April 2015. The law aims to make access to information easier, enhance competitiveness of SMEs, increase employment opportunities, and reduce the obstacles faced by SMEs in their operations. It encourages SMEs to manage resources in a sustainable manner and minimize negative impacts on the natural environment and society. The law also promotes the use of advanced technology and facilities for production and distribution. To further support SMEs, the Myanmar government set up a credit guarantee scheme in form of a department under the Myanmar Insurance (GIZ 2015). While the committees and the law are in place, the task of implementing this law is yet to be carried out. The system needs to create conducive environment where SMEs may flourish. This is a challenge in itself, given the diverse organizations and political scenarios.

16.2.3 Financial Support for SMEs in Myanmar

The banking and financial sector in Myanmar is still limited and only provides negligible financial support for SMEs. Financial coverage is very poor: only 5% of the populations have bank accounts. According to a KPMG survey in 2012, loans extended by local banks accounted for only 0.6% of GDP. It was the lowest figure across all Asian countries.

(1) Banking sector

The financial sector is still under-developed in Myanmar, consisting of about 2.5 banks per 100,000 people. In total there are 27 banks, of which 23 are private. The state-owned banks dominate the financial sector in terms of assets. The four state-owned banks - MEB, MFTB, MADB and MICB, account for over 60% of the total banking assets. Besides the local banks, 43 foreign banks have established local offices in the country. The types of banks in Myanmar can be categorized according to their ownership and, for the semi-governmental and private banks, their legal forms, i.e. private, public listed / not-listed, or international (GIZ 2015). The only financial product available to SMEs from banks is a fully collateralized (by land) loan

with a maximum tenure of one year (which can be rolled over) and with interest rates of 13-14% per annum. The 200% coverage through land titles is a regulatory requirement imposed on banks, which most SMEs find impossible to fulfil.

An exception to these harsh conditions is a loan offered by the Small and Medium Industrial Development Bank (SMIDB), a public sector bank under the Ministry of Industry (MOI). This loan has been created to exclusively focus on SME lending for the manufacturing sector. SMIDB offers collateralized loans of up to MMK 50 million (US$ 36,500) at 8.5% interest rates and three year repayment period. Yet, the application and approval procedures are cumbersome, which has resulted in a low number of loans dispersed to 300 SMEs from 2012 until May 2015. According to SMEs applying for the loans, preparing documents for the application is rather costly, consisting of up to 10% of the total loan amount.

This shows that the penetration of the SME financial market through the banking sector in Myanmar is limited. An important reason resulting from this unfavorable situation is that the regulations regarding collateral requirement are very strict. SMEs with limited assets and financial history have therefore not been able to access financing from banks. With the creation of SMIDB, the first loan scheme dedicated to SMEs has been put in place. Whilst the need for collateral still remains, the interest rates of the scheme are lower than the commercial rates so far.

(2) International finance

International banks, donor organization and their financial branches have recently started to look at the financial sector in Myanmar and develop programs to support its advancement. Most of these initiatives are still in the planning stage and, in general, focus more on SME finance. The Central Bank of Myanmar (CBM) gave authorization in May 2015 for SMIDB to avail of a US$ 16.0 million from Singapore banks. Another authorization to obtain financing from Vietnamese banks is still awaited. Together, the funds will be disbursed under the aforementioned SMIDB financing scheme, with a potentially lower interest rate of 6%.

In June 2015, JICA and Myanmar Government signed loan agreements which included the provision of JPY 5,033 million (US$ 42 million) for the development of financial products for SMEs. JICA will provide a medium-term financing to intermediary financial institutions through the Government of Myanmar (two-step loan). The European Investment Bank (EIB) plans to funnel EUR 30-100 million (US$ 35 – 116 million) per year to support Myanmar SMEs through loans to local banks. In 2015, EIB and the Government of Myanmar signed a Framework Agreement under which EIB will start financing capital investments in the country (EIB 2015).

In 2015 the International Finance Corporation (IFC) disbursed EUR 4.7 million to Yoma Bank for SME finance (The Irrawaddy 2014). This is expected to contribute to the 1,000 loans that Yoma Bank has planned to grant to SMEs by 2019, which will be worth EUR 348.5 million

(US$ 416 million). IFC has also extended a loan to Myanmar Oriental Bank for facilitating international trade for local SMEs (IFC 2015).

In May 2015, the German Agency for International Cooperation (GIZ) offered financial support for SME development in the country through three local banks – SMIDB, Yoma Bank and Kanbawza Bank. In addition, GIZ will provide technical assistance to the banks to support them in developing financial products specifically designed for SMEs. The program is planned to run until the end of 2016, when other banks are expected to be included to the program (The Nation 2015).

The Trade Finance Program (TFP) of the Asian Development Bank (ADB) and CB Bank signed an agreement on October 6, 2015. In this financing framework, TFP will provide guarantees of up to US$ 13 million per annum to support trade finance operations of the CB Bank. As expected, this financing will further support the small and medium-sized Myanmar exporters and importers (ADB 2015). In June 2015, the ADB declared that it would work with several commercial banks to raise the risk management capacity for lending to SMEs. As such the financial support for local banks by international financial institutions and donor country's institutional banks to increase their financial capability for lending to the SMEs has been expanded and enhanced in line with the Government policy.

The IFIs and donors have provided as such around US$ 2.7 billion for the coming three years, aimed at expansion of financing capability to the SMEs in Myanmar. This trend will continue and increase further, since the lending conditions of the intermediary banks will meet the requirement and request of SMEs who seek financial support from the banks. The majority of transport / logistics companies fall under SMEs category, thus the replacement of aged trucks, inland water transport vessels, warehouses, etc. will be replaced with new equipment and the truck and vessel fleet will be expanded to meet with the increased cargo transport demand. However, there still exist various barriers that should be removed.

(3) Informal financial sector

The informal financial sector in Myanmar is large. Informal money lenders are often unreliable and very expensive as they come with high interest rates. At the same time, requests for financing can be quickly processed, sometimes with only a phone call (GIZ 2015). The semi-formal financing sector includes pawnshops and community-based organizations. Chinese communities run the pawn shops and offer loans against collateral at 10% per month with a repayment period of around four months. The informal sector also comprises a mercantile class that lends out to rural customers against provision of collateral. The money lenders often act as brokers between banks and less financially literate individuals. Interest rates vary between 3-8% per month and average repayment periods are 3-6 months (GIZ 2015).

Given the difficult access of SMEs to formal financing products, the informal financing sector has a prominent place in the financing landscape in Myanmar. The flexibility of these informal financing sources makes it especially attractive for SMEs, in comparison to the formal financial sector. In a transition toward a formalized financial system in Myanmar with a better product portfolio for SMEs, the informal sector would definitely need to be considered.

(4) Access to Special Purpose Finance (Private transport industry)

It is clear that the future economic growth path of Myanmar will strongly depend on SME development that will be enhanced by the infrastructure developments. However, SMEs have been and are still facing various challenges that are restricting the expansion of SME operations and the inclusion of SMEs in the formal sector – one of the most important is the limited access to finance. A survey among 3,000 enterprises in Myanmar revealed that 91% of business financing comes from personal savings, personal loans and retained earnings. Only 9% of business financing comes from bank loans or money lenders (GIZ 2015). This section describes the demand-side barriers, supply-side barriers, and structural barriers to SME finance.

1) Demand-side barriers

SMEs lack in financial literacy: SMEs in need of external funding often lack the financial and bookkeeping knowledge required to prepare a complete loan application. Therefore, SMEs first need to understand what information is required for a loan application and have to be able to collect it. Yet, many SMEs do not have an appropriate accounting system in place that would allow an easy extraction of financial date. This leads to the situation in which SMEs cannot provide an accurate picture of their business situation, which again increases the reluctance of banks to lend money to SMEs at all. In addition, many SMEs lack in soft skills to present their business case to loan officers for obtaining financial support.

SMEs lack knowledge of financing options: As the financial sector is continuously growing in Myanmar, SMEs are often not up to date about the banking facilities that they can access. This makes the market entry for SME finance products rather difficult. New SME financing products, for which there is a demand, may not succeed as the information does not reach the relevant target SMEs.

2) Supply-side barriers

Strict funding requirements constrain access to SME finance: State-owned as well as private commercial banks have limited funding capacity due to the strict collateral requirements. Banks are not allowed to extend loans without collateral which can take the form of land and buildings, gold and jewelry, as well as agricultural assets and deposits.

Yet, even with collateral, banks can only lend up to 50-60% of the forced sale value of the collateral. Many SMEs cannot meet the collateral requirements and are therefore unable to access any formal financing.

Time-consuming loan appraisal process and the cost of loan applications make external finance unattractive for SMEs: The preparation of loan applications including certifications and registration is costly. According to estimates of an SME representative, the application costs can amount to 10% of the loan. This is prohibitively high for many SMEs, and even if SMEs can manage to submit a loan application, the subsequent process of appraisal takes too much time. It is thus easier and faster for SMEs to approach informal money lenders. One reason for the long appraisal process is often the inexperience of loan officers in the local bank branches.

Lack of credit assessment and risk management tools makes it difficult to assess SMEs' applications: The banking system in Myanmar is in need of credit assessment and risk management tools. Currently, banks do not have access to credit information of their customers which makes it difficult to lend out to SMEs for the first time. Thus, there is no way for banks to assess whether an SME is creditworthy and whether the investment is promising enough to guarantee a payback.

3) Structural barriers

An inadequate legal framework makes the development of financial products for SMEs difficult: The banking and financial sector faces challenges in developing products and releasing loans to SMEs due to inadequate legal and regulatory frameworks. The lending infrastructure including protection for creditors, enforcement of contract and collateral rights, rules dissolving commercial disputes and arbitration, and commercial laws are not yet well defined. In this context, the risks associated with lending to SMEs are perceived as too high by the financial institutions.

Apparently, the barriers identified have contributed largely to preventing more orchestrated collaboration between financial institutions and SMEs in the country. The opening of Myanmar's economy and its expected economic effects provide a unique opportunity to design and create a system which supplies SMEs with the needed funding while offering banks the security required that enabling them to continue their operations.

16.2.4 Purpose Built Institutional Financing Scheme for Freight Transport SMEs

As discussed in **Chapter-16.1.1,** the required amount of funds to support SMEs in the transport sector for the procurement of new trucks, vessels and warehouses is enormous. Unless the truck fleet, the inland waterway transport fleet, and the coastal shipping fleet are properly expanded, to meet with increased freight demand, the impact of investments in

development and improvement of transport / logistics infrastructure, cannot be optimized. As discussed in preceding sub-chapters, the reinforcement and modernization of the financial system to support SMEs started with various technical / managerial assistance programs provided by IFIs and donors.

The funding requirement of SMEs in the transport / logistics or wholesale sector is quite large, however, it can be organized in certain ways, such as the registration of companies in the Gate system or truck terminal operations, as member companies. The equipment which will be procured by SMEs with financial support can be mortgaged when insurance is arranged for loss and fire. The trucks and vessels procured by the SMEs are to be new vehicles/vessels but these will be deemed as collateral against borrowed money. Thus, institutional financing for the SMEs operating in the transport sector is thought to be much easier when compared with other kinds of businesses run by SMEs in other fields.

In the case of the institutional financial system, the repayment period is set at a longer period than that of commercial banks, and the lending rate is set at a lower rate than that of commercial banks as shown in **Table-16.2.3**.

Table-16.2.3 Prevailing Lending Conditions of Institutional Financial System

Condition	Commercial Bank		Institutional Financial System
Repayment Period	1 year	⇒	5 to 7 year
Interest Rate	13.0%	⇒	8.5% or less
Collateral Requirement	Strictly required	⇒	Placing mortgage on equipment procured and collective repayment guarantee arranged by the association formed by the SMEs registered under the UMCCI.

Source: Study Team

The conditions that can be offered to the SMEs by the institutional financial institutions specialized in financing SMEs, such as the Small and Medium Industrial Development Bank (SMIDB) in Myanmar, are supported by provision of loans with much softer conditions from donor countries. In 2016, JICA provided soft loans of around JYE 5.0 billion (or US$ 43 million) to SMIDB to relend the loan to SMEs, through SMIDB as an intermediary bank. The special financial program for supporting SMEs in the transport sector can be established, as the scale of funds needed is enormous.

CHAPTER-17 LOGISTICS PERFORMANCE INDEX

17.1 The Outline of the Logistics Performance Index

17.1.1 Performance of Supply Chain

Logistics organizes the movement of goods through a network of activities and services operating on the global, regional, and local scale. Logistics encompasses more than just freight transport. Traders delegate increasingly sophisticated tasks to networks of specialized service providers. Efficient logistics connects people and firms to markets and opportunities and helps achieve higher levels of productivity and welfare. Crucially, logistics is not only a private endeavor, but also a public policy concern. The performance and reliability of supply chains depends on an array of interventions, ranging from trade facilitation at the border to infrastructure and regulations and to urban planning and skills. Empirical evidence confirms that logistics- and connectivity-related interventions have the highest potential to reduce the costs of trade and to boost integration in global value chains. (Source: Global Trade Unit, the World Bank).

The efficiency of the supply chain connecting Myanmar internally and externally is the concern of the Government to ensure better economic performance of the country as a whole. Any effective action in logistics policies should be the result of coordinated efforts between the private and public sectors.

Logistics performance both in international trade and domestically is central to the economic growth and competitiveness of countries, and the logistics sector is now recognized as one of the core pillars of economic development to foster seamless and sustainable supply chain operations as an engine of growth. Efficient logistics connects firms and farmers to domestic and international markets through reliable supply chain networks. Conversely, countries characterized by low logistics performance face high costs, not merely because of unreliable supply chains; a major handicap in integrating and competing in global supply chains. (Source: Connecting to Compete 2016, Trade Logistics in Global Economy, Logistics Performance Index and Its Indicators, International Federation for Freight Forwarders)

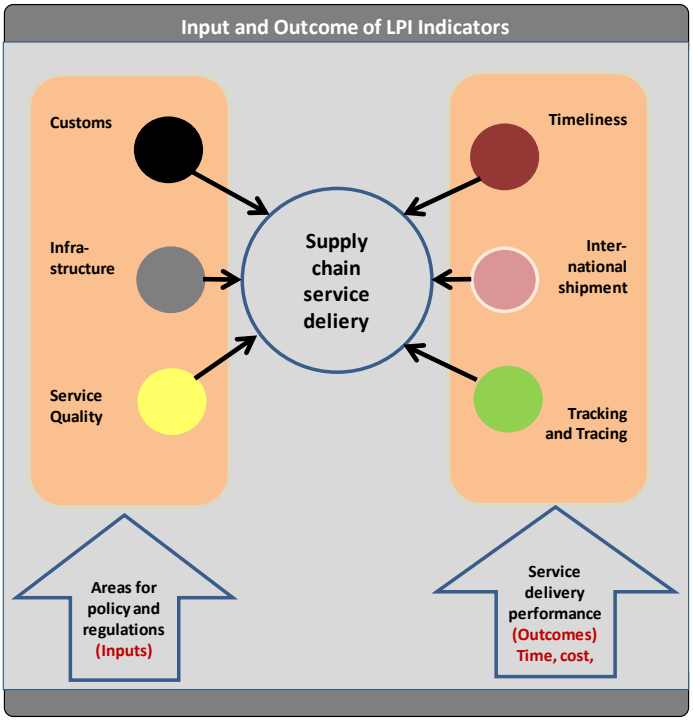
As such, the development of the logistics system does not mean the development of infrastructure and services for enhancement of international trade or FDI inflow but rather for entire economy of the country including all economic sectors and the economic activities in both urban and rural areas.

17.1.2 Scoring of LPI

The logistics performance index (LPI) analyzes countries in six components, as shown below.

- The efficiency of customs and border management clearance– Customs
- The quality of trade and transport infrastructure – Infrastructure
- The ease of arranging competitively priced shipments – International shipments
- The competence and quality of logistics services – Competence
- The frequency with which shipments reach consignees within scheduled or expected delivery times – Timeliness
- The ability to track and trace consignments –Tracking and tracing

Figure-17.1.1 illustrates the relationship amongst the six components mentioned above and the two main categories mentioned below supporting these components.



Source: Connecting to Compete 2016

Figure-17.1.1 Structure of LPI Scoring

As shown in the above figure, the performance in the two categories supports the score of each component, respectively.

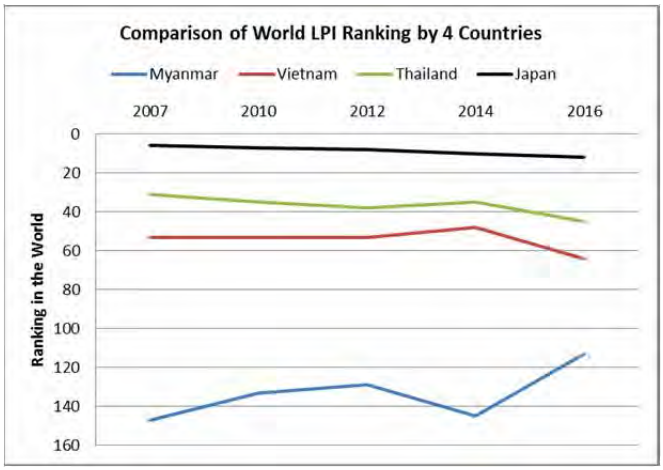
- Areas for policy regulation, indicating main inputs to the supply chain (customs, infrastructure and services)
- Supply chain performance outcomes (corresponding to LPI indicators of time and reliability, timeliness, international shipments, and tracking and tracing)

The focus of the LPI and its survey is the performance of international supply chains. Improvements in the cross-border movement of goods and logistics services, or trade and transport facilitation, have been the first area of attention of the LPI. Logistics policies are not limited to transportation or trade facilitation. They are part of a broader agenda that also includes services, the development of facilities, infrastructure, and spatial planning.

17.1.3 Change of Myanmar's LPI Rank in the World

The LPI is composed of six components and these components are evaluated and scored. The total of score for each component is the LPI rating. Every two years the World Bank carries out a LPI survey in over 160 countries. The first LPI survey was carried out by the World Bank in 2007. LPI 2016 is the sixth LPI survey since then.

Figure-17.1.2 shows the comparison in the LPI ranking of Myanmar, Thailand, Vietnam and Japan since 2007. As shown therein, Myanmar's LPI rank in the world has been rising steadily from 147th place in 2007 to 113rd place in 2016. Such LPI surveys are carried out every two years.



Source: Study Team based on the LPI 2016

Figure-17. 1.2 Comparison of Four Countries by World LPI Ranking

The LPI is built up from more than 5,000 assessments by more than 1,000 freight forwarders and logistics professionals worldwide. The LPI survey is carried out in cooperation with the partners of the World Bank LPI team. **Figure-17.1.3** shows the sample questionnaire of domestic LPI for the collection of data from respondents.

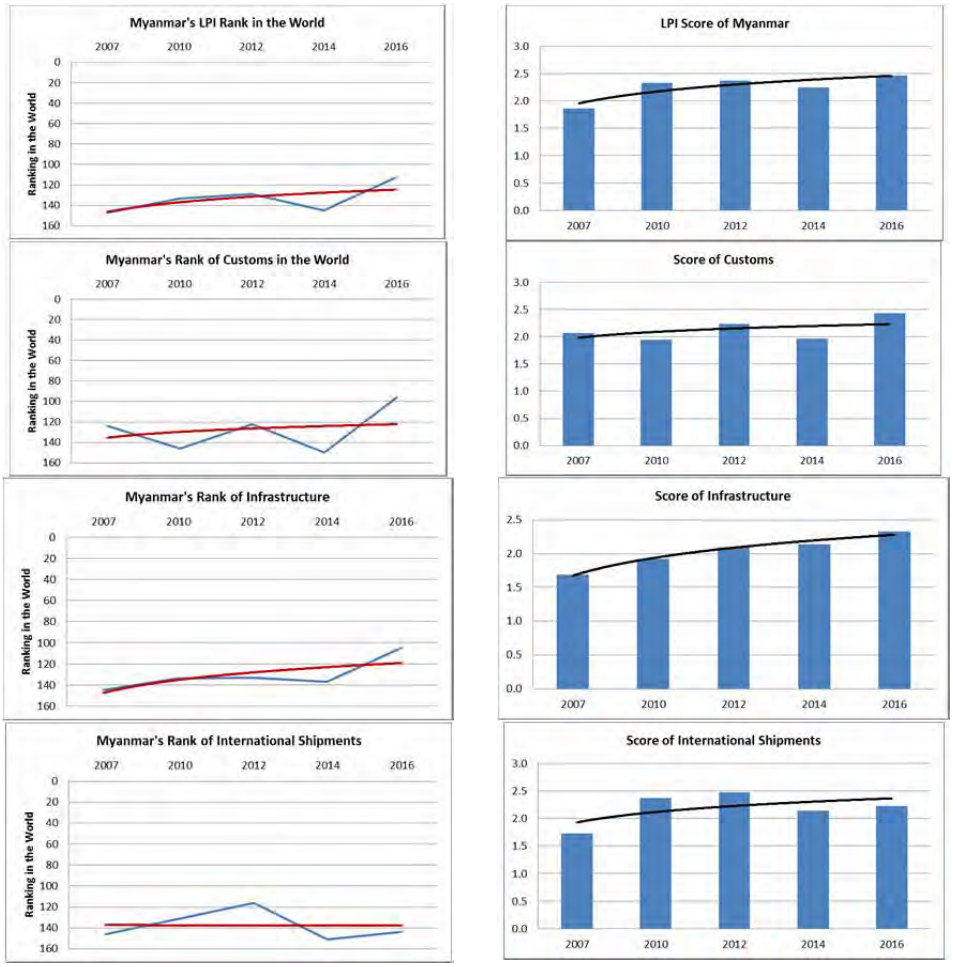
Evaluate the **quality of trade and transport related infrastructure** (e.g. ports, roads, airports, information technology) in your country of work (Australia)

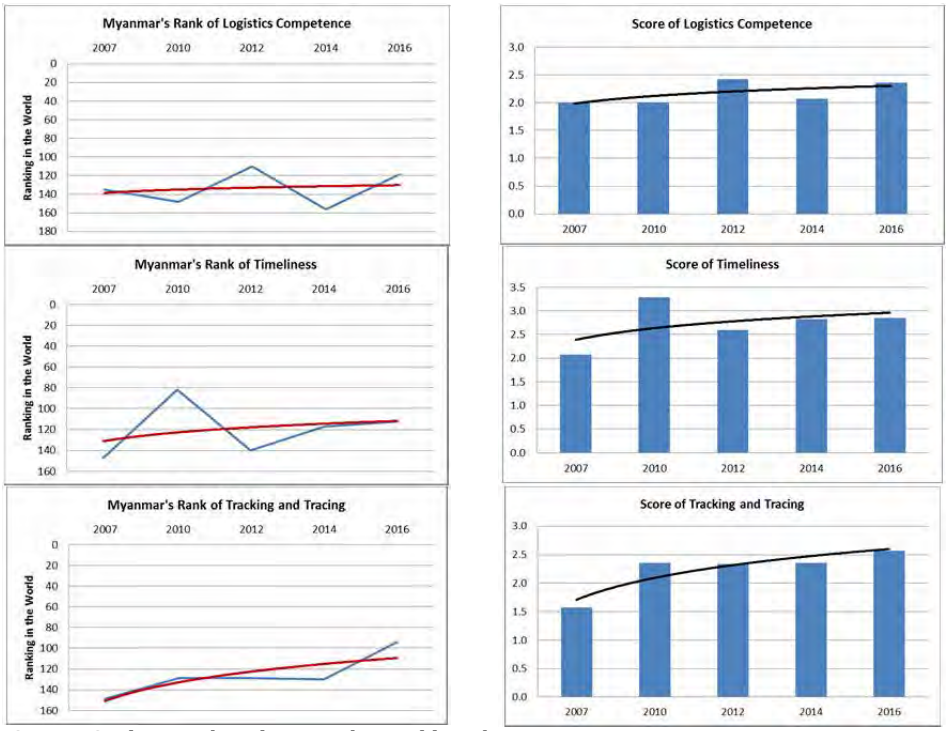
	Very low	Low	Average	High	Very high
Port infrastructure	○	○	○	○	○
Airport infrastructure	○	○	○	○	○
Road infrastructure	○	○	○	○	○
Rail infrastructure	○	○	○	○	○
Warehousing/transloading facilities	○	○	○	○	○
Telecommunications infrastructure and IT services	○	○	○	○	○

Source: LPI 2013/2014 Survey

Figure-17.1.3 Sample Questionaire of Domestic LPI

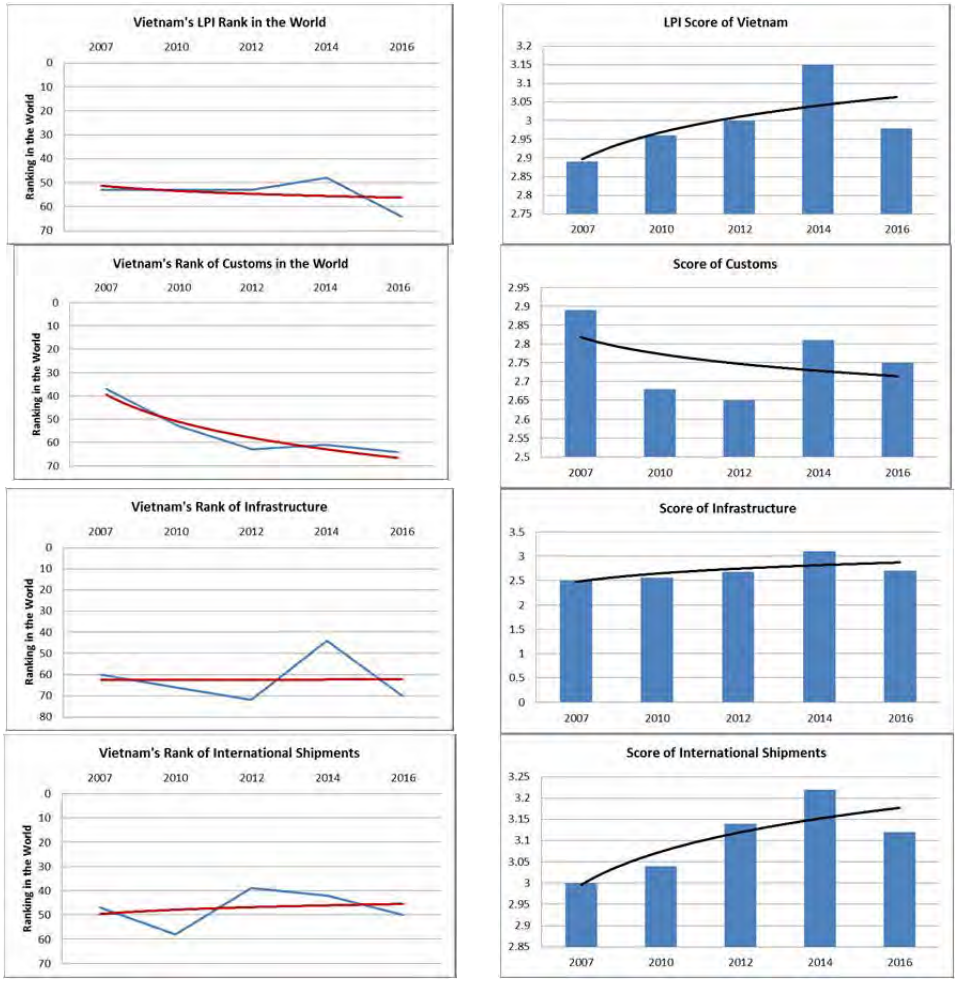
Figure-17.1.4 shows the changes of LPI ranking of Myanmar and score of each evaluated component. **Figure-17.1.5** and **Figure-17.1.6** show the changes in LPI ranking and the scores for each component of Thailand as Myanmar's neighbor and Vietnam as a pioneer of economic development amongst CLMV countries, respectively.

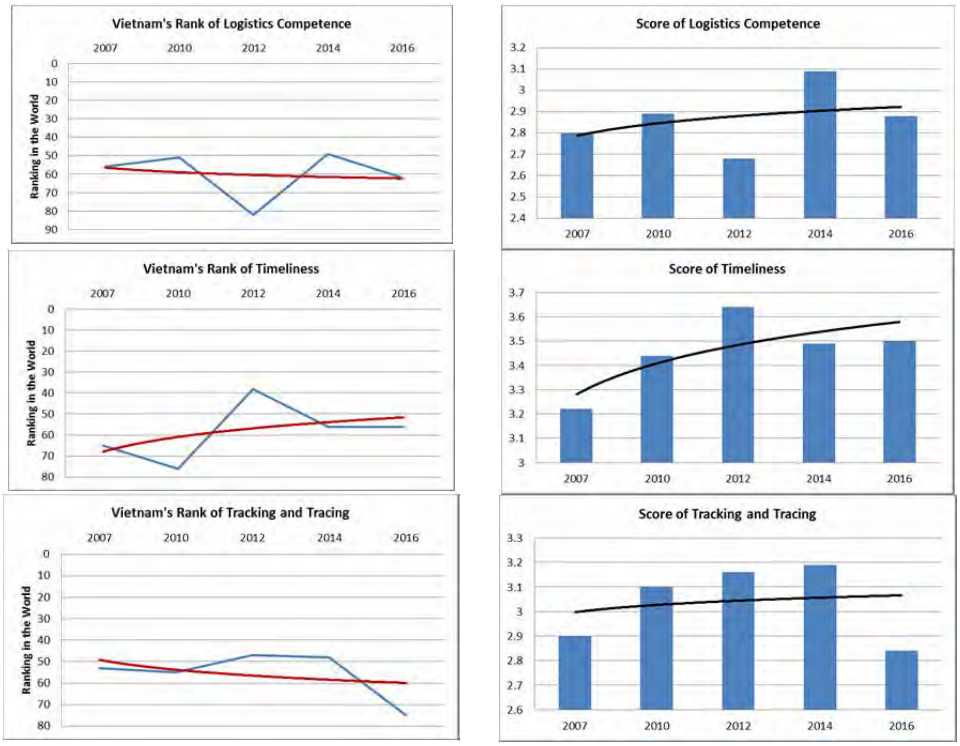




Source: Study Team based on LPI the World Bank

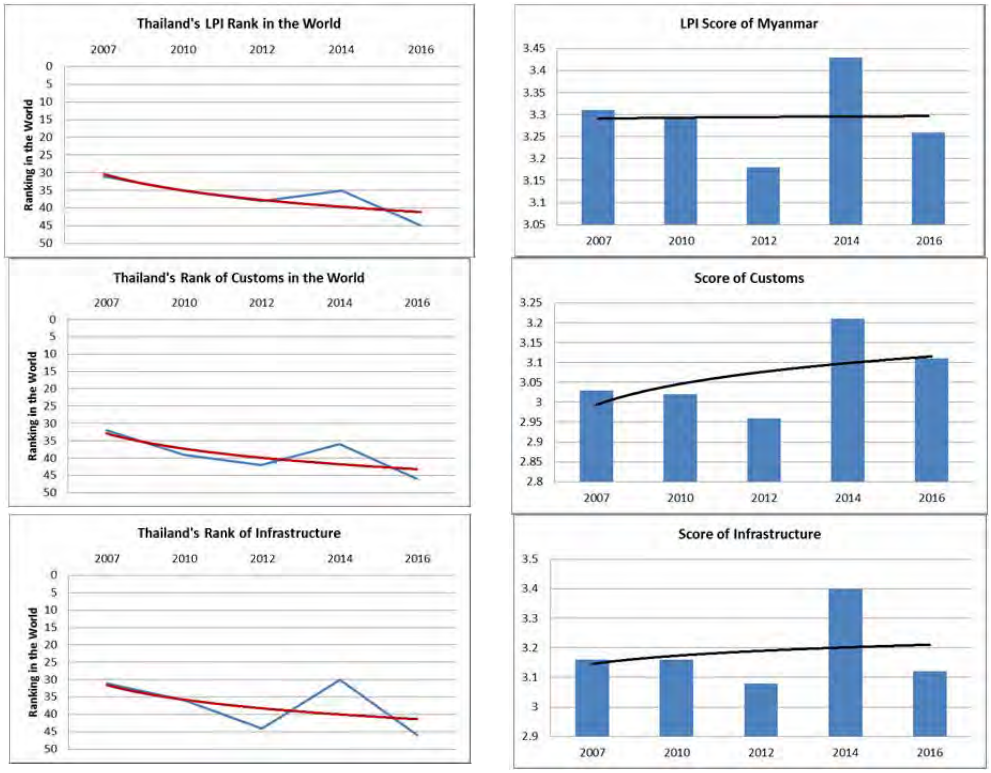
Figure-17.1.4 Changes in Myanmar's LPI Ranking and Score for Each Component

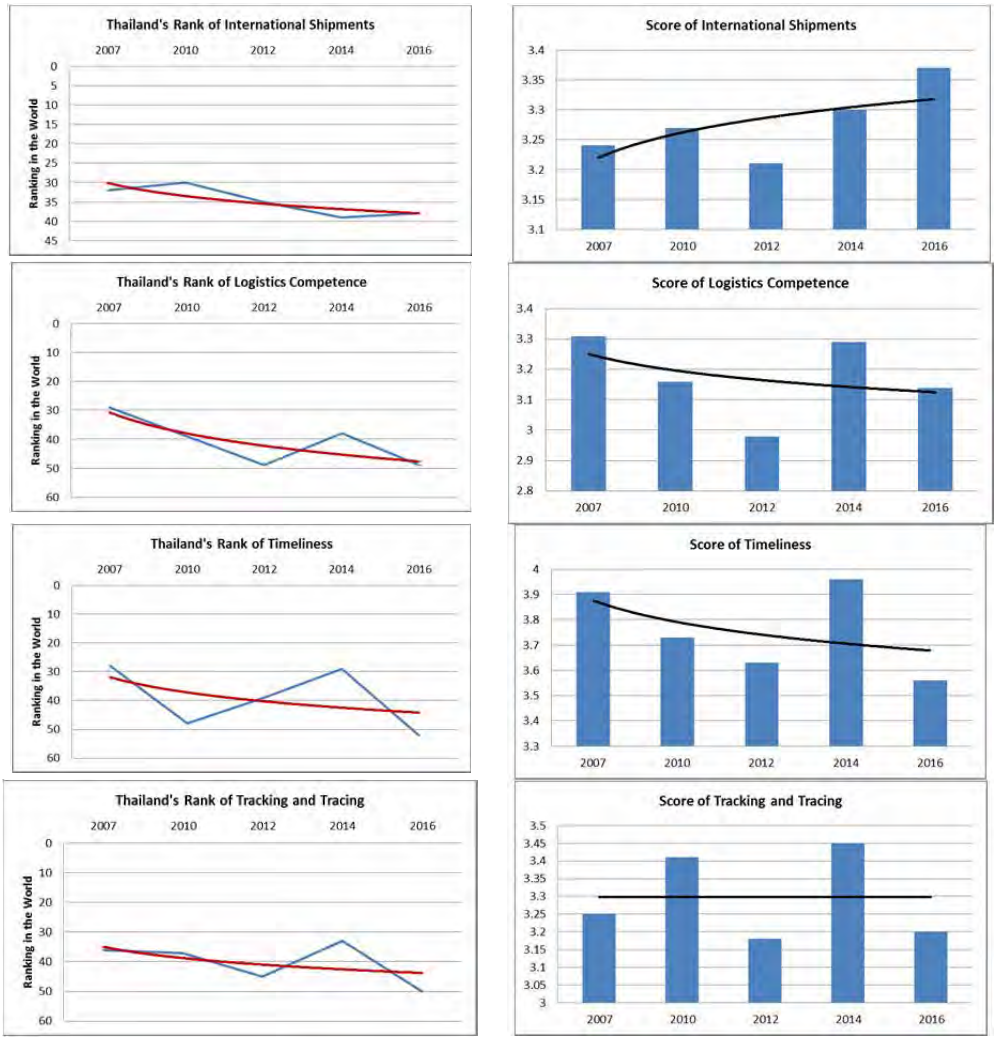




Source: Study Team based on LPI the World Bank

Figure-17.1.5 Changes of Vietnam's LPI Ranking and Score of Each Component





Source: Study Team based on LPI the World Bank

Figure-17.1.6 Changes of Thailand's LPI Ranking and Score of Each Component

17.1.4 The Meaning of Each Component

(1) Overall

The logistics sector is not limited to only transportation or trade facilitation. It is a part of a broader agenda that includes the development of facilities, infrastructure, services, and spatial planning. Myanmar is increasingly confronted with a more complex set of reforms and measures to be implemented. Design and implementation of logistics systems ultimately happens at the national or regional level. Not only private sector executives, but also policymakers across all type of countries (industrialized countries, emerging countries, developing countries), are aware of the contribution of efficient supply chains to the national economy.

(2) Trade and Transport Facilitation - Customs

Efficient clearance procedures at border areas are critical to eliminating avoidable delays and to improving the supply chain's predictability. To achieve this, the Government needs to facilitate trade, while safeguarding the public against harmful activities ranging from health

hazards to crime and terrorism. Realizing the objectives of facilitating trade and safeguarding the public interest is a challenge for authority. Border management reforms target improvements in customs processing and the coordination of controls by other agencies, for instance, risk management, the reduction of physical inspection, automation, and the implementation of single windows to facilitate information sharing, as well as the transparency of information and transactions for traders. Trade corridors and transport facilitation projects are critical to addressing the needs of transit and border infrastructure (one-stop border facilities), transit procedures, and the reduction of controls in transit.

(3) Infrastructure

Infrastructure development continues to be accomplished much in assuring basic connectivity and access to gateways. The quality of information and communication technology (ICT) infrastructure is an important factor to gain higher ratings in the area of infrastructure development.

(4) International Shipments

The frequency that shipments reach consignees within scheduled or expected delivery times is important. The shipment of cargoes is not limited to only the seaport but also to gateways, such as seaports, cross-border facilities and airports. If the frequency of shipments is high, the predictability of the arrival of goods at the destination by the consignee will be ensured.

(5) Logistics skills, competencies and training - Competence

Transport, storage, and goods handling are labor-intensive activities. The availability of skilled logistics staff is thus an important determinant of supply chain performance.

(6) Tracking and Tracing

Tracking and tracing operations are important for shipping companies as well as logistics providers to trace where their containers are and to predict when their containers return to the port or designated place. The tracking and tracing operations can be done by use of GPS system these days.

17.2 Implication of LPI in the Economic Growth

(1) Why is logistics improvement an important matter for a country's economy?

It is known and acknowledged by logistics experts and policymakers that supply chain bottlenecks are the primary cause of friction in trade (international and domestic) as it is concerned about transport / logistics costs. Reduction of these costs raises the volume of trade and production. (Source: The World Bank LPI, Transport Business Summit, Brussels, 2014) When logistics cost increases, logistics performance decreases. Most of the increases in

logistics costs come from lower reliability and the need to increase the inventory of goods.

(2) What is the role of the LPI?

The LPI is an overall metric of supply chain efficiency. It provides information about where a country stands and a broad indication of problem areas. The LPI itself is not a diagnostic tool while specific tools are needed to perform that function. Nevertheless, the LPI has had a significant impact in raising awareness and pushing for comprehensive "connectivity" and logistics policies.

(3) Policy matters related to logistics performance

The policy matters related to logistics performance are tabulated in **Table-17.2.1** by area concerned:

Table-17.2.1 Policy Matters related to Logistics Performance

Area	Concerned Matters
Infrastructure	Ports, road / rail corridors, inland waterways, coastal shipping, airports; and public-private partnerships
Trade facilitation and procedures	Customs, payment of duties, etc., simplification of procedures and automation, harmonization and standardization, modernization and governance of border agencies, etc.
Services	Forwarders, truckers, customs brokers, etc., regulation of entry, market structure and competition, competence and quality of services, etc.
Sustainable logistics	Green logistics, city logistics, food security, etc.

Source: The World Bank LPI

17.3 Implication of Logistics Improvement to Economic Growth

Economic growth is a process of enhancement of total production level, measured by the absolute and relative increase or by real production per capita. Economic growth is also related to development of production capacity. GDP is considered as one of the main indicators of growth. The LPI issued by the World Bank is an indicator of the logistics performance of a country, consisting of six dimensions. FDI involves establishing operations or acquiring tangible assets by foreign firms for doing business in another country. In order to indicate the importance of logistics performance and capabilities, FDI plays a mediator role between Logistics Performance and Economic Growth. Therefore, foreign investors consider logistics performance as important variable in their investment decisions. It can be said that countries with a high logistics performance are more likely to attract foreign direct investment. As a result, the logistics performance largely affects economic growth through foreign direct investment.

17.4 How can the LPI of Myanmar be raised?

The logistics performance in general is expected to increase when the Study for logistics development system will be implemented, as programed in accordance with the Roadmap presented within the plan. Thus, the LPI will increase accordingly, however, the increase of LPI can only be realized when the coordination and cooperation amongst policymakers, administrations mandated for the proper development of the transport and logistics system, and private transport industries aiming at the development and improvement of the logistics system, work together well. The focal points to attain a higher LPI can be summarized by each dimension of LPI as follows:

(1) The efficiency of customs and border management clearance – Customs

The custom procedures are to be simplified, pursuant to the standardized customs procedures set out in the logistics protocol agreed amongst the member countries of the AEC. The e-customs system (MACCS) has been already introduced for the clearance of cargoes arriving at international ports, although it has not been fully operationalized. It is required to foster customs brokers and forwarders to familiarize themselves with MACCS, not only for customs clearance in international ports including seaport and airports; but also at the cross-border gates. As cross-border trade is expected to increase further, the MACCS system is to be introduced and operated for trade cargoes passing through cross-border points (CBP's) at the national border. The customs clearance operation is recommended to be executed not only at international ports and CBPs but also in or adjacent areas of the SEZs and the major IZs. If these will be implemented, the score allocated for this dimension will increase naturally.

(2) The quality of trade and transport infrastructure – Infrastructure

As of March 2018, the preparation for construction of the Thilawa International Container Terminal has been ongoing. Once the expansion of the port container handling capacity will be realized by completing this terminal development project, the logistics performance will increase. However, if the handling capacity of cross-border trade cargoes will not expand to meet increased trade cargo volumes through the cross-border points, the LPI may decline. Therefore, the expansion of cross-border facilities at major CBP's is also essential.

(3) The ease of arranging competitively priced shipments – International shipments

At present, major trade cargoes are handled by the international port. However, international maritime transport is available only by feeder ships from Singapore. Therefore any substantial price reduction for maritime cargo transport cannot be expected. However, trucking costs to and from Laem Chabang in Thailand and Yangon can be substantially reduced once the cross-border facilities are expanded; the dwell times for customs clearance are shortened and the road link between the CBP and Yangon is improved for smooth and speedy road transport.

Therefore, it is essential to bring in the principle of competition in the logistics service industries. However, at the same time, the access to appropriate financial sources specially designed for SMEs is to be developed to meet the requirements of private local trucking companies and logistics providers, since all of them fall under the SMEs.

(4) The competence and quality of logistics services – Competence

The logistics service industry in Myanmar is still at an infant stage. However, this situation will change in a quite short time period, due to a rapid increase in the volume of trade cargoes. Several international logistics service providers has been already entered the market and commenced their services. The quality of local transporters and forwarders will be upgraded; as those local companies will be stimulated by the international logistics service companies. Therefore, it is essential to encourage the introduction of FDI in the logistics sector, however, the protection of the local transport industry is to be considered at the same time.

(5) The frequency with which shipments reach consignees within scheduled or expected delivery time – Timeliness

The timeliness of cargo transport and delivery depends on the quality and capability of transport infrastructure as well as the business principle of the actors in the logistics and transport industry. From this point of view, collaboration between Government agencies concerned and private transport and logistics service industries is essential. Cargo transport efficiency and industry profitability are closely related. Inventory reduction through higher turnover, ability to respond to volatile demand, short lead times, and achieving lowest cargo transport costs are essential aspects of a company’s competitiveness - and this also applicable to the competitiveness of Myanmar. Therefore, Government agencies concerned should focus on the elimination of current bottlenecks in transport and logistics services as far as is practically possible.

(6) The ability to track and trace consignments Tracking and tracing

The tracking and tracing of trade cargoes can be done electronically and through utilization of the internet. Therefore, encouragement and enhancement of both FDI and local logistics providers should take place, to equip then with such systems available in the world market.