Ministry of Economy and Finance
The Republic of Mozambique

THE PROJECT FOR

NACALA CORRIDOR

ECONOMIC DEVELOPMENT STRATEGIES
IN THE REPUBLIC OF MOZAMBIQUE

PEDEC-NACALA

Final Study Report

Analysis Report: Strategic Master Plan on Strengthening of Nacala Corridor Region-Wide Freight Network for Agricultural and Mining Sectors

April 2015

Japan International Cooperation Agency (JICA)

Oriental Consultants Global Co., Ltd.
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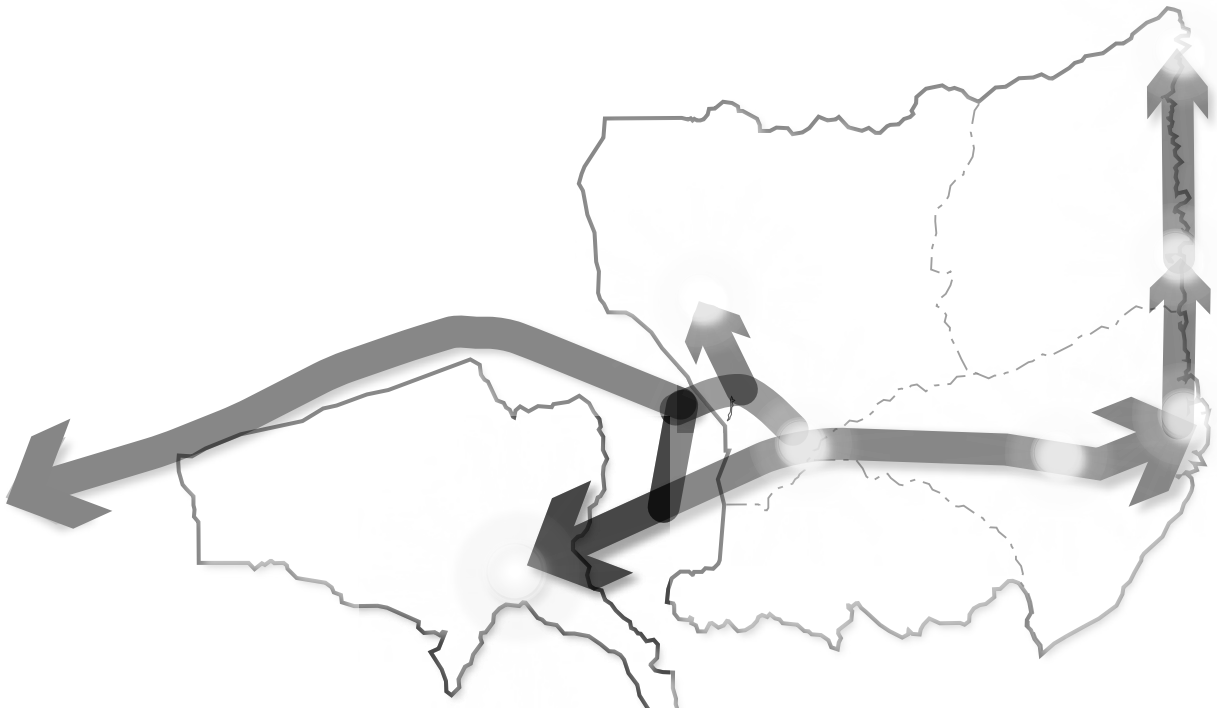

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List of Abbreviation

	English	Portuguese
AfDB	African Development Bank	Banco Africano de Desenvolvimento
ASM	Artisanal and Small-scale Mining	Mineração Artesanal de Pequena Escala
CDN	North Corridor Development, Limited Liability Company	Corredor de Desenvolvimento do Norte, S.A.R.L.
CEAR	Central East African Railway	-
CFM	Mozambique Ports and Railways	Portos e Caminhos de Ferro de Moçambique
CSR	Corporate Social Responsibility	Responsabilidade Social Corporativa
DUAT	Land Use Right	Direito de Uso e Aproveitamento da Terra
EAP	Economically Active Population	População Economicamente Ativa
FS	Feasibility Study	Estudo de Viabilidade
GAZEDA	Special Economic Zones Office	Gabinete das Zonas Económicas de Desenvolvimento Acelerado
GDP	Gross Domestic Products	Produto Interno Bruto
GIS	Geographic Information System	Sistema de Informação Geográfica
GRDP	Gross Regional Domestic Product	Produto Interno Bruto Regional
IFZ	Industrial Free Zone	Zona Franca Industrial
INATTER	National Land Transport Institute	Instituto Nacional dos Transportes Terrestres
INE	National Statistics Institute	Instituto Nacional de Estatística
JICA	Japan International Cooperation Agency	Agência Japonesa de Cooperação Internacional
MEF	Ministry of Economy and Finance	Ministério da Economia e Finanças
MPD	Ministry of Planning and Development	Ministério da Planificação e Desenvolvimento
MT	Metical	Metical
MTPA	Million Tons per Annum	Milhões de Toneladas Anuais
PEDEC-Nacala	The Project for Nacala Corridor Economic Development Strategies	Projecto das Estratégias de Desenvolvimento Económico do Corredor de Nacala
rai	Responsible Investment in Agriculture and Food System	Investimento Responsável em Sistemas Agrícolas e Alimentares
SEA	Strategic Environmental Assessment	Avaliação Ambiental Estratégica
SEZ	Special Economic Zone	Zona Económica Especial
SWOT	Strengths, Weaknesses, Opportunities and Threats	Forças, Fraquezas, Oportunidades e Ameaças
TAZARA	Tanzania-Zambia Railway Authority	-
TEU	Twenty Foot Equivalent Unit	Unidade Equivalente a Vinte Pés
UN	United Nations	Nações Unidas
USD	United States Dollar	Dólar dos Estados Unidos
VAT	Value Added Tax	Imposto Sobre o Valor Agregado
VGGT	Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security	Directrizes Voluntárias sobre a Governança Responsável da Posse da Terra, Pescas e Florestas

Introduction

This document was prepared as an analysis report for sharing a study result on a particular theme as part of 'The Project for Nacala Corridor Economic Development Strategies (PEDEC-Nacala)' which is a technical assistance project supported by Japan International Cooperation Agency (JICA) for the Government of Mozambique. PEDEC-Nacala formulated integrated development strategies for corridor development by an integrated approach involving several sectors and also by giving consideration to environmental and social aspects. The actual strategies formulated in PEDEC-Nacala and details of the present situation of the Nacala Corridor Region are compiled into the PEDEC-Nacala Final Study Report[1].

Background of PEDEC-Nacala

Historically, the Nacala Corridor was an international transport corridor consisting of Nacala Port, the Northern Railway and the Malawian Railway system. The Nacala Corridor used to be the most important export route for Malawi. However, the rail transport was disrupted by Mozambique's prolonged civil war (1977-1992).

In the 1990s, the deteriorated rail facilities and rolling stock of the Northern Railway were rehabilitated with international assistance. However, the railway rehabilitation could not drive economic development strongly in the areas along the Nacala Corridor. Moreover, road connection was poor between the inland areas and Nampula/Nacala. Although there are a variety of resources and potentials for development in the Northern Region, considering the malfunctioning cargo rail and road transportation, it had been difficult to envision future development in the areas along the Nacala Corridor and its surrounding areas in recent years.

In the late 1990s and early 2000s, for international corridor development in southern Africa, private sector initiatives got considerable attention for their possibility to promote development including infrastructure. In fact, the operation of the Northern Railway and that of Nacala Port have been privatised since 2005. However, no private operator was able to secure sufficient funds to rehabilitate the rail facilities and rolling stock due to low demand for cargo transport in the Northern Region. This is because railways and roads were still in poor condition and private investments did not come into the region in those years, including for infrastructure development. As a result, private sector development did not get enough momentum built up to be able to lead regional development in the Northern Region.

This situation has changed since the 2000s, when the Nacala Corridor began to attract attention from people and businesses. In fact, oceangoing liners to Asia started to visit Nacala Port. The hinterlands of Nacala Port have also begun to attract private investments partly due to the establishment of Nacala Special Economic Zone (SEZ) in December 2007. On the infrastructure side, road upgrading projects including the road sections between Nampula–Cuamba and

[1] See "Appendix I" in this report for the table of contents of the Final Study Report.

Lichinga–Montepuez have been going on with the co-financing from Japan International Cooperation Agency (JICA), the African Development Bank (AfDB) and other banks. They have also decided to finance upgrading projects of the road sections of Cuamba-Mandimba-Lichinga. In addition to these road upgrading projects connecting inland towns with seaports, projects for Nacala Port were started. As a result, private investments in the agriculture and tree planting sectors have also increased in the provinces of Nampula, Niassa and Zambezia.

Furthermore, another factor has arisen to bring development in the Nacala Corridor and its surrounding areas. The factor is the large-scale coal exploitation projects in Tete Province. The coal reserve found in Tete Province is huge and of high quality. The expected coal production in Tete Province amounts to over 50 million tons/year by 2016 and 75 million tons/year by 2020. At present, several coal mines are operating and several others will start their operation within five years.

This massive coal production requires at least three export routes consisting of railways and seaports. The export of coal from Tete through Sena Railway and Beira Port was started in 2012. The capacity of Sena Line and Beria Port, however, is limited and will not be able to accommodate the increasing coal production in Tete. In addition to the Sena Line and Beira Port, there are currently three more alternative export routes. One of the most promising routes is the route using the Nacala Corridor, which runs from Moatize of Tete Province through Malawi and the Nacala Corridor up to Nacala Port.

The coal transport through the Nacala Corridor requires upgrading of the railway of the Nacala Corridor, as well as the construction of new railway sections. Although Tete and Malawi are not part of the conventional route of the Nacala Corridor, Tete's coal mining and export is expected to revitalise the Northern Railway (Lichinga-Cuamba-Nampula-Nacala Port) so as to transport not only coal but also general cargo and containers. This is considered a very important factor to create development opportunities and potentials to initiate and promote regional development along the Nacala Corridor and its surrounding areas. In this context, it is very critical to take proper actions to take advantage of these emerging development opportunities and potential for effectively promoting the development of the Nacala Corridor Region. While such an increase in private and public investments is considered good for development of the Nacala Corridor Region, there are growing concerns about unplanned and uncoordinated development. The concerns include how to enhance the effectiveness of ongoing and planned projects. Unless proper measures are taken by the government to guide and coordinate development activities, the variety of development opportunities and the potential of the Nacala Corridor Region may be underutilised. Moreover, it is necessary to prepare measures to prevent or mitigate various environmental and social problems including urban environmental deterioration, industry-related pollution, land conflicts and depletion of environmental resources. Furthermore, it would become necessary to cope with vulnerable groups of people and those in less accessible areas, who might not be able to participate in emerging development opportunities

Under these circumstances, the Government of Mozambique recognised the importance and necessity of preparing a set of strategies for the entire Nacala Corridor Region. The Government of Mozambique requested that the Government of Japan provide technical assistance to the Project for Nacala Corridor Economic Development Strategies in the Republic of Mozambique (hereinafter referred to as "PEDEC-Nacala"), and both governments have agreed to implement the Project.

Objectives of the Analysis Report on Strengthening Nacala Corridor Region-Wide Freight Network for Agriculture and Mining Sectors

In this analysis report, the following opportunities are studied and presented:

- How a region-wide freight network would be established and strengthened through the implementation of not only ongoing and planned infrastructure projects but also PEDEC-Nacala development strategies.
- What kinds of private business chances would be available for agricultural, mining and logistics sectors by the implementation of PEDEC-Nacala development strategies, as well as of ongoing and planned infrastructure projects?

Chapter 1 Present Condition of Transport Infrastructure in the Nacala Corridor Region

1.1 Transport Infrastructure Development in the Nacala Corridor Region

Historically, the Nacala Corridor was an international transport corridor consisting of Nacala Port, the Northern Railway and the Malawian Railway system. However, despite the fact that there are a variety of resources and potentials for development in the Nacala Corridor Region, such potentials have not been utilized for the economic development of Mozambique. The poor road condition connecting the inland area and Nampula or Nacala has been one of the reasons.

Since the latter part of the first decade of the 2000s, the Nacala Corridor began to attract attention from people and businesses and road upgrade projects for connecting inland areas and ports as well as Nacala Port rehabilitation project started through the assistance of development partners including Japan. Additionally, the railway upgrade project including the construction of new railway sections began for exporting the coal from Tete Province by the private sector. Furthermore, road upgrade and railway construction have been considered at the far end of the Nacala Corridor in Malawi and Zambia.

At present, the following transport infrastructure projects are ongoing in the Nacala Corridor Region, Malawi and Zambia.

Ports

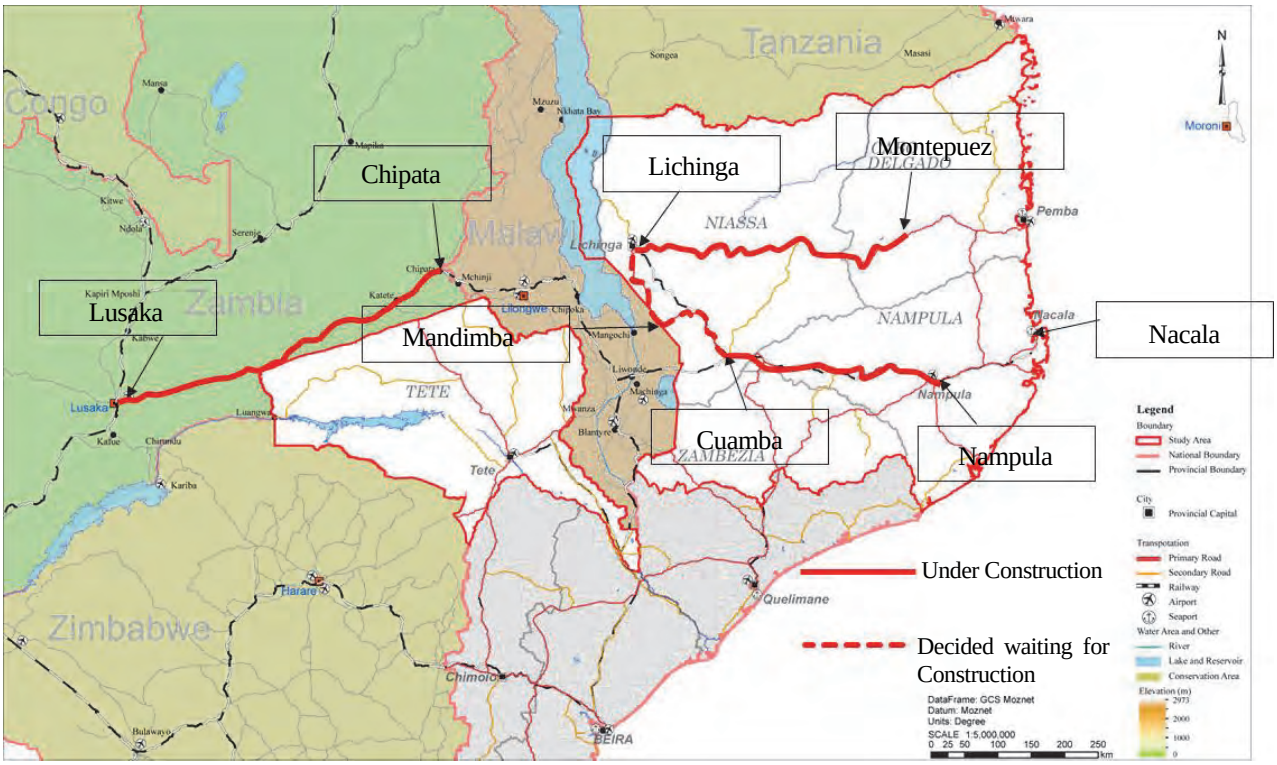
- The Project for Urgent Rehabilitation of Nacala Port (Grant Aid Project, Construction and Management, Ongoing)
- Nacala Port Development Project Phase 1 (Loan Project, Detailed Design, Ongoing)
- Nacala Port Development Project Phase 2 (Loan Project, Detailed Design, Ongoing)

Roads

- Napmula-Cuamba Road Upgrade Project (Under construction)
- Montepuez-Lichinga Road Project (Under construction)
- Cuamba-Mandimba Road Project (In preparation for construction)
- Mandimba-Lichinga Road Project (In preparation for construction)
- Chipata-Lusaka Road Project (Under construction)

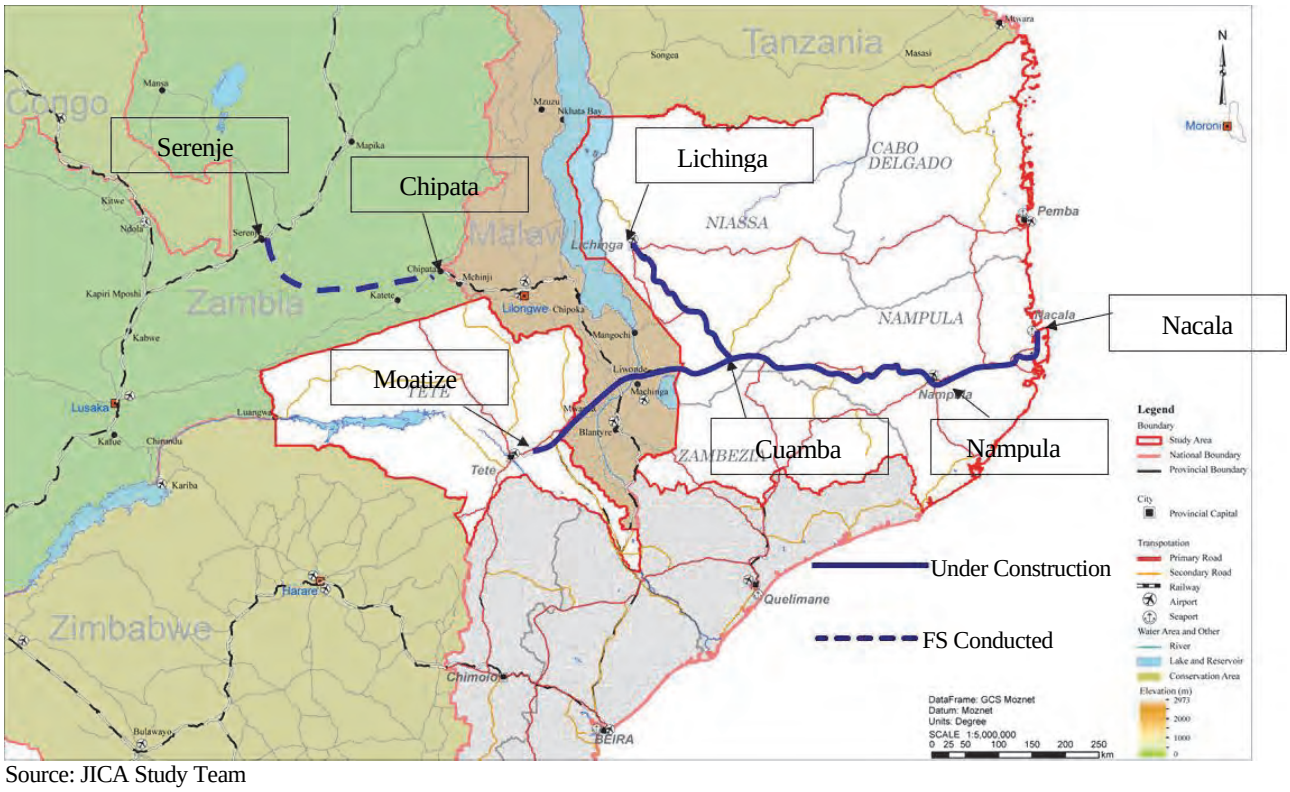
Railways

- Nacala Corridor Railway (Moatize-Nakaya-Nayuchi-Cuamba-Nampula-Nacala) Upgrade Project (Construction, Ongoing: expected to complete by the end of 2015)
- Chipata-Petauke-Serenje Railway Project (a Pre-FS was conducted by China Civil Engineering Construction Company. However, because of steep slopes along the route selected by the Pre-FS, different routes are considered.)



Source: JICA Study Team

Figure 1.1 Ongoing and Planned Road Implementation Projects



Source: JICA Study Team

Figure 1.2 Ongoing and Planned Railway Implementation Projects

1.2 Existing Conditions of Railway in the Nacala Corridor Region

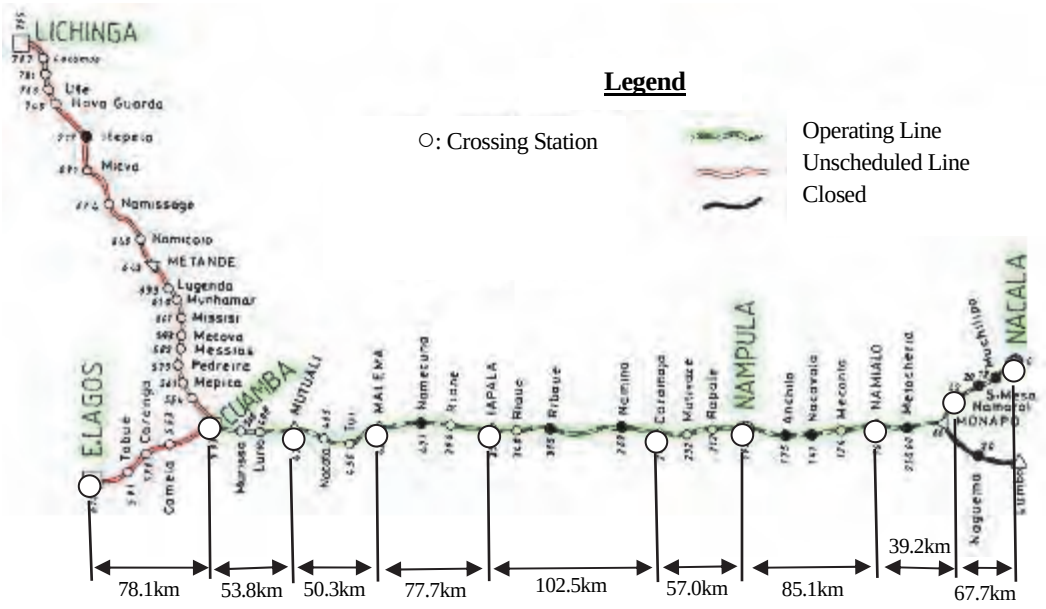
This section describes existing conditions of the railway and planned railway projects related to the Nacala Corridor Region in northern Mozambique, Malawi and Zambia.

(1) Existing Conditions of the Northern Railway in Mozambique

A total of 3,123 km of railway in Mozambique was constructed in the Portuguese colonial period. In Mozambique, there are four railway lines. They connect inland areas to ports and are not connected to each other. Their gauge is 1,067mm for the most part (2,983km), but that of the rest is 762mm.

Nacala Corridor has a railway called the Northern Railway that connects Nacala Port to Entre Lagos Station at the national boarder with Malawi. The Northern Railway branches off at Cuamba to the north and extends to Lichinga, provincial capital of Niassa. The total length of the Northern Railway is 872km.

The Northern Railway started operation in 1914. It was connected to Nacala Port in the 1940's. It was also connected to Malawi Railway in the 1970's.



Source: CFM

Figure 1.3 Northern Railway in Mozambique

In 1990, Mozambique National Railway became part of the state-owned company which operates both ports and railways under the Ministry of Transport. Furthermore, since 1995, its operation has been privatized with the assistance of the World Bank.

In 2000, a 15-year concession was signed for Northern Railway, and the group of private companies and CFM (Mozambique Ports and Railway) established CDN, a private operation company.

Although the operation of Northern Railway was privatized, the conditions of the existing railway tracks and wagons were poor and the demand for freight transport did not increase. Therefore, its revenues did not grow causing difficulty in borrowing a substantial amount of funds for maintenance and rehabilitation of railway tracks and wagons. This situation continued until 2012

and its freight volume continued to decrease from the time when Malawi's export and import mainly relied on the Northern Railway and Nacala Port.

However, since the Brazilian company Vale, which is engaged in coal development in Tete Province, took a majority stake in CDN for the purpose of transporting coal to Nacala Port for export, the future prospect of Northern Railway changed significantly.

It is said that Tete Province has a large coal deposit of 23 billion tons. The majority of them are high-quality bituminous coal suitable for iron manufacturing. At present, three coal mines are operational and five more coal mines are planned for development. Having all eight coal mines operational, Tete Province is expected to produce approximately 120 million tons of coal for export per year.

Nacala Corridor and Nacala Port are expected to become part of the coal exporting routes from Tete Province. With the construction of new sections and upgrading of existing sections, Northern Railway will become Nacala Corridor Railway which will connect Moatize in Tete Province to a new coal export terminal at Nacala-a-Velha in the western side of Nacala Bay.

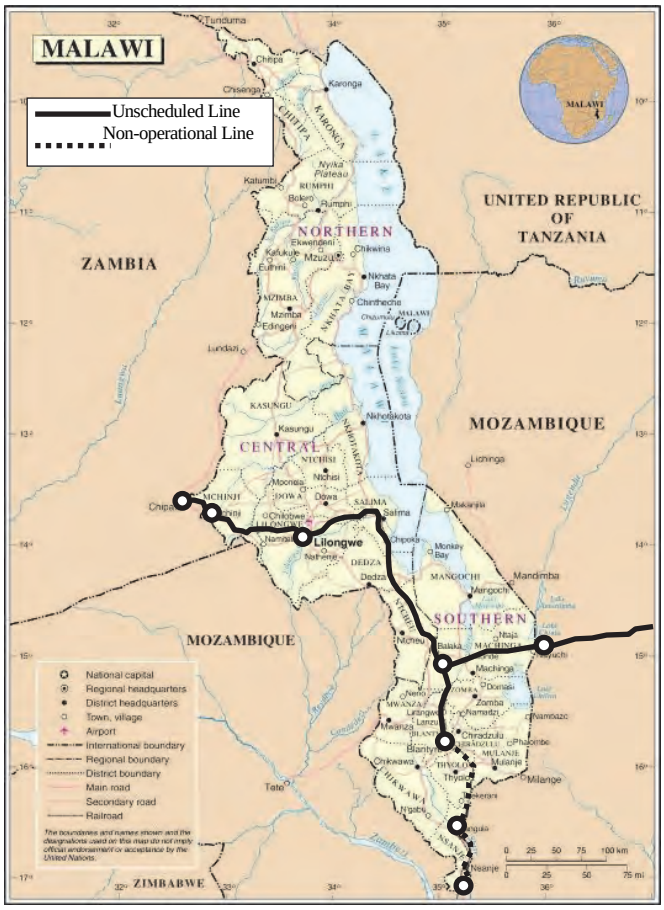
(2) Existing Conditions of Railway in Malawi

The railway in Malawi started in 1899 during the British ruling period. By 1935, Malawi was directly connected to Beira Port by Trans-Zambezia Railway (called Sena Line, at present), whose operation company was merged with Shire Highlands Railway. In 1970, the railway of Malawi was connected with Northern Railway of Mozambique and rail transport from Malawi to Nacala Port became possible.

Furthermore, the construction of the new extension line from Lilongwe toward Chipata in Zambia began and by 1981 the railway line was completed to Mchinji which is located at the national boarder of Malawi and Zambia. The total length of railway in Malawi became 797 km. However, the independence war and civil wars in Mozambique deteriorated the conditions of the Northern Railway, and reduced the rail transport volume between Malawi and Nacala Port.

The track gauge of Malawi Railway is 1,067 mm which is the same as Northern Railway of Mozambique and the railway in Zambia.

Malawi Railways was privatised in



Source: JICA Study Team based on UN Map

Figure 1.4 Railway Network of Malawi

1999 and has been operating as Central East African Railways (CEAR) for a 20-year concession. CEAR is a company that is owned by CDN which operated Northern Railway of Mozambique, and an American company. The privatization was thought to increase the cargo transport to Nacala Port via Northern Railway and to Beira Port via Sena Railway. Nonetheless, the Northern Railway and Sena Railway were not rehabilitated substantially and the cargo volume was on the decrease.

However, this situation has changed. The change is due to the decision of the Brazilian company Vale, participating in coal mine development in Tete Province of Mozambique to take a state in CDN which is part of CEAR. Vale has constructed new railway sections, as well as upgraded the existing railway sections to transport coal from Moatize via Malawi Railway and Northern Railway to Nacala Port.

In addition to the construction of railways by Vale, a new railway section from Mchinji at the boarder of Malawi and Zambia to Chipata in Zambia was completed in August 2011. It is expected that the rail cargo of Zambia will be transported to Mozambique via Malawi Railway and Northern Railway.

(3) Existing Conditions of Railway in Zambia

The railway network of Zambia consists of two railway lines. One railway from the border of the DR Congo to the south at the border of Zimbabwe (total length 1,266 km) and TAZARA (Tanzania-Zambia Railway Authority) railway from central Zambia at Kapiri Mposhi to Dar es Salaam (total length 1,860 km of which 891 km in Zambia). The gauge is 1,067 mm which is the same as the Malawi Railway and Northern Railway.

In addition to the above, as already mentioned in the previous section, new railway construction from Mchinji at the western border of Malawi to Chipata, a city located in eastern Zambia was completed in August 2011 and in May 2014 the first trial train was launched to Nacala Port. There is also a plan to construct an extension line from Chipata Station to TAZARA railway. The proposed route to Serenje Station on the TAZARA railway via Petauke located between Chipata and Lusaka the capital city of Zambia bypasses South Luangwa National Park. However this route is currently being revised since the change in elevation is large and difficult for construction. Chipata and its surrounding area is an agricultural region and is also an urban centre for tourism for visitors to South Luangwa National Park.

There is also a plan to transport copper from copper mines in the Copperbelt located in DR Congo and Zambia to Durban Port in South Africa. The agreement among four countries, namely DR Congo, Zambia, Zimbabwe and South Africa is to be signed.

Source: JICA Study Team based on UN Map

Figure 1.5 Railway Network of Zambia

1.3 Existing Conditions of Roads in the Nacala Corridor Region

Roads in the Nacala Corridor Region in Mozambique are mostly non-paved roads. After each rainy season, the surface of gravel earth surface roads are graded (levelled by scraping and filling the road surface) and the grass on the road side is cut so that these roads are motorable during the dry season.

Major paved roads in the Region were National Road No.1 running north-south of Mozambique and National Road No. 12 connecting Nampula and Nacala Port, but with the foreign aid in the recent years the paved road ratio is increasing. The Government of Mozambique also has a plan to connect the provincial capital cities by paved national roads and the plan has already started to be implemented.

National Road No. 13 connecting Nampula (capital of Nampula Province) and Lichinga (capital of Niassa Province) was a non-paved road, and challenging to drive during the rainy season. Currently there is an ongoing road paving project by the assistance of AfDB (African Development Bank), JICA (Japan International Cooperation Agency) and Korean Export-Import Bank. This construction work was planned to be completed by 2015 but is due to be delayed.

The road between Motepuez and Marpa which lies between Pemba (capital of Cabo Delgado Province) and Lichinga (capital of Niassa Province) is still a non-paved road. The road between Montepuez and Lichinga is currently being paved by the assistance of AfDB, JICA etc. This road was planned to be completed by 2013 but is not yet completed and the progress is delayed greatly.

As just described, Cuamba and Lichinga in Niassa Province are not connected with Nacala and Nampula with paved all season road. This means Nacala Corridor is not yet connected by paved road. (See Figure 1.6)

Source: JICA Study Team

Figure 1.6 Road Condition in Central and Northern Mozambique

Due to this road condition, goods to Cuamba and Lichiga are transported by road from Beira Port via Tete and Malawi instead of the Nacala Corridor via Nacala and Nampula, especially in the rainy season but even in the dry season.

On the other hand, roads in Malawi are well maintained compared to Mozambique from the road density and paved road ratio points of view.

Additionally, in the Eastern Province of Zambia, the road density and paved road ratio are inferior compared to Malawi, but are much better than the condition in Mozambique. The paving project of the important section of the Nacala Corridor in Zambia which is between Lusaka and Chipata (total length of 575 km) has already started. Out of that 575 km, a section of 300 km has been under construction since June 2014 by the assistance of China.

1.4 Existing Condition of Nacala Port

Nacala Port is a good natural deep-sea port with the water depth of 14 metres[2] at the deepest point. The port was opened in 1951 during the Portuguese colonial period and the railway to the inland

[2] Before the rehabilitation and upgrading, North Quay of Nacala Port had a depth of 7.5~10 meters and South Quay had a depth of 14 meters.

was already connected at that time. In 1970, that railway was connected from Nacala Port to Malawi Railway.

Nacala Port is the major commercial port for the Northern Region in Mozambique. In the recent years, there was an increase in handled containerized cargo (annual handling amount increased from 30 thousand TEU in 2006 to 90 thousand TEU in 2011) as well as port call of liners to Asia at Nacala Port. However, since Nacala Port and the railway connecting Nacala Port to Malawi have deteriorated, and the road construction projects to the inland have been delayed, the transit cargo amount for Malawi is still less than the amount which once had been transported.

In 1990, Nacala Port became part of the state owned company which operates the ports and railways in Mozambique. Then in 2000, it was privatized with a 15-year concession. However, the port facilities of Nacala Port are extremely worn out. This is because there hasn't been any investing capital for rehabilitation and upgrade with insufficient amount of demand for cargo.

With the current situation of roads and railway not serving the inland area appropriately, demand for Nacala Port is limited to the area of approximately 250 km from Nacala Port.

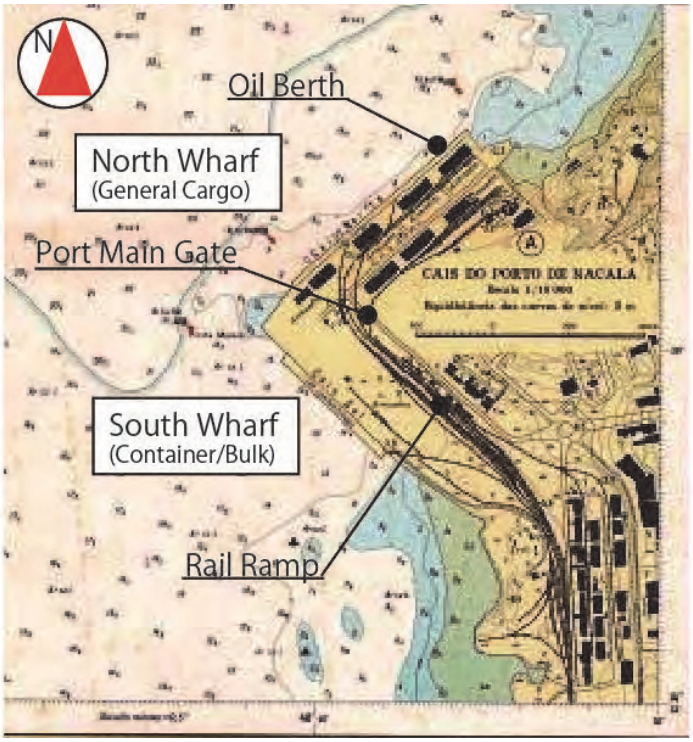
As mentioned in Section 1.1, the rehabilitation and upgrade of the facilities at Nacala Port will be implemented by Japanese assistance The objective of 'The Project for Urgent Rehabilitation of Nacala Port' is to rehabilitate the structures which are too old to be used. On the other hand, 'Nacala Port Development Project (project for upgrading port facilities)' aims to increase the scale of facilities to handle the increasing demand for cargo transport once the Nacala Corridor Railway and major roads are improved. With these rehabilitation and upgrade projects for port facilities, the cargo handling capacity will increase substantially. The expected cargo demand is 9 million ton for general cargo and 490 thousand TEU (twenty-foot equivalent unit) by 2030, whereas current general cargo amount is 1.3 million ton and 50 thousand TEU.

In addition to the existing Nacala Port, a coal terminal for export was constructed in Nacala-a-Velha in the western side of Nacala Bay. Northern Railway will branch off to connect to this coal terminal.

In the future, if the roads and the railway of the Nacala Corridor are upgraded, the service catchment areas of Nacala Port would be expanded to 500-1,000 km from Nacala Port.

Source: Ministerio de Mozambique, Canal de Mozambique, Porto de Nacala, 49611-M

Figure 1.7 Nacala Port and Nacala-a-Velha Coal Terminal



Source: JICA Study Team based on Ministerio de Mozambique, Canal de Mozambique, Porto de Nacala, 49611-M

Figure 1.8 Nacala Port at Present

Chapter 2 Emerging Development Opportunities in the Nacala Corridor Region

2.1 Four Factors Regarding Emerging Development Opportunities in the Nacala Corridor Region

There are four strong driving forces for development for the Nacala Corridor Region. They have a large transformative power on the economy and spatial structure of the Nacala Corridor Region.

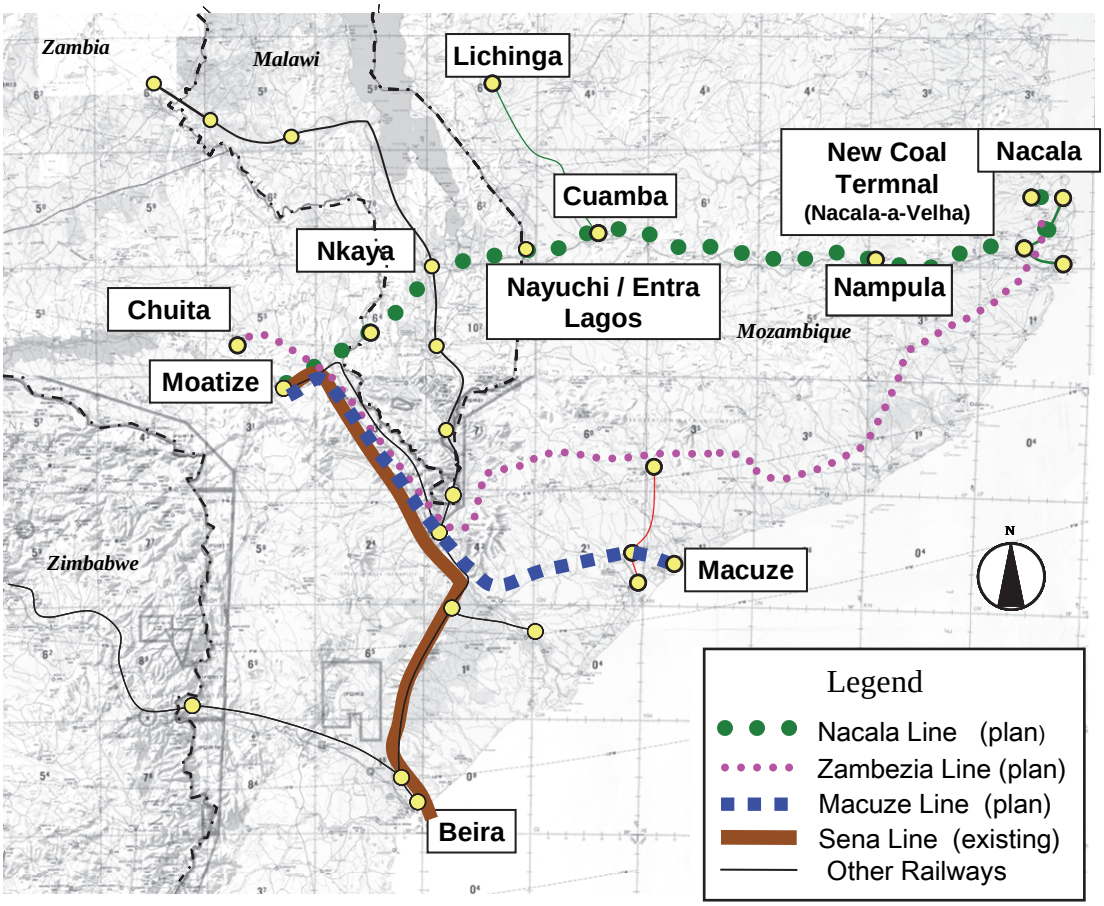
- Coal mining and coal transport for export
- Natural gas exploitation and LNG production for export
- Increasing investments and development in Nacala Special Economic Zone (SEZ) near the Nacala Port to be rehabilitated and upgraded
- Key transportation projects as driving forces on regional development

2.2 Coal Mining and Coal Transport for Export

A huge coal reserve of over 23 billion tons has been found in Tete Province. The developable coal found in Tete contains around 50% high quality coal (coking coal), which is one of the raw materials for iron making. At present, three coal mines are operational and the development of five more coal mines is planned. Coal production is expected to reach 56.6 million ton per year by 2017 and 75.4 million tons per year by 2020, and 100 million tons per year in the future.

For exporting the increasing amount of coal production in Tete Province, 3-4 railway lines from Tete Province connecting to seaports are required. Coal export was started in 2012 and is currently using Sena Line and Beira Port. However, the Sena Corridor does not have enough transport capacity for the amount of coal to be produced by 2017. See Figure 2.1 and Table 2.2.

One of the promising export routes is the Nacala Line which connects Moatize of Tete Province through Malawi with Nacala Port. The Nacala Line is composed of existing lines and new lines.



Source: JICA Study Team based on Information from Vale and CFM

Figure 2.1 Existing and Planned Coal Export Routes

Table 2.1 Characteristics of Existing and Planned Coal Export Routes

		Nacala Line	Zambezia Line	Macuze Line	Sena (Beira) Line
Transport Capacity	Initial Capacity	22 MTPA	40 MTPA	25 MTPA	6.5 MTPA
	Eventual Capacity*	30 MTPA	60 MTPA	50 MTPA	-
Type of Work		Rehabilitation and new line	New line	New line and new port (Macuze)	Rehabilitation
Route Length		913 km	1,100 km	520 km	575 km
Completion		2015	2015	2017	Completed

Source: JICA Study Team based on data collected from various sources
Note*: The transport capacity after the implementation of the expansion of the railway capacity.

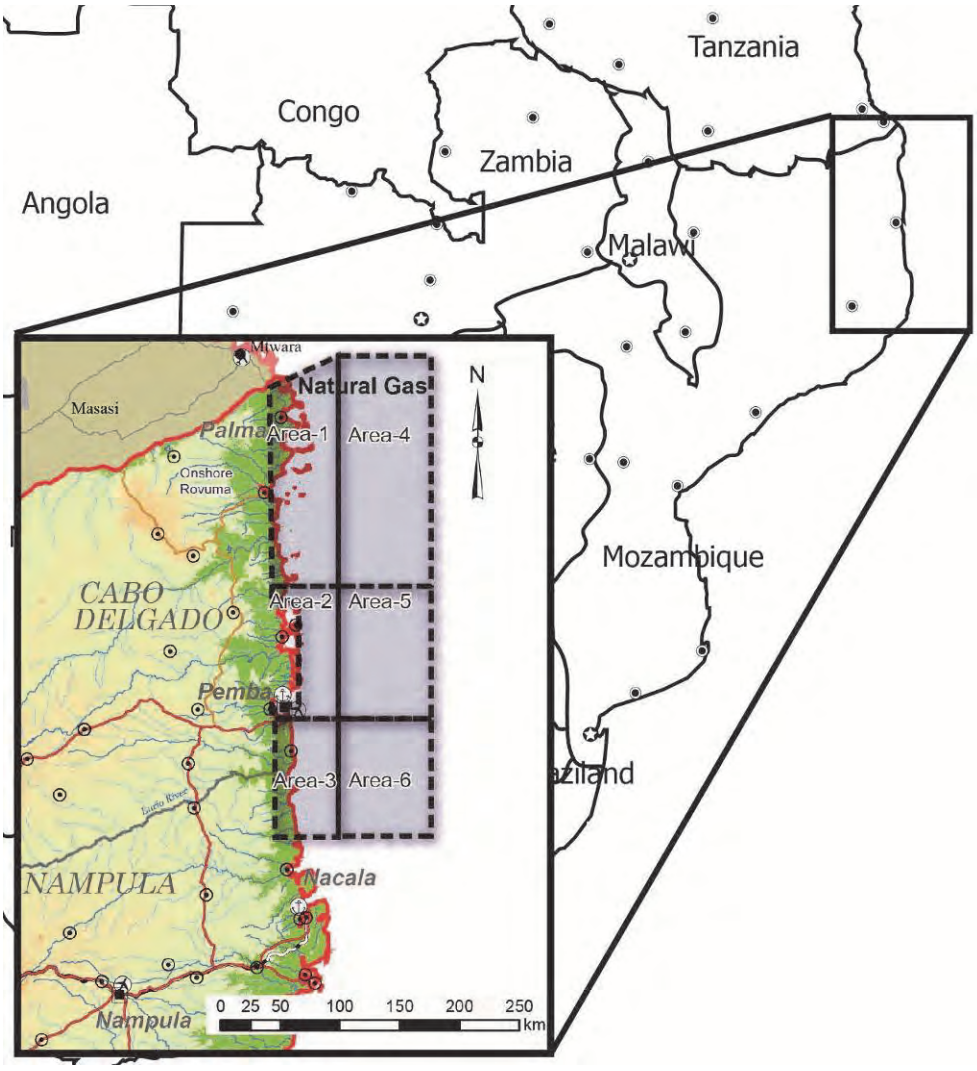
2.3 Natural Gas Exploitation and LNG Production for Export

Natural gas reserves in Mozambique were drastically increased by the discovery of huge gas fields at the concession areas in the offshore Rovuma Basin, in northern Mozambique. (see Figure 2.2)

Recoverable reserves in Areas 1 and 4 are estimated as 75 trillion cubic feet (Tcf).[3]

Natural gas exploitation and LNG production are planned to start in 2018 at 10 million tons per year. This world-class natural gas production could create 70,000 job opportunities at most (including direct and indirect employment and construction jobs).

It could offer an opportunity for the Nacala Corridor Region to acquire a new energy source other than the electricity transmitted long distance from Cahora Bassa and to generate new chemical industries, such as those for ammonia and methanol, resulting in widening the industrial base of the Nacala Corridor Region.



Source: JICA Study Team based on ICF International (The Future of Natural Gas in Mozambique: Towards a Gas Master Plan, Pages 4-18)

Figure 2.2 Natural Gas Concessions in Rovuma Offshore & Onshore Areas

[3] ICF International's estimation shown in "The Future of Natural Gas in Mozambique: Towards a Gas Master Plan (20 December 2012)" prepared by ICF International.

2.4 Increasing Investments and Development in Nacala Special Economic Zone (SEZ)

Mozambique enacted the law on Special Economic Zones (SEZ) in 2009. In 2009, the first SEZ in Mozambique was established in Nacala Municipality and Nacala-a-Velha District. Since then the number of approved investment projects and the amount of registered investment values has increased in the Nacala SEZ. From 2009 to 2012, there were 68 investment projects approved by GAZEDA. The total amount of investment value registered with GAZEDA was US$ 3,300 million (in years 2009-2012).

The increase in investments and development in the Nacala Area have been driven by the Nacala Port and SEZ. With the rehabilitation and upgrade projects for Nacala Port and the upgraded railway from Tete, the Nacala Area will attract more investments and developments as the international gateway for the Nacala Corridor Region.

2.5 Key Transportation Projects as Driving Forces to Regional Development

Opportunities are emerging in the Nacala Corridor Region for economic growth. There are a number of ongoing and planned initiatives that could fundamentally enhance the development potential of the Region. They include 1) the railway upgrade projects to be undertaken by a private concessionaire for operating trains for transporting not only coal but also other cargoes from Moatize in Tete Province and Nacala Port in Nampula Province through Malawi, 2) rehabilitation and upgrading of Nacala Port, 3) upgrading of trunk roads in the provinces of Niassa, Cabo Delgado and Nampula.

A private consortium headed by Vale Mozambique S.A, a subsidiary of Vale, a Brazilian mining company, started railway upgrading works in 2012 for a total length of 919 km comprising 237 km for installation of a new line and the remaining 682 km for upgrading of the existing line. The primary purpose of this railway line is to transport the coal produced in Moatize in Tete Province to Nacala Port for export. The consortium started rehabilitation work of the Cuamba-Lichinga line as well as part of its CSR. One of the concessionaire conditions is to ensure transportation of other companies' coal, general cargoes and passengers capitalising on the upgraded railway line. This condition could create a significant impact on the economy of the Nacala Corridor Region, as well as on land locked Malawi and Zambia. Access to and from international markets would be greatly improved, contributing to an increase in export of agro-products from the Region and inland neighbouring countries, as well as to lower prices and wider availability of daily goods, fuels, construction material and chemical inputs to agriculture. Intra-regional commerce will also be activated, thus stimulating production. Coupled with appropriate measures to support small-scale farmers, this railway upgrading could contribute to the improvement of income and living standards of people, reduction of poverty and reduction of income disparity.

Nacala Port, situated at the eastern end of the Nacala Corridor, is currently under rehabilitation and will be upgraded with the assistance of the government of Japan. The cargo-handling capacity, which declined significantly due to the damages caused during the civil war, poor maintenance and lack of fund for rehabilitation, will be significantly enhanced by the two current projects. Urgent rehabilitation work and the upgrading of the facilities would increase its cargo-handling capacity

from the present 1.3 million tons per year for general cargoes and 53 thousand TEU per year for containers to 49 million tons and 491 thousand TEUs respectively. Nacala Port could ensure efficient export and import of goods in large amounts as a new international gateway.

There are three major initiatives in upgrading the conditions of trunk roads in the Nacala Corridor Region. They are the road upgrade projects for Nampula-Cuamba, part of National Road No.13 (N-13), the project for two sections of National road No.14 (N-14) running eastward from Lichinga of Niassa Province toward Montepuez of Cabo Delgado Province and the project for National Road No.13 (N-13) connecting Cuamba and Lichinga in Niassa Province. Upgrading works are ongoing for Nampula-Cuamba and N-14 from Lichinga, while the upgrading of the Cuamba-Lichinga section has been committed for implementation. The government of Japan, the African Development Bank and other banks are supporting these three projects. The areas inland from Nampula westward have been largely isolated by poor roads, many of which have been impassable during the rainy season. Upgrading of these trunk roads to all-weather roads will significantly improve the mobility of the population in the surrounding areas, ensuring better access to market for agro-products and easier procurement of inputs and consumer goods. Activation of the regional and local economies could, thus, be accelerated.

Chapter 3 Development Strategies for the Nacala Corridor Region and Programme for Strengthening of Multi-Modal Transport Function

3.1 The 'Nacala Corridor' as the International Transport Corridor and Regional Development for the 'Nacala Corridor Region'

The railway from Moatize in Tete Province will be connected to Nacala-a-Velha via Malawi, Cuamba and Nampula by partly constructing new lines and upgrading the remaining existing Northern Railway for the transportation of coal in Tete Province. This will improve the railway operation. Using this railway for coal transport, long distance transport for general cargo will become possible. It is also expected that the operation of long distance railway will avoid heavy loaded trucks to travel excessively on the upgraded parallel major road that is also being upgraded.

PEDEC-Nacala recommends[4] that the transport network should be composed of a railway which is the major axis of the Nacala Corridor Region and trunk roads which supplement the railway network. At joints of the railway and trunk roads, development of important urban centres is also recommended. Furthermore, by taking into consideration both industry and space, it will enable the transport corridor to benefit people in wider areas and encourage effective resource use in more areas. As a result, the development of this transport network could contribute to regional development which would sustainably create enough cargo volume of to maintain such transport corridors.

The PEDEC-Nacala recommends an enhancement programme for a 'multi-modal transport function' which functionally connects railway, road and port transport in its recommended corridor network. Once the network consisting of both railway and road is constructed, the Nacala Corridor will become a very important international transport corridor for inland areas of northern Mozambique, as well as Malawi and Zambia, while Nacala Port, a natural deep seaport, which is located closer to Asia than other Southern African ports, would become the gateway for the Nacala Corridor Region.

Participation of private sectors in development of the value-chain for the agricultural and natural resource sectors will become possible due to the decline of transport costs in the inland areas of Mozambique and land-locked countries by enhancing multi-modal transport function in the region-wide freight network. Also as a result, the commercial catchment areas of Nacala Port, Nacala Bay Area and Greater Nampula are expected to grow significantly. Then by using those emerging opportunities, it will be possible for Nacala Port to increase its handled cargo volume. It is also possible for Nacala Bay Area and Greater Nampula to develop their manufacturing industries.

[4] To come up with this recommendation, three scenarios were formulated and were studied from the economic development, social and environmental points of view. See Final Study Report of PEDEC-Nacala for the detailed characteristics and comparison of these scenarios.

3.2 Future Spatial Structure of the Nacala Corridor Region

(1) Transport Corridor Network for the Nacala Corridor Region: Spatial Structure based on the Development Scenario

PEDEC-Nacala recommends the spatial structure of Nacala Corridor Region in 2035 as shown in Figure 3.1. The blue arrows indicate proposed corridor routes, while the brown arrows are the existing transportation routes. The corridor structure is designed in such a way that Nacala Port will be connected with Lilongwe of Malawi and Lusaka (or Mpika) of Zambia through an international corridor that extends for approximately 2,000 km and the effect of improved access will be spread to as many areas in the Mozambican part as possible to enhance people's mobility and promote development along the routes.

(2) Main Corridors

- **[M-1]** Nacala-Nampula-Cuamba-Lilongwe (Malawi)-Lusaka (Zambia)
- **[M-2]** Cuamba-Tete
- **[M-3]** Cuamba-Lichinga

The main corridor shown in solid blue arrows starts at Nacala at the eastern end, runs westward through Nampula and reaches Cuamba in Niassa Province, about 530 km west of Nacala. The main corridor splits at Cuamba into three directions: in the northwest direction to Lichinga, in the western direction to Lilongwe of Malawi and further to Lusaka (or Mpika) of Zambia and in the south western direction to Moatize of Tete Province through Malawi.

These main corridors will be served by both railways and trunk roads. This main part of the Nacala Corridor will ensure faster and lower cost transportation of cargoes, especially for long haul transportation, thus accelerating exports and imports for Malawi, Zambia and Mozambique. The Cuamba-Lilongwe-Lusaka Main Corridor [M-1] will ensure import of goods at lower prices and increase the possibility of exporting goods produced in Malawi and Zambia through Nacala Port. The Cuamba-Lichinga Main Corridor [M-3] would dramatically change the status of Niassa Province, from a dead-end province with weak linkages with other areas to a province exporting abundant agro-related and wood-related products to other areas and overseas through the new corridor. Niassa Province could become a new international gateway to Malawi and southern Tanzania through water transport on Niassa Lake (Malawi Lake). The Cuamba-Tete Main Corridor [M-2] would add a new outlet for Tete Province, which has been an important node of the transportation network connected with Malawi, southern Zambia, Zimbabwe and Beira.

(3) Sub Corridors

- **[S-1]** Lichinga-Pemba
- **[S-2]** Nacala-Pemba-Palma
- **[S-3]** Chipoka-Metangula-Mbamba Bay-Itsungi Port

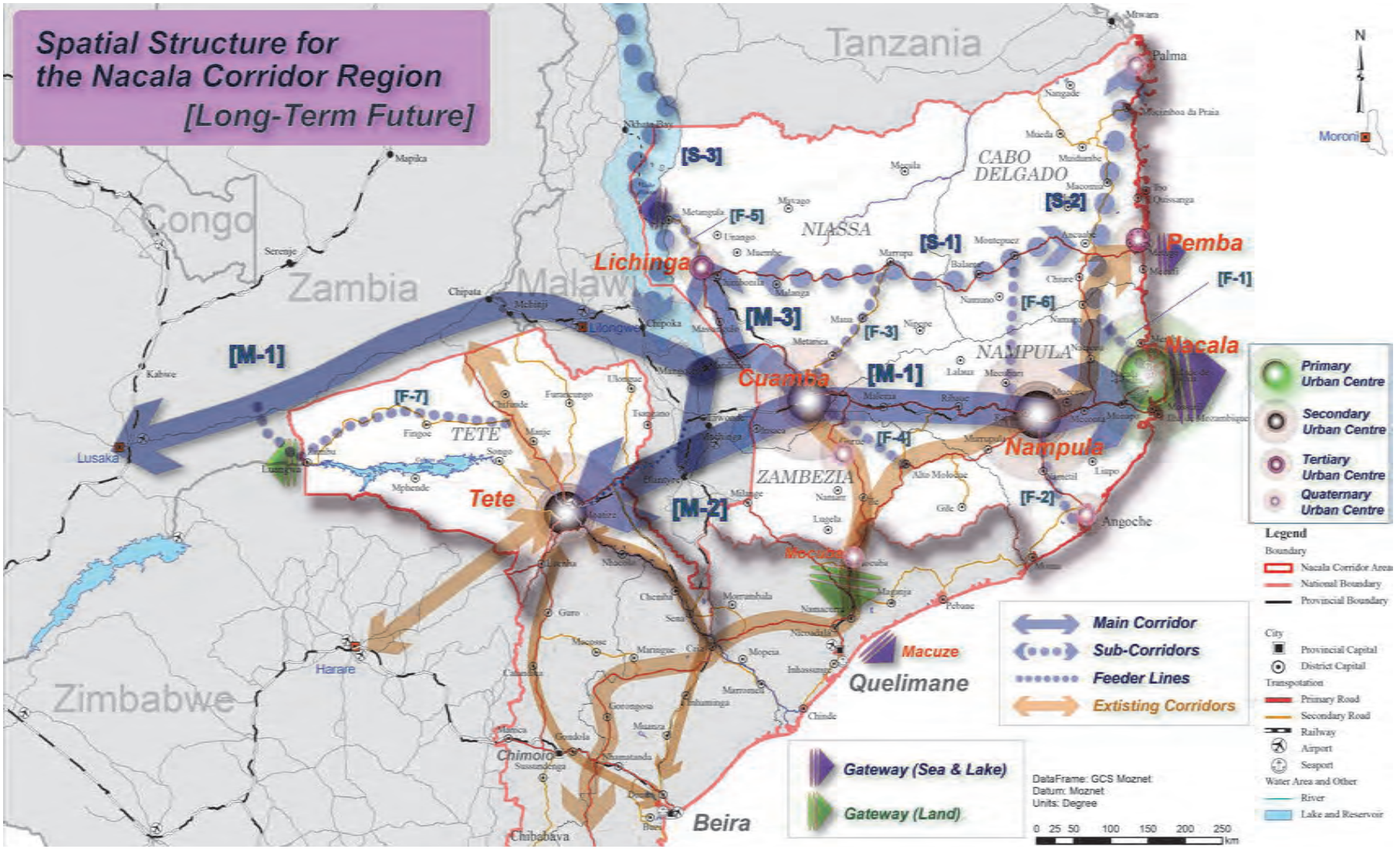
Three sub-corridors are shown in big blue dashed lines in Figure 3.1. One runs east to west from Pemba of Cabo Delgado Province to Lichinga of Niassa Province for about 700 km, while the other runs south to north from Nacala all the way up to Palma in Cabo Delgado Province through Pemba for about 660 km. While both of these sub-corridors are served by roads, there may be a possibility of a natural gas pipeline connection for the Palma-Nacala section. The Lichinga-Pemba sub-corridor accommodates road traffic between Pemba and Niassa Province and provides an

alternative route to the Nacala-Nampula-Cuamba-Lichinga main corridor in the event of hindrances such as emergencies and traffic congestion. The Nacala-Palma sub-corridor serves the traffic delivering goods to Palma for the natural gas project and tourist destinations along the coastal area and islands of Cabo Delgado Province and Nampula Province. The third sub-corridor is a water transport corridor connecting Malawi's Chipoka, Mozambique's Metangula and Tanzania's Mbamba Bay and Itungi Port.

(4) Feeder Roads

PEDEC-Nacala proposes the following seven feeder lines shown in small blue dashed arrows in Figure 3.1. They would play a crucial role in expanding the impact of the corridor development spatially to every corner of rural areas.

- **[F-1]** Nacaroa-Nacala Feeder Line: to ensure easier access to Nacala Port to/from the north
- **[F-2]** Nampula-Angoche Feeder Line: to support development of the southern part of Nampula Province through promoting fishery and agriculture
- **[F-3]** Cuamba-Marrupa Feeder Line: to support development of agriculture along the route and strengthen the mutually supportive function of the Lichinga-Pemba Sub-Corridor and Nacala-Nampula-Cuamba Main Corridor
- **[F-4]** Cuamba-Gurue-Alto Molocue Feeder Line: to stimulate agriculture production along the route in northern Zambezia Province
- **[F-5]** Lichinga-Metangula Feeder Line: to promote development of agriculture and tourism along the route and create a new international gateway to Malawi and Tanzania by water transport
- **[F-6]** Nampula-Montepuez Feeder Line: to promote development of agriculture and tourism along the route and strengthen the mutually supportive function of the Lichinga-Pemba Sub-Corridor and Nacala-Nampula-Cuamba Main Corridor
- **[F-7]** Tete-Fingoe-Zumbu Feeder Line: to promote agriculture production in the fertile land along the route and open a new outlet to the southern part of Zambia



Source: JICA Study Team

Figure 3.1 Spatial Structure for the Nacala Corridor Region in 2035 (Long-Term Future)

(1) Hierarchical System of Urban Centres

Urban areas/urban centres are important areas where urban functions and economies are accumulated and interacted with. Urban centres will provide various urban services including public administration services, commercial-business services and urban infrastructure services (roads, electricity and water).

When international/regional transport corridors are developed, urban centres will develop more in respect of accumulation of public administrative functions and commercial-business functions, because transport corridors can help expand catchment areas of urban centres. That is, commercial-business services sectors and manufacturing sectors will be attracted to be located in urban centres/ urban areas, in response to the increased degree of interconnection/integration through international/regional transport corridors.

To effectively cover a wide region like the Nacala Corridor Region, it is important to establish a hierarchical system of urban centres. Table 3.1 shows the present situation and the recommended hierarchy of urban centres in the future (2025-2035).

Table 3.1 Urban Population of Major Urban Centres at Present and 2030-2035

Urban Centres in Mozambique	2011	2035
Nacala Bay Area	285,000	927,000
Greater Nampula	583,000	1,329,000
Cuamba City	99,000	267,000
Tete City and Moatize City	232,000	567,000
Lichinga City	182,000	467,000
Pemba City	168,000	470,000
Urban Centres in Neighbouring Countries	Present	Future (2030)
Lilongwe (Malawi)	674,000*1 (2008)	1,580,000*3 (2030)
Blantyre (Malawi)	661,000*1 (2008)	1,531,000*4 (2030)
Lusaka (Zambia)	1,747,000*2 (2010)	2,900,000*5 (2030)

Source: Without mark: The JICA Study Team
*1: 2008 Population and Housing Census, Malawi
*2: 2010 Census of Population and Housing, Zambia
*3: The Study on Urban Development Master Plan for Lilongwe in Malawi (2010), JICA
*4: Malawi Population Projections
*5: The Study on Comprehensive Urban Development Plan for Lusaka in Zambia (2009), JICA

3.3 Programme for Strengthening of Multi-Modal Transport Function in the PEDEC-Nacala Strategies

PEDEC-Nacala recommends the following seven pillars of essential strategies[5] for forming the future regional spatial structure presented in the previous section into on the basis of on-going various investments and developments:

[5] PEDEC-Nacala Essential Development Strategies (See Section 13.3 in Final Study Report of PEDEC-Nacala)

- Securing of the Multi-Modal Transport Function of the Nacala Corridor
- Development of the Foundation for Economic Development in Nacala Bay Area, Greater Nampula and Palma
- Promotion of Sustainable Agricultural Development by 1) Promoting Development of Small-Scale Farmers and 2) Promoting Effective Utilisation of the Private Sectors' Vitality and Funds for Assisting Small-Scale Farmers
- Strengthening of Implementation System and Capacity for Environmental Management and Land Management
- Strengthening of Basic Education and Industrial Human Resources Development
- Establishment and Capacity Development of an Institutional Framework for Coordinating and Promoting Integrated Regional Development
- Taking Care of Emerging Social Problems, Vulnerable People and Less Accessible Areas

Out of the above strategies, the first pillar 'securing of the multi-modal transport function' of the Main Corridors must start with the following actions:

- Assuring Coal Railway Transport from Moatize to Nacala Port
- Assuring Non-Coal Railway Transport for the Nacala Corridor
- Port-Railway Integration at Nacala Port
- Port-Road Integration in Nacala Bay Area
- Securing the Upgraded Road Function of the Nacala Corridor
- Capacity Development of Railway Regulatory Function of INATTER
- Enhancement of the connection between railway and road in Malawi
- Enhancement of the connection between railway and road in the eastern Zambia

The high priority projects corresponding to the above actions are as follows:

- Nacala Port Access Road Project
- Nacala Multi-Modal Terminal and Railway Shunting Yard Project
- Nampula Southern Road Bypass Project
- Nampula Railway Bypass Project
- Nampula Multi-Modal Terminal and Railway Shunting Yard Relocation Project
- Railway Crossings Improvement Project
- Cuamba Road Bypass Project
- Railway Regulator Capacity Development Project
- Malawi Central Inland Container Depot Project (Malawi)
- Chipata Inland Container Depot Project (Zambia)

If the transport function of the Nacala Corridor is enhanced constantly by implementing these high priority projects, opportunities for dynamic economic development in the Nacala Corridor Region would emerge. It is necessary to utilize such opportunities fully in promotion of industrial development, development of urban infrastructures and economic infrastructures, as discussed in Chapter 5.

Chapter 4 Socioeconomic Framework for the Nacala Corridor Region

4.1 Future Socioeconomy of the Nacala Corridor Region, Malawi and Zambia

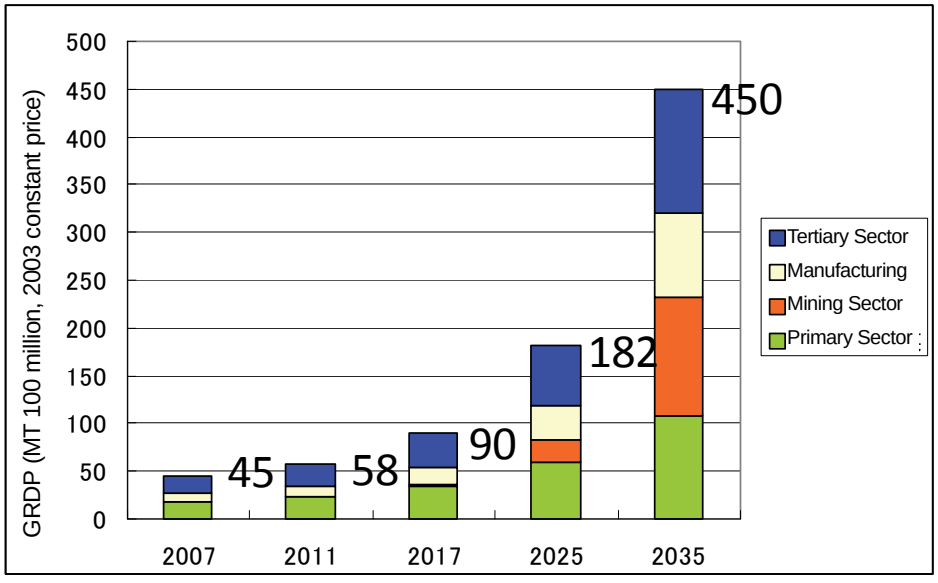
Socioeconomic situations of the Nacala Corridor Region in Mozambique (Nampula Province, Cabo Delgado Province, Niassa Province, Tete Province and the seven northern districts of Zambezia Province), Malawi and Zambia are compared in Table 4.1.

The GRDP of the Nacala Corridor Region will grow to become eight times larger between 2010 and 2035. In 2035, it is expected to become much larger than the GDP of Zambia in 2010.

Table 4.1 Socioeconomy of Mozambique's Nacala Corridor Region, Malawi and Zambia

		2010				2035
		Mozambique	Mozambique Nacala Corridor Region	Malawi	Zambia	Mozambique Nacala Corridor Region
Population (million)	2010	23.4	11.8	14.9	12.9	21.4
Annual Population Growth Rate (%)	2004-2010	2.4	2.9	3.0	2.4	-
Area (km2)		799.4	440.5	118.5	752.6	440.5
Population Density (person/km2)	2010	29.3	26.8	125.7	17.1	48.6
GDP/GRDP (100 million USD)	2010	96	31	51	162	241
GDP/GRDP per Person (USD)	2010	410	264	342	1,256	1,125

Source: [for 2010] World Bank, World Development Indicators, [for 2035] JICA Study Team



Source: JICA Study Team

Figure 4.1 GRDP Growth of the Nacala Corridor Region in Mozambique

4.2 Socioeconomy of Nacala Corridor Region of Mozambique: Future Framework

A socioeconomic framework for the Nacala Corridor Region includes the future population and GRDP by provinces. The socioeconomic framework covers population and economy. The socioeconomic framework indicates the foreseeable level of population growth and economic development as a result of the Nacala Corridor regional development. It is an indicative framework rather than definitive forecast.

Table 4.2 Future Population Framework for the Nacala Corridor Region by Province

	Population (thousand)				**Annual Growth Rate** (%)	
	2007	**2017**	**2025**	**2035**	**2007-2025**	**2007-2035**
Niassa Province	1,213	1,686	2,083	2,535		
Annual Growth Rate (%)	-	3.3%	2.7%	2.0%	3.0%	2.7%
Cabo Delgado Province	1,634	2,046	2,444	3,034		
Annual Growth Rate (%)	-	2.3%	2.2%	2.2%	2.3%	2.2%
Nampula Province	4,085	5,480	6,707	8,252		
Annual Growth Rate (%)	-	3.0%	2.6%	2.1%	2.8%	2.5%
Zambezia Province*	1,808	2,425	2,946	3,561		
Annual Growth Rate (%)	-	3.0%	2.5%	1.9%	2.7%	2.4%
Tete Province	1,807	2,675	3,528	4,747		
Annual Growth Rate (%)	-	4.0%	3.5%	3.0%	3.8%	3.5%
Nacala Corridor Region	10,548	14,312	17,707	22,129		
Annual Growth Rate (%)	-	3.1%	2.7%	2.3%	2.9%	2.7%
Other Areas	10,084	12,846	15,508	19,425		
Annual Growth Rate (%)	-	2.4%	2.4%	2.3%	2.4%	2.4%
Mozambique	20,633	27,158	33,215	41,554		
Annual Growth Rate (%)	-	2.8%	2.5%	2.3%	2.7%	2.5%

Source: JICA Study Team
Note*: Only the northern seven districts for Zambezia Province

Table 4.3 GRDP by Province, Years 2011, 2017, 2025 and 2035

	GRDP (million MT, 2003 constant price)				**Annual Growth Rate** (%)	
	2011	**2017**	**2025**	**2035**	**2011-2025**	**2011-2035**
Niassa Province	5,272	8,000	14,200	27,800		
Annual Growth Rate (%)	-	7.2%	7.4%	6.9%	7.3%	7.2%
Cabo Delgado Province	8,152	12,600	31,400	143,500		
Annual Growth Rate (%)	-	7.5%	12.1%	16.4%	10.1%	12.7%
Nampula Province	26,551	40,700	72,700	148,500		
Annual Growth Rate (%)	-	7.4%	7.5%	7.4%	7.5%	7.4%
Zambezia Province*	7,615	11,600	20,600	41,000		
Annual Growth Rate (%)	-	7.3%	7.4%	7.1%	7.4%	7.3%
Tete Province	10,038	17,400	43,000	89,400		
Annual Growth Rate (%)	-	9.6%	12.0%	7.6%	11.0%	9.5%
Nacala Corridor Region	57,629	90,300	181,900	450,200		
Annual Growth Rate (%)	-	7.8%	9.1%	9.5%	8.6%	8.9%
Other Areas	120,143	185,004	324,626	698,971		
Annual Growth Rate (%)	-	7.5%	7.3%	8.0%	7.4%	7.6%
Mozambique	177,772	275,304	506,526	1,149,171		
Annual Growth Rate (%)	-	7.6%	7.9%	8.5%	7.8%	8.1%

Source: JICA Study Team
Note*: Only the northern seven districts for Zambezia Province

Chapter 5 Infrastructure Development and Industrial Development Potential in Major Cities in the Nacala Corridor Region

5.1 Infrastructure Development and Economic Sectors in Major Cities

Due to the upgrading of Nacala Port and the railway between Moatize and Nacala, Nacala Bay Area, Greater Nampula and furthermore an inland city Cuamba will all obtain large potential for economic growth. In order to utilize such emerging potential, as already explained in Chapter 3, firstly, infrastructure development and operational improvement for strong and close integration of different transport modes (port, railways and trunk roads) is necessary, in addition to the development of port, railways and trunk roads.

Secondly, as the next action, it is necessary to develop infrastructure for power and water supply, as well as urban infrastructure, in order to take advantage of the emerging development potential in the Bay Area, Greater Nampula and Cuamba for promoting industrial development.

By developing economic infrastructures in these major urban centres, Nacala Bay Area, Greater Nampula and Cuamba, they will become able to attract domestic and foreign private investment for industrial development. Especially for Nacala Bay Area, it is also recommended to develop industrial parks equipped with infrastructure.

5.2 Industrial and Infrastructure Development in Nacala Bay Area

(1) Infrastructure Development for Industrial Development

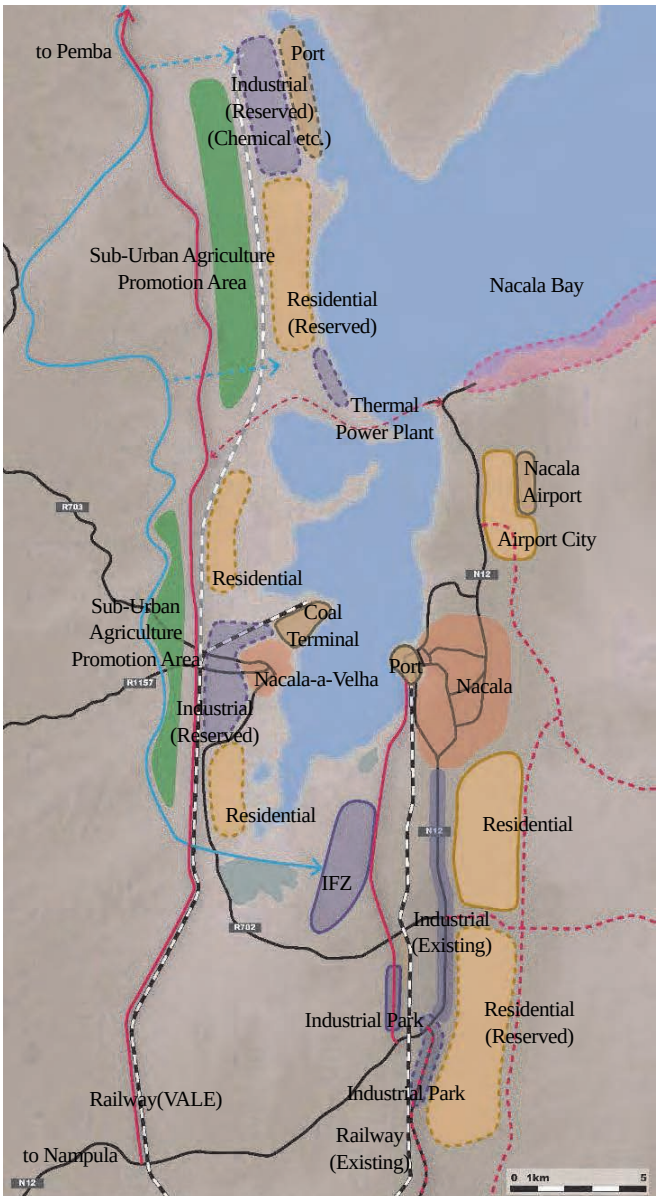
In Nacala City where Nacala Port is located, factories and warehouses have been built along the major road connecting the central area and the port of Nacala from the south, since Nacala SEZ was established. These factories mainly process raw materials imported through Nacala Port and sell the processed products. Such factories are simple processing industries which are targeted at the market of Mozambique and its neighbouring countries. They produce products such as wheat flour and cookies out of imported wheat grains and produce cement by crushing imported clinker.

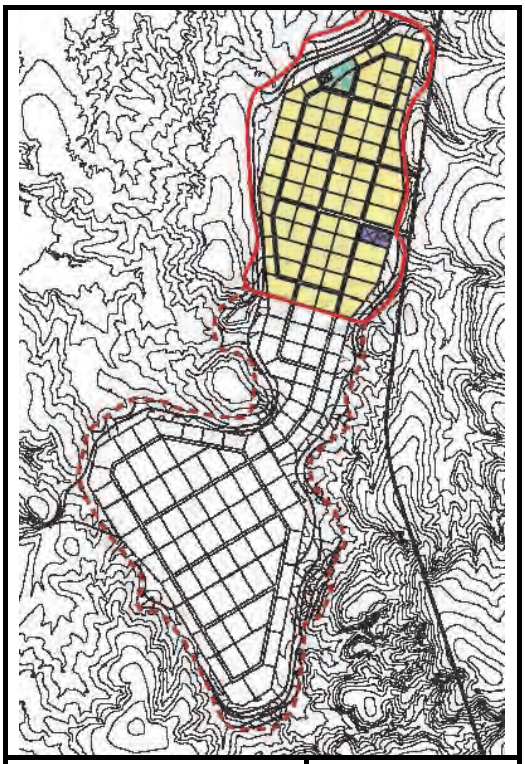
Once major roads and Nacala Corridor Railway are upgraded and medium to long distance transport becomes possible, the catchment areas of Nacala Bay Area in terms of logistics and commerce would be expanded significantly. To take advantage of such business opportunities, it is considered that various manufacturing industries would start their operation in Nacala Bay Area. However, neither economic infrastructure are strong enough, nor cleared lands with utilities are wide enough to accommodate a growing number of manufacturing industries. Therefore, PEDEC-Nacala Strategies include the following high priority projects:

- Nampula-Nacala Power Substation Reinforcement Project
- Nacala Thermal Power Plant Project

- Sanhute Dam Project (for Urban Water Supply to Nacala)
- Project for Lurio River Water Resources Development for Water Supply to Nacala Bay Area
- Nacala SEZ/IFZ Management Improvement Project
- Nacala Industrial Belt Area Development Project
- Nacala Industrial Park Project

Out of the above projects, the study for implementing Nampula-Nacala Power Substation Reinforcement Project is currently on-going with assistance of JICA. Essential projects in particular to develop the capacity to bring investment and accommodate manufacturing industries in Nacala Bay Area are Nacala Industrial Belt Area Development Project (short term) and Nacala Industrial Park Project (medium term). PEDEC-Nacala Strategies recommend that Nacala Industrial Park Project initially starts with public investment at the size of 50-100ha and the remaining area is to be developed by private developers.





Industrial Free Zone (IFZ)	Scale: 1/50,000

Legend

Colour	
	Short Term Plan
	Long Term Plan
	Industrial
	Urban Area
	Traffic Facility
	Residential
	Tourism
	Sub-Urban Agriculture Promotion Area

Source: JICA Study Team

Figure 5.1 Proposed Location for Nacala Industrial Park

(2) Development Potential for Manufacturing Industries

In the last decade, in Nacala Bay Area, the number of factories for simple processing using raw materials from outside the Nacala Corridor Region has been increasing. The markets for these products are found not only in Mozambique but also in neighbouring countries. Production of cement, wheat flour and cookies utilizing imported raw material are some good examples of this kind of manufacturing industry.

Once the Nacala Corridor consisting of railway, trunk roads and Nacala Port starts to function effectively and efficiently as a multi-modal international transport corridor, the logistical and commercial catchment areas of Nacala Bay Area will not only cover the inland areas of northern Mozambique, but also will be extended to cover Malawi, eastern Zambia and Zimbabwe. Furthermore, countries in the Middle East and South Asia, as well as coastal neighbouring countries, such as Tanzania and Kenya, will become future potential markets of manufacturing industries to be located in Nacala Bay Area. At this stage, it is considered that development opportunities for the following processing industries using raw material locally produced in the Nacala Corridor Region will be increasing in Nacala Bay Area:

Agro-Processing Industries

- Oil production from locally produced soya beans, sunflower seeds, cotton seeds and sesame seeds
- Processing of cashew nuts
- Production of fruit juice using locally produced fruits
- Manufacturing of cotton yarn and cotton cloth using locally produced cotton

Forest Products Processing Industries

- Manufacturing of wooden chips
- Manufacturing of pulp

Chemical Industries

- Oil refinery (using imported crude oil)
- Processing phosphoric acid (using phosphate rock to be extracted in Monapo)
- Processing methanol and ammonia (using natural gas produced in the Rovuma Basin)
- Cement（using local limestone）

At a further stage, Nacala Bay Area is expected to attract an increasing amount of investments for manufacturing industries which already have wide international marketing channels and high-visibility products with brand awareness.

Table 5.1 Incentives to Investors in Industrial Free Zones and Special Economic Zones

	Industrial Free Zones (IFZ)		Special Economic Zones (SEZ)	
	Developers	Enterprises	Developers	Enterprises
Customs Duty and Value Added Tax Exemption (VAT is on both the import and on internal acquisitions)	Import of construction materials, machinery, equipment, accompanying spare and accessory parts and other goods used in the carrying out of the licensed IFZ activity	Import of goods and merchandise to be used in the implementation of projects and exploration of activities which have been authorized under the terms of the IFZ Regulations.	Import of construction materials, machinery, equipment, accompanying spare and accessory parts and other goods used in the carrying out of the licensed SEZ activity.	
Corporate Income Tax	a) Exemption (first 10 years) b) 50% reduction (11th-15th years) c) 25% reduction (remaining life of the project)		a) Exemption (first 5 years) b) 50% reduction (6th-10th year) c) 25% reduction (remaining life of the project)	a) Exemption (first 3 years) b) 50% reduction (4th-10th year) c) 25% reduction (11th-15th year)

Source: Law on Investment (Law no.3/93 of 24th June), Regulation on the Investment Law (Decree 20.43/2009 of 21 at August), Code of Fiscal Benefit (Law No.4/2009, 12th January)

5.3 Industrial and Infrastructure Development in Greater Nampula

(1) Infrastructure Development for Industrial Development

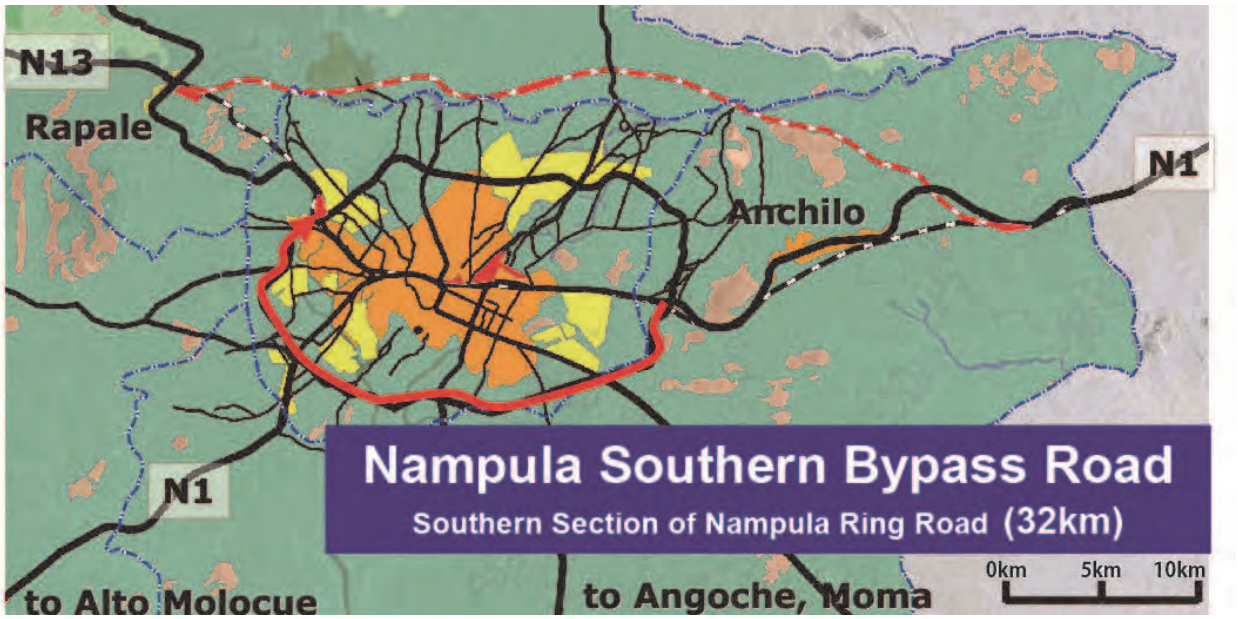
Nampula is the administrative capital of Nampula Province and has prospered as a commercial and industrial centre of the Northern Region for a long period. Therefore, it already has developed various manufacturing industries and logistics industries, and infrastructure necessary for supporting such industries including roads, electricity and water supply, has been developed to a certain extent. However, due to the increase of urban population and road traffic volume, serious water shortage often occurs during the dry season and traffic congestion has been increasing .

In the future, once the implementation of upgrading major roads and railway are completed and medium to long distance transport becomes possible, the logistics and commercial zone of Greater Nampula will expand. To take advantage of such opportunity, it is assumed that various manufacturing industries will also expand in Greater Nampula. Locations where such industries are to be accommodated will be mainly along National Roads No. 1 and No. 13 which are the major access roads to Greater Nampula. However, along Nampula Southern Road Bypass which is recommended by PEDEC-Nacala Strategies will also become convenient locations for such factories to be established.

The Southern Road Bypass is to disperse the traffic of National Road No. 13 coming from the west as well as the traffic of National Road No. 1 coming from the east and also to enable road users to bypass the central area of Nampula City. This bypass road is 32.5 km in length and runs through the south of Nampula City and is to become part of the proposed ring road. (see Figure 5.2)

Despite the expected trend, necessary infrastructure and land with adequate infrastructure have not yet been developed to accommodate a large quantity of manufacturing factories. Therefore, PEDEC-Nacala development strategies include the following high priority projects:

- Nampula-Nacala Power Substation Reinforcement Project
- Nacala Thermal Power Plant Project (for stable power supply to Greater Nampula, Nacala Bay Area and their surrounding areas)
- Mon Tiza Dam Project (for urban water supply)



Source: JICA Study Team

Figure 5.2 Greater Nampula and Proposed Nampula Southern Bypass Road

(2) Development Potential for Manufacturing Industries

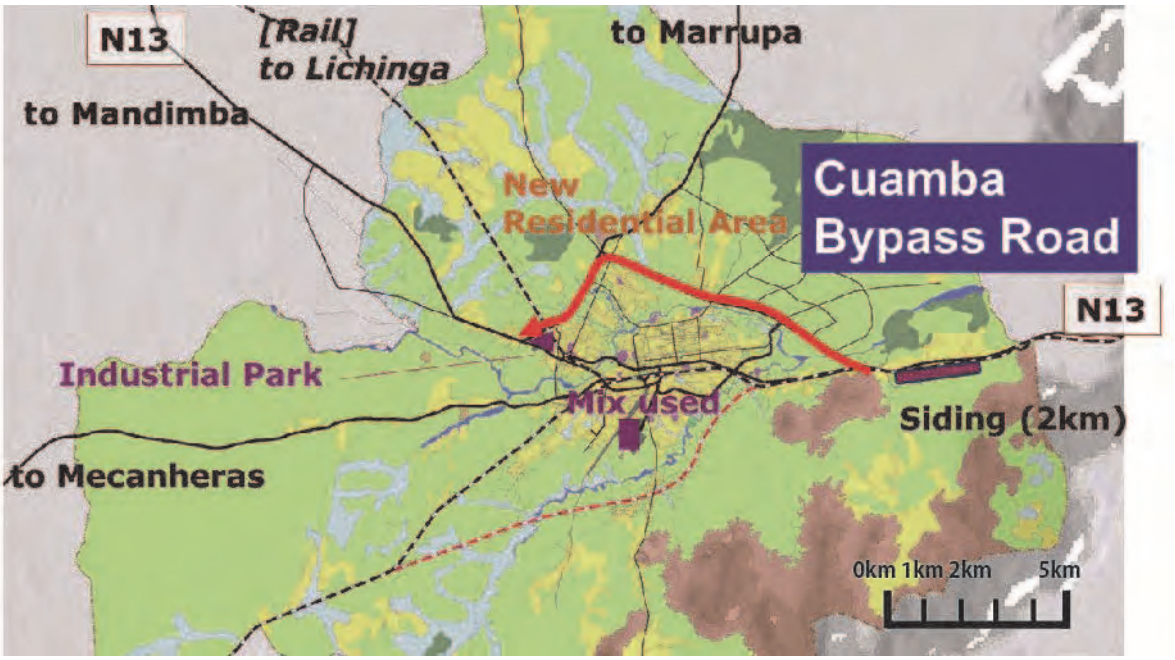
Once the Nacala Corridor (consisting of railway, trunk roads and Nacala Port) starts to function efficiently as a multi-modal international transport corridor, like Nacala Bay Area, the catchment areas of logistics industries of Greater Nampula will cover not only inland areas of northern Mozambique but also Malawi, eastern Zambia and Zimbabwe. Furthermore, not only the coastal neighbouring countries, such as Tanzania and Kenya, but also countries in the Middle East and South Asia will become future potential markets. At this stage of development, opportunities for processing industries will be those which use raw material from the Nacala Corridor Region. The types of potential industries are the same as those for Nacala Bay Area, as described in the previous section.

5.4 Cuamba City and Cuamba Bypass Road

It is the city of Cuamba that could take advantage of emerging development opportunities next to Nacala Bay Area and Greater Nampula in the period 2017-2020. National Road No. 13 and Northern Railway go through Cuamba City. Then at Cuamba City the national road branches out into three directions, the first to Mandimba, a border town with Malawi, the next to Lichinga, provincial capital of Niassa Province, and the last to Marrupa, district capital in the north. Cuamba City is also a crossroad of the main line of Northern Railway and the branch line from Cuamba to Lichinga. Cuamba is currently only one of the municipalities and one of the district capitals in Niassa Province, but it is an important commercial centre in the Nacala Corridor Region due to its logistically strategic location. In PEDEC-Nacala development strategies, Cuamba City is designated as the Secondary Urban Centre for the future. Cuamba is also expected to aim to become an inland regional logistics and industrial centre.

Cuamba Bypass Road recommended by PEDEC-Nacala could prevent urban environmental degradation and reduce risks of traffic accidents by diffusing the traffic from the National Road No. 13 to the north of Cuamba crossing a branch of Lurio River. This bypass road will be a two-lane

road and the total length will be approximately 11 km including a 50m bridge. The new road is to start from 5km east of Cuamba City and will branch off from National Road No. 13 to the northwest and will connect to National Road No. 360.



Source: JICA Study Team

Figure 5.3 Proposed Bypass Road and Industrial Park in Cuamba

Potential industries in Cuamba City would be mainly agro-processing industries, processing agricultural products grown in its surrounding areas. These processed products will be transported not only to Nacala Bay Area and Greater Nampula for consumption, but also exported to landlocked neighbouring countries.

Chapter 6 Development Potential of Economic Sectors of the Nacala Corridor

6.1 Agricultural Sector

(1) Strengthening of Region-Wide Freight Network and Developing Value Chains for Agricultural Sector

It will become much easier and more feasible for private sectors to develop value chains for agriculture once a region-wide freight network is established for the purpose of strengthening the multi-modal function covering Mozambique's Nacala Corridor Region, Malawi and eastern Zambia in accordance with the development strategies of PEDEC-Nacala. This is mainly due to the prospective decrease of transport costs and improvement of transport security from coastal areas to inland areas and landlocked countries by developing transport infrastructures, such as trunk roads and railways. In the past, poor conditions of roads and railways tended to significantly damage motor vehicles and products to be transported. Moreover, not only such poor conditions of roads and railways, but also poor telecommunication facilities, make it difficult to predict transport hours and to secure products to be transported.

Based on the region-wide freight network to be established, private sectors will be able to invest and operate in the following businesses so as to create value chains for the agricultural sector:

- Supply of agricultural material (seeds, fertilizer and agricultural chemicals)
- Supply, operation and maintenance of agricultural equipment (farm machine etc.)
- Agricultural production (which is feasible and acceptable if the institution and implementation system for attracting agricultural investment by following the "rai Principle" (Principles of Responsible Investment in Agriculture and Food System) and Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) of Land, Fisheries and Forests in the Context of National Food Security should be established.)
- Intermediate distribution for agricultural products: collecting of agricultural products for shipment, intermediate distribution and terminal operation
- Agro-processing industries

(2) Agricultural Sector in the Nacala Corridor Region in Mozambique

The Nacala Corridor Region has relatively rich soils with relatively ample rainfall. Therefore, this region has potential for growing various agricultural products. To utilize this potential for agriculture, improvement in agricultural technology is necessary and some development activities are ongoing.

At the same time, if the institution and implementing system for attracting agricultural investment by following rai Principles (Principles of Responsible Investment in Agriculture and Food System) and VGGT (Voluntary Guideline on the Responsible Governance of Tenure for Land, Fisheries and

Forest in the Context of National Food Security) are established, the Nacala Corridor Region has potential to develop responsible commercial agriculture with a win-win relationship with local small agriculturalists. In order to achieve this situation, it is especially important to support community residents in obtaining DUAT (land use rights).

As already discussed in the previous section, once both infrastructure and operation of a region-wide freight network in the Nacala Corridor Region are established and strengthened, business opportunities for private sectors in development of value chains for agriculture would emerge. Under such circumstances, in the Nacala Corridor Region of northern Mozambique, maize, cassava, beans and peas out of various food crops, offer promising prospects. Soy, potato, vegetables, sugar cane, cashew nuts, cotton and tobacco are promising cash crops in the Nacala Corridor Region. These agricultural products have the following characteristics:

Maize

It is expected that maize's demand not only for local people's food but also for chicken feed will increase. It is necessary to develop enough space for warehouses for maize grains for securing an adequate volume of supply of maize throughout the year for both food and feed.

Cassava

The demand for cassava is expected to continue to grow because it has a wide range of usage from food for local people to raw material for brewing and bread, feed, bio-fuel and starch for manufacturing.

Peanuts, Beans and Peas

There is a strong demand for peanuts, beans and peas (especially for haricot beans) from both domestic and international markets.

Soy Beans

Soy beans are strongly demanded not only by the international market, but also by the domestic market of Mozambique since the demand for soy beans for feed for Mozambique's poultry industry is increasing. At present, this demand is satisfied by imported soy beans.

Cashew Nuts

Mozambique's cashew nuts have price competitiveness in the international market. The factory capacity for processing cashew nuts has been increasing in Mozambique. However, the level of value added generation of domestic cashew nuts processing is much lower than overseas manufacturers. The productivity of domestic cashew nuts processing is expected to improve in Mozambique.

Vegetables

Production of vegetables, such as tomato, onion and potato, is suitable in the Nacala Corridor Region. Once the urban populations of Nacala Bay Area and Greater Nampula increase and the income level raises, vegetable consumption is expected to increase. Furthermore, tomatoes from Malawi and potatoes from South Africa currently sold in this region are to be replaced by domestically grown vegetables in Mozambique.

Sesame Seeds

Sesame seeds have a large growth potential in the international market. They also have possibility to bring larger profits to producers.

Poultry

The demand for poultry is increasing in Mozambique. To increase poultry production in Mozambique, sustainable increase of domestic feed production and supply are necessary.

(3) Agricultural Sector in Malawi

The major industry in Malawi is agriculture. Major agricultural products are tobacco, maize, tea and beans. Approximately 70% of EAP (economically active population) are engaged in the agricultural sector. Maize grown in Malawi is mainly for domestic consumption. On the other hand, Malawi has been growing its economy with its tobacco industry for a long period. Although in the recent years export of uranium has changed the monocultural structure of the national economy (the main uranium mine, Kayelekera Mine has been closed since the end of 2014), the country is still largely dependent on the tobacco industry.

At present, most tobacco leaves produced in Malawi are exported around the globe after the maturation of tobacco leaves in Johannesburg of South Africa. Johannesburg is also an exporting centre for tea for Southern Africa. Tobacco and tea leaves produced in Malawi are mostly exported from Durban Port in South Africa.

For Malawi, by importing goods through the upgraded Nacala Port and Nacala Corridor, it is expected that the transport costs for import will decrease. As a result, the prices of imported goods which used to rely on road transport would decline. Especially, once the prices of imported fuel decrease, this could become an important factor to grow Malawi's domestic economy. However, since most arable lands in Malawi have already been cultivated, decreased fuel prices may not have an impact significantly large to substantially increase agricultural production in Malawi.

(4) Agricultural Sector in Zambia

Out of Zambia's total land area of 752,000 km^2, 420,000 km^2 are areas with medium to high potential for farming. Zambia's land areas are categorized into the following three Agro-ecological Zones:

- Zone 1 (Annual Rainfall <800mm) : possibility of being affected by drought
- Zone 2 (Annual Rainfall 800-1,000mm) : maize, sugar cane, cotton and crops
- Zone 3 (Annual Rainfall >1,000mm) : late-maturing products

Zambia still has large areas of agricultural potential, which have attracted attention from China and India as a promising agricultural investment destination.

Farmers in Zambia can be categorized into the following four types:

1. Smallholders:

   Smallholders account for over 50% of GDP of the agricultural sector. 75% of farmers are categorized in this category. The size of their farm lands is 0.5-9 ha.

2. Emergent Farmers:

   Approximately 20% of farmers are categorized in this category, and the size of

their farm lands is 9-20 ha.

3. Middle-scale Farmers

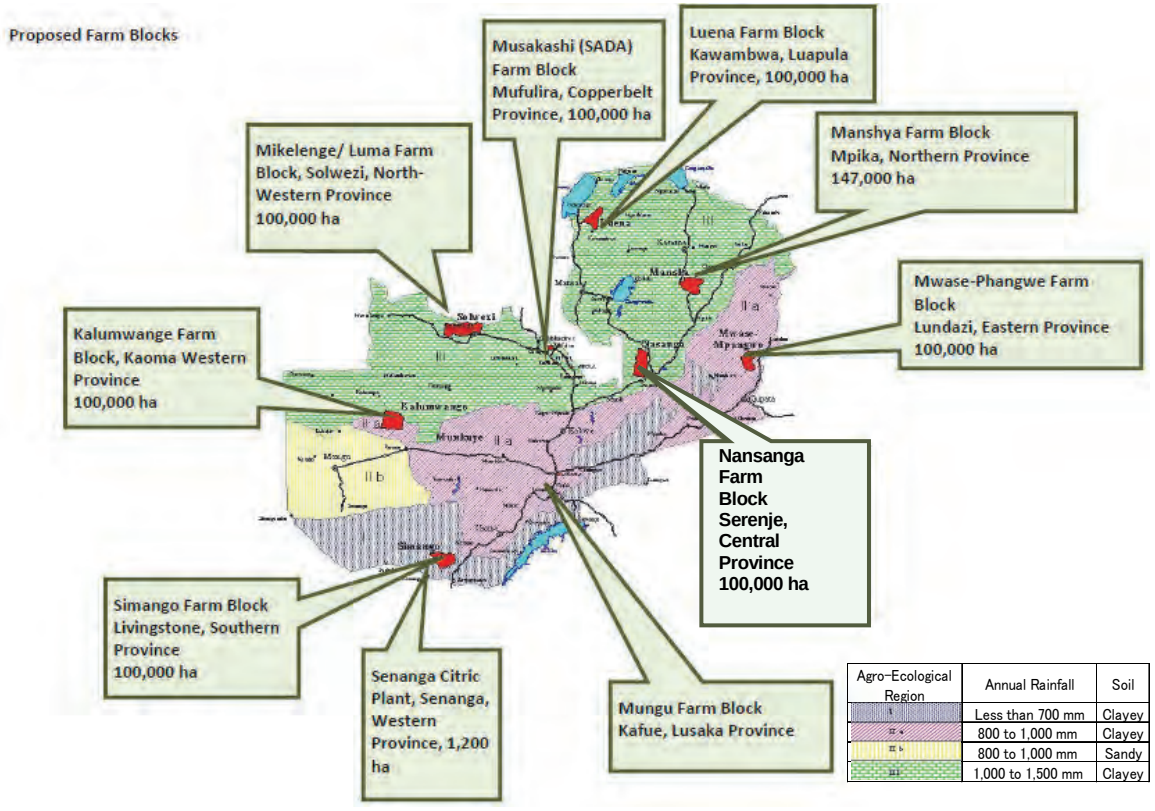
   Approximately 4% of farmers are categorized in this category, and the size of their farm lands is 20-60 ha. Emergent farmers and middle-scale farmers together account for approximately 25% of the GDP of the agricultural sector.

4. Large-scale Farmers

   Less than 1% of farmers belong to this category, and their farm lands are larger than 60 ha.

Approximately 25% of the total farmers are emergent farmers, middle-scale farmers and large-scale farmers, whose farmlands are larger than smallholders.

In Zambia, to promote commercial farming, the Government of Zambia has a policy for promoting agricultural investment and has started a land development programme, which provides investors with access-ready land called 'Farm Blocks'. Each Farm Block is approximately 100,000 ha and has been prepared to accommodate at least one large-scale farm. The programme's main objective is to export agricultural products to SADC (Southern African Development Community) countries neighbouring Zambia, but the progress of developing and utilizing Farm Blocks has been and is still limited. At present, there is no fruitful result of the Farm Blocks policy in terms of agricultural investment promotion.



Source: Zambia Development Agency, 2011, Agriculture, Livestock and Fisheries Sector Profile

Figure 6.1 Proposed Farm Blocks in Zambia

6.2 Forestry Sector: Mozambique

In 2006, the Government of Mozambique formulated an industrial tree plantation policy. Under this policy, 7 million ha of suitable land for industrial tree plantations have been identified in the provinces of Sofala, Manica, Zambezia, Nampula and Niassa. It is recommended that in the next twenty years, plantations of at least 2 million ha should be established. Niassa Province in the Nacala Corridor Region is expected to be an especially promising province for industrial plantation.

In Niassa Province, plantation business started in 2005. By 2010, 300 thousand ha of land were registered for plantation investment. Furthermore by 2012, 600 thousand ha in total were registered. These plantation areas are in Muembe District, Lichinga District, Ngauma District, Sanga District and Lago District. There are five companies currently operating and the species of the majority of trees planted until now is pine trees. The planted trees will be ready to be logged in 20-25 years. In addition to pine trees, plantation companies have business plans to start planting fast growing trees, such as eucalyptus.

By 2035, such pine plantations in Niassa Province will be able to supply logs. By 2035, 300 thousand ha of plantation lands is expected to exist including both pine and eucalyptus and approximately 2.4 million ton of wood chips per year will be transported by railway. This estimation is based on the case where logs are processed into wood chips in Niassa Province. If the logs are to be transported as raw material, the cargo amount will become larger.

However, at present, there are some issues for the development of industrial plantation. By utilizing the past experience, a sustainable operation is expected to take place in the future.

Means of Transport

- Railway is essential for transporting logs and processed wood products and pulps to the domestic and international markets from around Lichinga in the north of Niassa Province.
- The foreign private companies currently operating in Niassa Province actually started their investing in the large-scale plantation business based on the condition given by the Government of Mozambique that the railway will be rehabilitated between Lichinga-Cuamba-Nampula-Nacala.
- In March 2014, Vale started the rehabilitation work.

Wood Processing

- Due to the existence of large-scale plantation sites in Niassa Province, there is a large development potential for the wood processing industry (lumber, furniture, floor material etc.) to develop.
- There was also a plan for a foreign private company to establish a pulp factory near Lichinga, but the plan has been abandoned.

Land for Industrial Tree Plantation

- Industrial tree plantations have been taking place on a large scale by acquiring lands from local small-scale farmers. Local residents have been employed by these businesses. However, as plantation areas expanded, conflicts between plantation companies and local residents became notable. As a result, some plantation companies sold their plantations to other companies and walked away from the plantation business in Niassa Province.

- The land disputes between the plantation companies and local residents were originally caused by the land acquiring processes at the beginning of the plantation business when such processes were not yet familiar. This turned out to cause problems at a later stage. One of the plantation companies which were trying to expand their plantation lands in a short period aborted its business plan. However, since the plantation companies have accumulated know-how on land acquisition problems, it is considered that those companies will not have similar problems any longer in the future. On the other hand, for the purpose of promoting sustainable and responsible tree plantation investments, it is important for the Government to take the lead in development of methodologies in which lessons learnt could be properly accumulated and utilized.

6.3 Mining Sector

(1) Strengthening Interregional Logistics Network and Developing Value-Chain for Mining Sector

Once the region-wide freight network is established by implementing the strategies of PEDEC-Nacala with emphasis on strengthening of the multi-modal function for Mozambique's Nacala Corridor Region, Malawi and eastern Zambia, it will become easier to develop value chains for the mining sector. This is mainly due to a decrease of transport costs from coastal areas to inland areas and landlocked countries by developing transport infrastructures, such as roads and railways. Until now, damage of vehicles because of poor road and railway infrastructure, and difficulty to ensure the security of the drivers and minerals to be transported because of long transporting hours and poor telecommunication have been issues for transporting mining resources.

Based on the interregional logistics network, private sectors will be able to invest in businesses such as those below and as a result the value chains for the mining sector will be developed.

- Supplying materials (construction materials and spare parts) for mineral resources exploitation
- Development of mineral resources (in the inland area)
- Transport of mineral resources and necessary goods for resources development (mineral resources exploited from inland to port and fuel from port to mining sites)
- Power generation utilizing mineral resources (coal-fired thermal power plant)
- Processing mineral resources

(2) Mining Sector in the Nacala Corridor Region in Mozambique

The economy of Mozambique has been dependent on agriculture (over 80% of EAP are working for agriculture). Although there are many dormant natural resources, they have not been contributing to the national economy for a long time. However, due to the coal mining, large-scale infrastructure projects and trust towards private sectors in the recent years, Mozambique's GDP growth rates exceeded 7% per annum in 2013. It is considered that such large growth will continue for some years.

The mining sector's GDP has been growing at approximately 16 % per annum between 2007 and 2011. The mining sector's GDP which was MT 47 million in 2007 (2003 constant price) increased to MT 85 million in 2011 (2003 constant price).

Development of Mineral Resources

There is no special incentive for mineral resources development by foreign investment. The following mineral resources development are active in the recent years:

- Coal (Moatize and others in Tete Province)
- Natural gas (Rovuma Gas Basin off the coast of Cabo Delgado Province)
- Black sand (Angoche in Nampula Province)

Coal and gold are among promising mineral resources in the future.

Power Generation Using Mineral Resources

In a site close to Vale's Moatize coal mine, Vale has a plan to construct a coal-fired thermal power plant using fuel coal which is exploited in the Moatize mine.

Processing Mineral Resources

A phosphate rock reserve is found in Moma of Nampula Province. Vale had a plan to extract phosphate rocks in Moma and to construct a phosphoric acid processing plant in Nacala-a-Velha, using phosphate rocks from Moma. However, the phosphate rocks in Moma turned out to contain a certain substance difficult to process into phosphoric acid. As a result, Vale's plan has been aborted.

Regulatory Environment of Mineral Resources Development

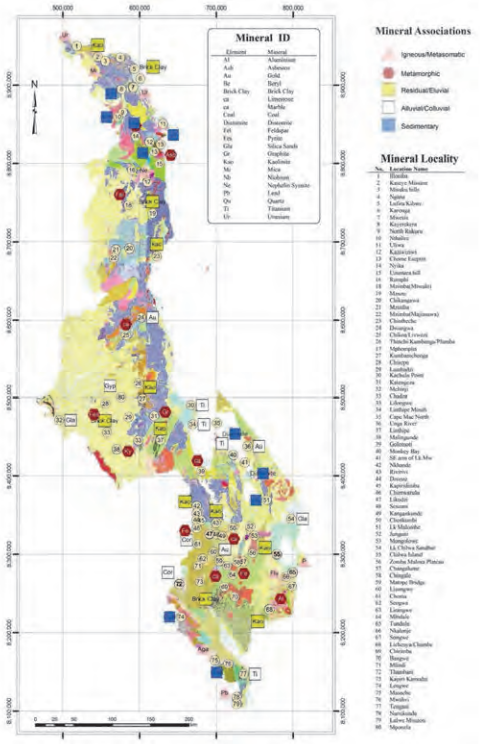
According to the present Mining Law of Mozambique, the Government owns all mineral resources. Depending on operation size, private companies are permitted to operate mineral exploitation. To get approval on exploration rights and exploitation rights, private mining operators should have partners of Mozambican companies for applying to the Ministry of Mineral Resources and Energy. Large-scale mining projects by foreign investors must also comply with individual license agreements.

In May 2014, the Government of Mozambique planned to submit a draft revised Mining Law to the council of ministers, by which the Government aimed to simplify procedures for mineral resources development. It is expected that the revised law could attract more foreign direct investments to the coal mining sector. The new Mining Law aims at changing neither royalty levels nor tax rates. It purely focuses on speeding up of mining license procedures and reducing administrative procedures for mining investment.

(3) Mining Sector in Malawi

The major economic sector of Malawi is agriculture whose major products include tobacco, sugar cane, cotton, and tea. The agricultural sector of Manawi contributed one third of Malawi's GDP. The agriculture sector also contributes 90% in terms of export value. During the period of former Mutharika President, the mining sector and tourism sector were designated as growing sectors. In fact, the Government of Malawi has made efforts at promoting the development of the mining and tourism sectors.

In 2010, uranium export increased to have a 10% share of the export income of Malawi. The share of mining sector's GDP reached 10% in 2009 as well. However, the major uranium mining site, Kayelekera Mine has stopped operating since the end of 2014, and the export of uranium has dropped to close to zero.



Distribution Map of Malawi's Mineral Resources

- Fuel Coal (Northern Malawi)
- Uranium (Northern Malawi)
- Titanic Iron (Lake side of Malawi Lake in Malawi and basin of Shire River)
- Niobium (Southern Malawi)
- Rare Earth Elements (Central Malawi)
- Bauxite (Southern Malawi at Mt. Mulange and Mt. Zomba)

Source: Sumiko Resources Exploration and Development, Project for Establishment of Integrated Geographic Information System (GIS) Database for Mineral Resources, Final Report, 2013, JICA

Figure 6.2 Distribution Map of Mineral Resources in Malawi

Mineral resources exploration and mining development for uranium, rare metal and rare earth elements are currently ongoing. As already mentioned, the new Mining Law has been formulated for improving the governance of the mining sector and promoting investment. The new law is currently under discussion.

JICA was also implementing a technical assistance project for Capacity Development in the Mining Sector from 2014 until 2018. Completion of a geochemical survey, integration of past survey data, technical support for the environment and security of artisanal and small-scale mining and long-term training of government officers at the Ministry of Mineral Resources and Energy are the major objectives of the project.

(4) Mining Sector in Zambia

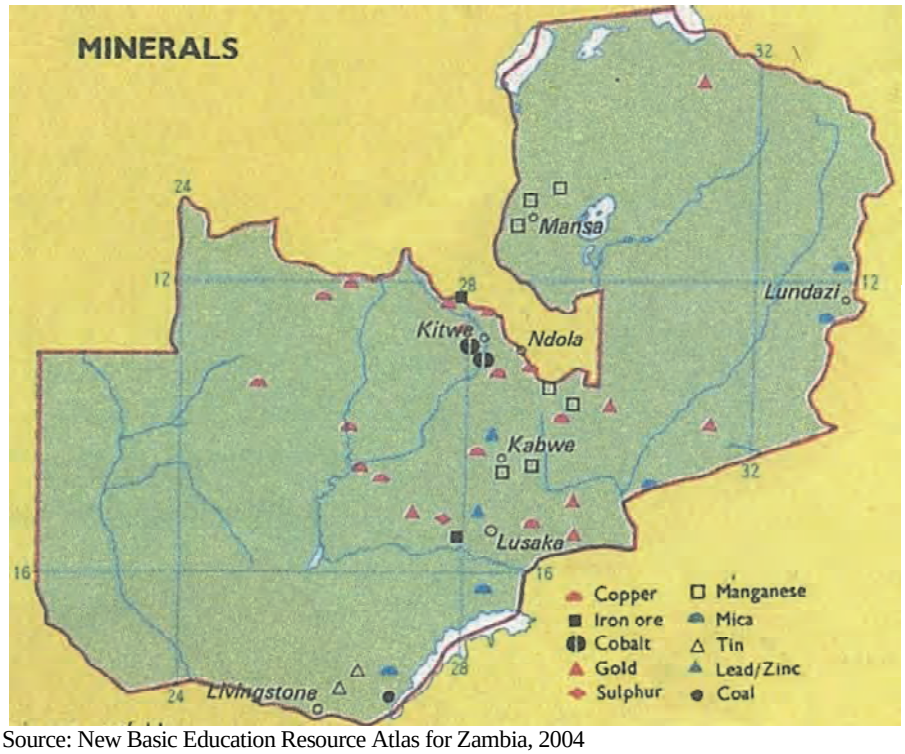
The mining sector of Zambia increasingly has attracted foreign investments in the last 20 years by privatizing the public copper mining company and introducing low tax rates. Zambia has some of the best quality copper in the world and is also the sixth largest copper producing country. There is also a copper production expansion plan, which is currently ongoing. Furthermore, the production volume is expected to increase and become the fifth largest in the world. Copper is one of the major export products of Zambia. Together with copper related products, copper's share of export value amounts to 75%. The three largest export destinations for Zambia's copper are first, Switzerland, second, South Africa and third, China.

Export products from copper are refined copper/copper alloy, copper alloy sheets, copper ore and copper wire. The total export amount was 950 thousand ton in 2010. At present, copper from

Zambia is mainly transported by truck to Durban Port and Dar es Salam Port, instead of TAZARA Railway. However, once the rehabilitation of TAZARA Railway is completed, railway transport of copper is expected to start again. On the other hand, the transport time to Nacala Port by truck is considered to be shortened greatly by road upgrading along the Nacala Corridor. Therefore, it is highly possible for the copper to be transported on the Nacala Corridor by truck in the future.

Once Chipata Station is connected with Mpika Station on the TAZARA Railway, Nacala Port will also be connected with the Copper Belt by railway. There is also a plan to transport copper from the Copper Belt to Durban Port in South Africa by railway. If Nacala Port is connected to TAZARA Railway by railway, Nacala Corridor's railway will also have the opportunity to transport copper. However, it is considered to be financially unfeasible to extend the railway in order to transport the present volume of copper exported to the Middle East and other Asian countries.

Although Zambia's coal production is the smallest in Southern Africa, coal is one of the sectors which are growing substantially. It is expected that Zambia's coal production will be larger than 2 million ton by 2017. This increase in coal produced is planned to be supplied to a coal-fired thermal power plant under construction in Maamba. It is considered to contribute to solve present power shortages.



- **Copper Ore and Cobalt** (Copper Belt, Zambia)
- **Lead and Zinc** (Kabwe, Central Zambia)
- **Gold** (Eastern and Central Zambia)

Source: New Basic Education Resource Atlas for Zambia, 2004

Figure 6.3 Distribution Map of Mineral Resources in Zambia

Chapter 7 Emerging Business Opportunities for Region-Wide Logistics in the Nacala Corridor Region

7.1 Programme for Strengthening of Multi-Modal Transport Function and Emerging Business Opportunities for Region-Wide Logistics

Business opportunities for region-wide logistics will arise in Mozambique's Nacala Corridor Region, Malawi and Eastern Zambia (covering 700 to 1,000 km from Nacala Port) by implementing projects of PEDEC-Nacala's Programme for Strengthening of Multi-Modal Transport Function, as described in Section 3.3.

Region-wide freight network businesses (see the next section) and logistics businesses, such as intermediate distribution for a particular agricultural product as part of developing value-chains for the agricultural sector are included in this business opportunity.

7.2 Business Opportunities for Supporting and Operating the Region-Wide Freight Network based on Major Transport Infrastructure

Opportunities for logistics companies will be created, as the transport infrastructures, such as ports, roads and railways as well as infrastructure for integrated transport usage are implemented. Due to the improvement of Nacala Corridor Railway and its operation, benefits, such as lower cargo transport costs, shorter delivery time and more reliable transport and lower risk of theft can be created. Additionally, road improvement will bring benefits, such as lower costs for vehicle depreciation, better fuel efficiency, fewer transport hours, less risk of vehicle accidents and improved security for transport (lower risk of theft).

The following three businesses are new opportunities which could emerge by establishing the region-wide freight network:

- Development and operation of logistics business by connecting the port and railway efficiently and operation and maintenance of port and railway infrastructure
- Development and operation business of multi-modal terminals connecting road transport and railway transport: The multi-modal terminals include cargo railway stations, warehouses and truck terminals. They are planned to be constructed in Nacala, Nampula and Cuamba.
- Development and operation business of inland container depots in Central Malawi and Eastern Zambia: The operation of the inland container depots becomes more efficient when its operation can be done in good coordination with railway operation.

Chapter 8 Conclusions and Issues

8.1 Conclusions and Issues (1): Strengthening of Multi-Modal Transport Function for Region-Wide Freight Network

For development and transporting of good quality coal from Tete Province for export, upgrading of the existing Northern Railway which goes through the Nacala Corridor, construction of new railway sections in Tete Province and Malawi and also a new railway section to the coal terminal in Nacala-a-Velha have been implemented and some of them are still ongoing. By utilizing the railway line to be upgraded for coal transport, Nacala Corridor has a high possibility to accommodate the transport demand of various goods in addition to coal.

For strengthening the region-wide freight network in the Nacala Corridor Region and neighbouring landlocked countries, it is important to improve the nodes of road transport and railway transport for collecting and distributing cargoes from region-wide areas. To put this into practice, it is necessary to implement the high priority projects of PEDEC-Nacala. See page 23 for the high priority projects.

For operating the Nacala Corridor as an international transport corridor with multi-modal function of railways, roads and ports, capacity development of the Government's regulatory body, INATTER, is necessary to guide the railway operation which is run by private companies. This is also one of the important strategies recommended by PEDEC-Nacala.

8.2 Conclusions and Issues (2): Development of Value-Chains for Agricultural Sector and Mining Sector

The Nacala Corridor with strengthened multi-modal function will be able to provide private sectors with a solid foundation for developing value-chains for the agricultural sector and mining sector in inland areas of northern Mozambique, Malawi and eastern Zambia. In other words, due to the strengthened region-wide freight network, private sectors can participate in the following businesses so as to create value chains for the agricultural sector and mining sector:

<u>Businesses related to Development of Value-Chains for the Agricultural Sector</u>

- Business for supplying material (seeds, fertilizer and agrichemical chemicals) and equipment (agricultural machines and tools) for agriculture
- Business for agricultural production
- Intermediate distribution business for agricultural products: collecting agricultural products, intermediate distribution and operating terminals
- Agro-processing industries

Businesses related to Development of Value-Chains for the Mining Sector

- Business for supplying materials necessary for mineral resources development (construction material and spare parts)
- Business for mineral resources development in inland areas
- Logistics business related to mineral resources (transporting extracted minerals from inland areas and landlocked countries to port, as well as transporting fuel from port to mining sites)
- Power generation business using mineral resources (coal fired thermal power generation plant etc.)
- Mineral resources processing industries

In the past, vehicles were badly damaged during transport between Nacala Port and inland areas, and the costs of fuel and transport were expensive due to the poorly established region-wide freight network. Additionally, the long transport time and poor telecommunication network have caused difficulty to secure the safety of cargos. However, if such a situation is improved by strengthening the region-wide freight network, value-chains for agriculture and mining could be developed by private sectors. As a result, development potentials for agriculture and mining sectors could be utilized.

8.3 Conclusions and Issues (3): Industrial Development in Nacala Bay Area

Strengthening of the multi-modal function for region-wide freight network could expand development opportunities not only for inland areas but also for landlocked countries. As a result, the catchment areas of logistics and commerce of Nacala Bay Area, the gateway to the Nacala Corridor, and Greater Nampula, the commercial and industrial centre of Northern Region, would be expanded significantly. Although the catchment areas of Nacala Port have been around 200 km from Nacala Port, they are expected to be widen up to 700-1,000 km toward inland areas when Nacala Corridor's multi-modal transport function is strengthened.

Nacala Port , a good deep port, is located in the Nacala Bay Area. Moreover, projects for rehabilitation and upgrading of Nacala Port have been under implementation. Nacala SEZ has been allocated in the adjacent area of this good natural port, Nacala Port with an ongoing rehabilitation project. Incentives such as exemption of customs duty and value added tax, and reduction of cooperate income tax are offered. However, physical capacity to accept investments and companies expanding their businesses is not adequate.

PEDEC-Nacala development strategies recommend projects to develop access roads and power supply in Nacala Bay Area. Currently studies for project preparation for access roads and power supply are being conducted. On the other hand, studies on preparation for satisfying the demand for water in the medium-term and long-term is yet to take place. For the actual production operation, upon access roads, power supply and water supply, the rights of land must be controlled and such land is most necessary. In PEDEC-Nacala development strategies, projects for both industrial park development along existing roads as short-term projects and new industrial park development as medium-term projects are both recommended.

In addition to the above, to drive forward such projects, the capacity development of GAZEDA which manages Nacala SEZ is recommended in PEDEC-Nacala development strategies. This

recommended capacity development not only supports the PR for promoting investment and administrative procedure but also improves the capacity for preparing land to accept investment.

APPENDICES

Appendix I Table of Contents of Final Study Report for PEDEC-Nacala

The Final Study Report of PEDEC-Nacala is composed of the following volumes.

- Summary
- Main Text: Volume 1
- Main Text: Volume 2
- GIS Atlas
- Sector Supporting Document

The Main Text of the Final Study Report is composed of 7 parts with 21 chapters and 5 appendices. The table of contents of the Main Report is as follows:

Main Text: Volume 2

Appendix II Future Cargo Volume of Nacala Corridor Railway

Appendix II shows the estimated future cargo volume of Nacala Corridor Railway for 10 years in the future and 20 years in the future from the present excluding the coal transport demand.

As shown in Appendix-Table 1, the estimated volume (between 2010 and 2012) of cargo transport by railway from Nacala Port to inland areas is 140 thousand ton per year and that from inland areas to Nacala Port 800 thousand ton per year. The cargo volume for the period between 2022 and 2025 by railway from Nacala Port to inland areas is estimated to increase seven times larger than the present (2010-2012) amounting to 930 thousand ton per year in 10 years, and it is estimated to increase 12 times larger than the present (2010-2012) amounting to 1.63 million ton per year in 20 years (around 2035). On the other hand, railway cargo volume from inland areas to Nacala Port will increase 15 times larger than the present in 10 years (2022-2025) amounting to 1.21 million ton per year and 39 times larger than the present amounting to 3.04 million ton per year in 20 years (2035).

Appendix-Table 1 Future Volumes of Cargo Transport on Nacala Corridor Railway

	Direction from Nacala Port to Inland Areas	Direction from Inland Areas to Nacala Port
Present（2010-2012）	137,700 ton/year	78,300 ton/year
10 years later（2022-2025）	926,000 ton/year	1,208,000 ton/year
20 years later（2035）	1,627,000 ton/year	3,040,500 ton/year

Source: JICA Study Team

Appendix-Table 2 shows all cargo volumes to be transported by railway from Nacala Port to inland areas and that from Nacala Port to Malawi. In 2014, a railway line was constructed to connect Malawi Railway to Chipata in Zambia. Furthermore, the railway between Cuamba and Lichinga is being rehabilitated. Therefore, in the future, cargoes are expected to be generated in the northern part of Niassa Province and eastern Zambia and transported to Nacala Port by railway.

Appendix-Table 2 Detail of Future Volumes of Cargo Transport on Nacala Corridor Railway

Unit: ton/year

Nacala Port to Inland				
	Direction from Nacala Port to Malawi	Direction from Nacala Port to Niassa Province	Direction from Nacala Port to Zambia Province	Total
Present (2010-2012)	137,700	-	-	137,000
10 years later (2022-2025)	753,000	89,000	84,000	926,000
20 year later (2035)	1,227,000	145,000	255,000	1,627,000
Inland to Nacala Port				
	Direction from Malawi to Nacala Port	Direction from Niassa to Nacala Port	Direction from eastern Zambia to Nacala Port	Total
Present (2010-2012)	78,300	-	-	78,300
10 years later (2022-2025)	324,000	800,000	84,000	1,208,000
20 year later (2035)	528,000	2,400,000	112,500	3,040,500

Source: JICA Study Team

It is expected that the cargo volumes from Nacala Port to Malawi will have over 70% share of the cargo volumes transported from Nacala Port to inland areas in 10 years and also 20 years. On the other hand, the cargo volumes from inland to Nacala Port are expected to grow greatly due to extracted and processed timber transported from Niassa Province to Nacala Port.

Appendix III Transport Cost Reduction

In Appendix III, transport costs from each port to major cities are estimated and compared with the values in 2013.

(1) Cuamba

The closest port from Cuamba is Nacala Port. However, due to the road condition from Cuamba to Nacala Port, Nacala Port has not always been the preferable port for Cuamba. Especially during the rainy season, road transport from Cuamba is challenging. By improving the road condition between Cuamba and Nampula by paving the road, the transport time required between Cuamba and Nacala Port would become significantly smaller. Since the transport costs are to largely decrease, there would be more who prefer to use the route between Nacala Port and Cuamba.

Appendix-Table 3 Changes in Transport Costs between Cuamba and Ports

Port	Distance (km)	Cost (US$/TEU)	Mode
Present			
Nacala Port (Mozambique)	813	$ 1,785	Road
Beira Port (Mozambique)	926	$ 2,033	Road
Future			
Nacla Port (Mozambique)	552	$1,212	Road
Beira Port (Mozambique)	926	$2,033	Road

Source: JICA Study Team

(2) Lichinga

Lichinga is located further inland from Cuamba and has been isolated for a long time because Lichinga is connected to Beira Port through Cuamba, Malawi and Tete, but not directly connected to Nacala Port at present. That is why the Lichinga area has been an expensive place in terms of prices of goods, mainly due to high transport costs between Lichinga and ports. By the operation of a railway from Nacala Port to Lichinga via Cuamba, the transport distance and time will decrease significantly, resulting in a reduction of transport costs in comparison with the present.

Appendix-Table 4 Changes in Transport Costs between Lichinga and Ports

Port	Distance (km)	Cost (US$/TEU)	Mode
Present			
Nacala Port (Mozambique)	—	—	—
Beira Port (Mozambique)	1,219	$ 2,677	Road
Future			
Nacala Port (Mozambique)	801	$1,491	Railway
Beira Port (Mozambique)	1,219	$2,677	Road

Source: JICA Study Team

(3) Blantyre

Blantyre is connected to Nacala Port by railway, but the present condition of railway line to Nacala Port is very poor. By rehabilitation and upgrade of the Nacala Corridor Railway for coal transport, general cargoes and containers will be also served by an upgraded Nacala Corridor Railway.

In the future, the preference to Nacala Port over Beira Port is expected to become stronger than it is now. As a result, cargoes currently transported to Beira Port by road or railway will gradually shift to the Nacala Corridor and Nacala Port. Furthermore, this shift will be strengthened, as the cargo volume between Blantyre and Beira Port will reach the cargo handling capacity at Beira Port.

Appendix-Table 5 Changes in Transport Cost between Blantyre and Ports

Port	Distance (km)	Cost (US$/TEU)	Mode
Present			
Nacala Port (Mozambique)	806	$1,500	Railway
Beira Port (Mozambique)	796	$ 1,750	Road
Durban Port (South Africa)	2,275	$3,030	Road
Dar es Salam Port (Tanzania)	1,786	$2,600	Road
Future			
Nacala Port (Mozambique)	801	$1,491	Railway
Beira Port (Mozambique)	796	$1,750	Road
Durban Port (South Africa)	2,275	$3,030	Road
Dar es Salam Port (Tanzania)	1,786	$2,600	Road

Source: JICA Study Team

(4) Chipata

Chipata will obtain a new alternative port access (route to Nacala Port) when Chipata is connected to Nacala Port through the Nacala Corridor Railway, which is to be upgraded for coal export from

Tete. Prior to the prospective upgrading of Nacala Corridor Railway, at present, cargoes transported from and to Chipata use Dar es Salam Port (Tanzania) and Durban Port (South Africa).

With the new railway connection, Nacala Port will become the closest seaport for Chipata, and goods currently imported to Chipata from Dar es Salam Port will be shifted to closer and cheaper transport routes to Nacala Port in the future. On the other hand, goods currently imported to Chipata from Durban Port of South Africa are considered to mostly continue to be imported from Durban Port.

Appendix-Table 6 Changes in Transport Costs between Chipata and Ports

Port	Distance (km)	Cost (US$/TEU)	Mode
Present			
Nacala Port (Mozambique)	—	—	—
Durban Port (South Africa)	2,442	$3,253	Road
Dar es Salam Port (Tanzania)	1,549	$2,255	Road
Future			
Nacala Port (Mozambique)	1,136	$2,114	Railway
Durban Port (South Africa)	2,442	$3,253	Road
Dar es Salam Port (Tanzania)	—	—	—

Source: JICA Study Team