

**Ministry of Transport,  
The United Republic of Tanzania**

**Comprehensive Transport and Trade  
System Development Master Plan  
in the United Republic of Tanzania**

– Building an Integrated Freight Transport System –

**Final Report**

**Volume 1**

**Summary**

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Note: In this study, the work for Master Plan Formulation and Pre-Feasibility Study was completed at the end of 2012 and a Draft Final Report was issued. This final report incorporates comments on the draft final report received from various concerned parties. In accordance with Tanzanian Laws, the process of Strategic Environmental Assessment (SEA) was carried out after the issuance of the Draft Final Report in order to allow for the study to be officially recognized as a Master Plan. The results of the one year SEA have been incorporated in this report. The report contains data and information available at the end of 2012 and does not reflect changes which have taken place since then, except for notable issues and those related to the SEA.

## Contents

<b>Chapter 1</b>	<b>Current Issues (Volume 2)</b> .....	<b>1</b>
1.1	Introduction .....	1
1.2	Economic Development .....	1
1.3	Ports.....	2
1.4	Roads.....	2
1.5	Railways.....	3
1.6	Other Modes and Facilities .....	3
1.7	Institutional Issues.....	4
1.8	Transport Demand Forecasting .....	4
<b>Chapter 2</b>	<b>Master Plan (Volume 3)</b> .....	<b>6</b>
2.1	Transport Network and Demand, and Moving from the Demand Forecasts to Corridor/Sector Strategies .....	6
2.2	Strategies for Freight Transport Development .....	9
2.3	Port Sector Development Strategy .....	15
2.4	Road Sector Development Strategy .....	17
2.5	Railway Sector Development Strategy.....	17
2.6	Development Strategy for Other Modes and Facilities .....	19
2.7	Institutional Development Strategy.....	20
2.8	Master Plan Projects and Priorities .....	21
2.9	Environmental and Social Considerations .....	24
<b>Chapter 3</b>	<b>Pre-Feasibility Studies (Volume 4)</b> .....	<b>27</b>
3.1	Introduction .....	27
3.2	Railway Rehabilitation.....	27
3.3	Refurbishment of Kigoma Port .....	30
3.4	Result of Scoping Study on Subjected Pre-F/S Projects .....	31

*Note: For ease of understanding, this summary volume (Volume 1) follows the structure of the overall report, covering current issues (Volume 2), the master plan (Volume 3), and pre-feasibility studies (Volume 4). Key points are in bold font to facilitate scanning of the text. Busy executive readers familiar with the current issues may wish to focus their attention on the master plan and pre-feasibility studies sections.*

## Figures

Figure 2.1	Existing Network.....	6
Figure 2.2	Future Network (2030).....	6
Figure 2.3	Freight Movement between Regions in 2010.....	7
Figure 2.4	Freight Movement between Regions in 2030.....	7
Figure 2.5	Change in the Structure of Transport Demand.....	8
Figure 2.6	Overview of Potential Growth in Transport Demand.....	8
Figure 2.7	Tanzania as a Regional Hub .....	10
Figure 2.8	Unit Cost vs. Hauling Distance, Comparison between Rail and Road Excluding Transfer Cost (Case of Hauling 345,000 Tonnes Over Varying Distances).....	12
Figure 2.9	Unit Cost vs. Total Haulage, Road and Rail (Excluding Transfer Cost).....	12
Figure 2.10	Growth of Domestic, Import/Export, and Transit Freight.....	13
Figure 2.11	Bagamoyo Development Vision.....	14
Figure 2.12	The Strategies in Relation to Goals, Measures, and Issues .....	15
Figure 2.13	Location of Berths 13 and 14 at Dar es Salaam Port.....	15
Figure 2.14	Location of Proposed New Port at Mbegani–Bagamoyo .....	16
Figure 2.15	Track Layout within Kigoma Port.....	19
Figure 2.16	Location of Priority Airports .....	19

## Tables

Table 2.1	Summary of Transport Demand Growth.....	9
Table 2.2	Increase in the Share of Central Corridor in Transporting Transit Cargo to/from Landlocked Countries.....	10
Table 2.3	Inherent Characteristics by Mode as Seen by Shippers.....	11
Table 2.4	Summary of One-Stop Border Post Development in Tanzania.....	20
Table 2.5	Development Expenditure by Sector and Timeframe (2012/13–2029/30).....	21
Table 2.6	Summary List of Master Plan Projects.....	22
Table 2.7	Development Expenditures for the Five Strategies .....	23
Table 2.8	Summary of Economic Benefits for the Central Corridor for Tanzania.....	24

## Chapter 1 Current Issues (Volume 2)

### 1.1 Introduction

- 1.1.1 It is expected that **transport demand in Tanzania will more than quadruple over the next 20 years**. How to accommodate this increase in transport demand is a pressing issue. Also, Tanzania has several international corridors connecting its east coast with neighbouring landlocked countries, and therefore **development of transport infrastructure has a great impact not only on the Tanzanian economy but also on economies elsewhere in East Africa**.
- 1.1.2 Thus, Tanzania's Ministry of Transport (formerly the Ministry of Infrastructure Development) requested support from the Government of Japan to (i) prepare a comprehensive transport plan to streamline the countrywide freight transport system, and (ii) conduct (pre)feasibility studies to develop necessary transport and trade systems.
- 1.1.3 This study was officially launched by the Japan International Agency (JICA) on 12 August 2011 and the first study team members arrived in Tanzania on 16 August 2011. The study was completed in February 2013, except for the Strategic Environmental Assessment, which will be completed later in 2013.

### 1.2 Economic Development

- 1.2.1 **Tanzania is now on a path towards economic growth**, based on continuous policy efforts aimed at achieving self-reliance, structural adjustment, and poverty reduction. The national economy is growing especially through the export of mineral resources overseas and products to the neighbouring landlocked countries. Taking this opportunity, the government has embarked on the Tanzania Five-Year Development Plan 2011/12–2015/16 (FYDP I) to make the country's growth more sustainable by improving infrastructure, human resources, and the business climate. This plan will be followed by second and third five-year plans under *Tanzania Vision 2025*. **This study will thus provide timely and important input into these five-year development plans**.
- 1.2.2 **A strengthened transport network will contribute to integrating economic activities** that have been dispersed over different parts of the country. It will also contribute to tapping the country's vast cultivable lands and mineral resources. This process will result in a reduction in economic disparities especially between lagging inland areas and the advanced coastal areas, as well with neighbouring countries.
- 1.2.3 **Major projects under FYDP I would considerably change the spatial structure of the national economy** if realized as planned. Important elements include:
- Emergence of the Dar es Salaam metropolitan region as the hub of the national economy and the gateway to overseas;
  - Intensive resource-based development, particularly in the Southern Agricultural Corridor and energy/mineral development in the Mtwara region;
  - Development of the Central Corridor between Dar es Salaam and Kigoma, not only for international access but also as a major chain of domestic distribution and processing; and
  - Cross-border economic development in specific areas such as Mbeya, Kigoma, Mwanza, Arusha, and Tanga.

## 1.3 Ports

- 1.3.1 Dar es Salaam Port serves as a gateway that handles cargo not only for Tanzania but also transit cargo for neighbouring landlocked countries. The proportion of total cargo accounted for by transit cargo has been about 35%. The volume of containerized traffic handled at Dar es Salaam Port increased 3.3 times from 2000 to 2010<sup>1</sup>, from 125,000 TEUs to 410,000 TEUs. If the volume of container cargo continues to increase at a comparable rate, Dar es Salaam Port will reach its capacity over the next decade, even taking into account the construction of (new) Berths 13 and 14.
- 1.3.2 A new inland container/clearance depot (ICD) is to be constructed at Kisarawe in order to supplement the limited storage capacity for containers inside the port due to space limitations. The new ICD is expected to be linked with the existing lines of Tanzania Railway Limited (TRL) and the Tanzania Zambia Railway (TAZARA).
- 1.3.3 To cope with growing cargo traffic as manifested by the growth of containerised cargo at Dar es Salaam Port, development of a new port at Mbegani–Bagamoyo (about 75 km north of Dar es Salaam) has been proposed under a public private partnership scheme.
- 1.3.4 Marine transport on Lake Victoria is important for the trade of Uganda, which seeks to secure access to the Indian Ocean through Tanzania. Mwanza South Port had been providing a railway connection between Uganda and Tanzania with MV Umoja, a railway wagon ferry operated by Marine Services Co., Ltd. (MSCL), to Port Bell Port. Similarly, for Burundi and the Democratic Republic of Congo (DRC), Lake Tanganyika served as an important marine trading route. Kigoma Port used to load and unload significant volumes of cargo to and from the TRL railway. At present, however, because of the poor performance of TRL, both Mwanza South Port and Kigoma Port have lost their important role in international trade with the neighbouring countries. **Unless the TRL railway is revitalized, it will be highly unlikely that Mwanza Port and Kigoma Port will be able to attract transit cargo.**
- 1.3.5 Regarding domestic marine transport on the lakes of Tanzania, MSCL monopolizes scheduled services on Lake Tanganyika and Lake Nyasa. This is due to the relatively small demand for cargo and passenger transport on these lakes, which prevents the private sector from competing with MSCL. Unlike Lake Tanganyika and Lake Nyasa, **on Lake Victoria the private sector actively competes with the MSCL fleet for the transport of cargo and passengers. This is due to the relatively large traffic demand on Lake Victoria. As almost all the ships owned by MSCL are of the outdated cargo-passenger type, MSCL has been losing market share to the private sector, which is deploying roll-on/roll-off (RoRo) ships for speedy cargo loading/unloading.**

## 1.4 Roads

- 1.4.1 **Road transport is the major mode of transport carrying over 90% of passengers and over 75% of the freight traffic in Tanzania.** While many stakeholders understand the importance of better roads for improving the national economy, current data indicate that only 45% of trunk roads and 4% of regional roads are paved. Although the proportion of paved roads has increased over the years, only 77% of paved roads and only 45% of regional roads are in good condition, while 17% of unpaved (trunk and regional) roads are in poor condition. To make road transport more efficient, the

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<sup>1</sup> According to the statistics compiled by TPA, the container throughput reached to 540,000 TEU at Dar es Salaam Port in 2012.

**upgrading of existing unpaved roads to a bituminous standard is of utmost importance.**

- 1.4.2 The Government of Tanzania (GOT) is well aware of this situation and has started paving earth and/or gravel roads and rehabilitating existing surface treated roads in various locations. The sections that are mostly paved are along the east-west corridors; trunk roads in the north-south direction are not paved and are under active construction. **Pavement work should be accelerated not only along trunk roads but also along regional roads.**

## 1.5 Railways

- 1.5.1 The TRL network has a track gauge of 1,000 mm (metre gauge) and comprises 7 lines with a total length of 2,724 km. Of this network, three lines are not in operation due to damage to the track structure caused by flooding. Operating conditions on four of the lines are generally poor due to a lack of proper maintenance except the sections along which where 80 lb/yd rail has been placed. The volume of freight and passengers carried by TRL has been decreasing sharply. **While TRL carried its peak freight traffic of 1.56 million tonnes in 2003, volume decreased to 0.25 million tonnes in 2010.**
- 1.5.2 **The sharp decline** in TRL's traffic since 2003 is almost wholly attributable to **the severe shortage of locomotives** that has arisen as a result of TRL being deprived of adequate funds to purchase the spare parts needed to carry out major overhauls of the majority of its mainline and shunting locomotive fleets. **The total number of mainline locomotives owned by TRL is 44 but the average number of working locomotives is only 12** (an availability ratio of only 27.3%).
- 1.5.3 TAZARA operates a line with a track gauge of 1,067 mm (Cape gauge) running from Dar es Salaam in Tanzania to New Kapiri Moshi in Zambia, a distance of 1,860 km, 975 km of which is in Tanzania. Over the last three years, the total freight tonnage on the TAZARA Line increased from 0.38 million tonnes in 2008/09 to 0.53 million tonnes in 2010/11, which is only 45% of its peak. However, there was a substantial decrease in the number of passengers originating at both Tanzanian and Zambian stations, which is attributable to the shortage of locomotives as well as to the poor state of the passenger rolling stock.

## 1.6 Other Modes and Facilities

- 1.6.1 Air transport traffic at airports of the Tanzania Airports Authority continuously increased from 2003 to 2010, both in terms of passengers and aircraft movements, while cargo volume decreased over the period. **Air cargo tonnage decreased by 3% between 2009 and 2010. On the other hand, passenger volume increased by 108% between 2009 and 2010**, with increases in international and domestic flights by 112% and 106%, respectively. The major airports in Tanzania with the highest cargo tonnage and passenger volume in 2010 were Julius Nyerere International Airport (JNIA), Kilimanjaro International Airport (KIA), Mwanza, Arusha, and Kigoma.
- 1.6.2 **Tanzania had three long-distance pipelines** as of 2012: (i) the 1,710-km Tanzania Zambia Mafuta (TAZAMA) Pipeline transports crude oil from Dar es Salaam to the Ndola refinery terminal in Zambia; (ii) a 232-km pipeline with a submarine part transports gas from Songo-Songo Island to Dar es Salaam; and (iii) a 28-km pipeline transports gas from Mnaz Bay Field to the power generation facility in the Mtwara

region. In addition, there are **19 short-distance pipelines owned by oil marketing companies solely around Dar es Salaam** and two more are under construction.

- 1.6.3 The Tanzania Revenue Authority has been implementing a modernization programme to improve the efficiency and effectiveness of cross-border operations. The programme includes several independent projects including one-stop border posts (OSBPs), declaration system improvements, a cargo tracking system, and capacity development of clearing agents. **Targeted efficiency improvements will reduce dwell time by half at both airports and seaports by 2013.** In addition, coordinated efforts in port operations, telecommunications, bilateral negotiations with neighbouring countries, and data exchange are proving successful.

## 1.7 Institutional Issues

- 1.7.1 The **Public Private Partnership (PPP) Act came into effect in 2009.** Should another railway PPP project be implemented, the guidelines of the Act will be applied, which may be time consuming. A PPP experts group will have sufficient knowledge and experience to respond to various problems that future projects in Tanzania are likely to face.
- 1.7.2 **Different planning frameworks with varying timeframes and sector coverage tend to result in overly optimistic long-term investment plans that are well beyond the country's fiscal capacity.** While there have been attempts to bridge such financing gaps such as the Short-Term Transport Sector Investment Program, the overall fiscal planning framework needs to be further refined, with a view to clearly identifying the necessary funding for prioritized projects. The funding capability of each subsector also needs to be scrutinized, taking into account revenue-generating capacities. The financial situation varies by subsector, ranging from the relatively self-sustaining port/aviation subsectors to the almost moribund railway subsector. While the general direction over the longer term should be characterized by a greater role for the private sector as sought by the GOT, it is also important to improve the efficiency of budget execution, as well as to expand both revenue sources (through further cost recovery) and funding sources (through new financing schemes).
- 1.7.3 The Strategic Environmental Assessment (SEA) Law (CAP. 191, 2008) requires that **all master plan development studies conducted in Tanzania obtain approval from the Vice President's Office through an appropriate SEA study** and examination process.

## 1.8 Transport Demand Forecasting

- 1.8.1 In the first step of the transport demand forecasting process, an existing origin-destination (OD) matrix consisting of 34 zones—21 in Tanzania, 8 for neighbouring countries, and 5 areas integrating the rest of the world—was formulated based on bilateral trade statistics. Tanzania's imports and exports were distributed into regions by considering regional ratios of socio-economic variables. In addition, domestic freight movement was estimated referring to the surplus of production and consumption in each region, and then added to the interregional part of the OD matrix. The result of this procedure was calibrated using the results of OD interview and traffic count surveys. In order to forecast transport demand, **a future OD matrix was estimated** applying this procedure and **inputting the future socio-economic framework. This OD matrix was then distributed to corridors based on service level.**



- 1.8.2 **A roadside OD interview survey and a traffic count survey were conducted** from mid-September to the end of October 2011. A total of 3,032 interviews were completed covering about 22% of the total number of vehicles in the traffic count survey. In addition, 68 cargo owners and transport business firms in Tanzania and 68 in neighbouring countries were interviewed starting in mid-October 2011.
- 1.8.3 Preliminary analysis of freight movements in the past showed that Tanzania's **imports increased to USD 8 billion in 2010, which was 4.6 times the total in 2001**, implying an equivalent average annual growth rate of 18%. Exports increased to USD 4 billion in 2010, which was 5.3 times higher than in 2001. The annual average growth rate of freight in terms of volume between 2001 and 2010 for both imports and exports was 13%; the total volume of imports and exports in 2010 was 7.7 million tonnes and 2.1 million tonnes, respectively. The volume of transit freight was 2.8 million tonnes in 2010, registering a share of more than 20% of the total amount of freight crossing Tanzania's borders. About 90% of import freight enters at Dar es Salaam, while the share of Dar es Salaam for export freight is only 43%. The share of Namanga and Rusumo is relatively higher for imports. More than 90% of transit freight passes through Dar es Salaam and Tunduma.

## Chapter 2 Master Plan (Volume 3)

### 2.1 Transport Network and Demand, and Moving from the Demand Forecasts to Corridor/Sector Strategies<sup>2</sup>

2.1.1 The existing network is illustrated in Figure 2.1. The network in 2030 showing all network components assessed in this study is presented in Figure 2.2.



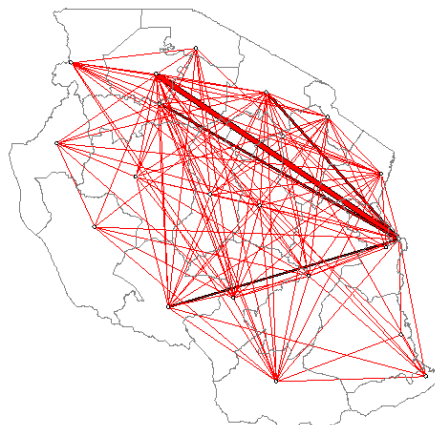
Figure 2.1: Existing Network



Figure 2.2: Future Network (2030)

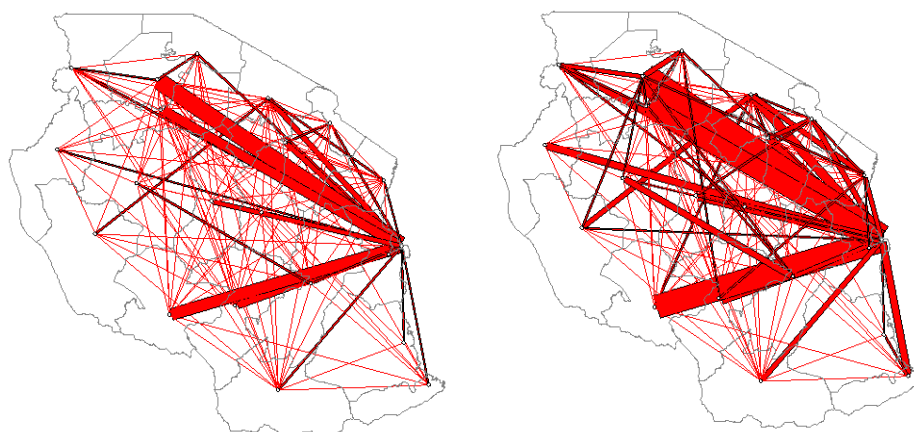
2.1.2 Transport demand patterns were analysed with 21 zones corresponding to the 21 regions of Tanzania, as well as 8 zones for neighbouring countries, and 5 for the rest of the world. Combining the results of the extensive OD survey along with other surveys and related information obtained from databases such as the United Nations Commodity Trade Statistics Database (UN Comtrade), movements of freight in 2010 were determined. Future demand was projected by assuming GDP growth rates of 5% for all countries (in the “conservative” or low growth case) and 8% for Tanzania and International Monetary Fund (IMF) estimates for other countries (in the target growth case). Figure 2.3 and 2.4 show projected movements in 2010 and estimated prospective demand in 2030 under the two cases.

<sup>2</sup> This section corresponds to Chapters 1 and 2 of Volume 3.



Source: JICA Study Team

**Figure 2.3: Freight Movement between Regions in 2010**



Source: JICA Study Team

**Figure 2.4: Freight Movement between Regions in 2030**

- 2.1.3 The transport demand projections were allocated to major corridors and modes. In that process, intermodality was taken into consideration. This process served as the basis for the strategies underlying the master plan, and the specific projects for each mode identified to materialize these strategies. Figure 2.5 and 2.6 present breakdowns of transport demand in 2010 and 2030, respectively, based on these estimations.
- 2.1.4 Overall demand for land transport, including domestic and transit demand, was estimated to increase from 37.07 million tonnes in 2010 to 284.19 million tonnes in 2030. This estimate for 2030 was allocated to two major corridors, the Central Corridor (36% of total) and the Dar es Salaam Corridor (16%), among others. Transport demand along these two corridors was further divided into road and rail (with the share of rail increasing over time), while demand among other corridors will only be for road transport.
- 2.1.5 Other than road and railway, an increase in demand of 264% was forecast for major ports (Dar es Salaam, Mwanza, and Kigoma), 402% for the three major international airports (Dar es Salaam, Kilimanjaro, and Mtwara), and 466% for the two major oil refineries (in Dar es Salaam and Mwanza, as a proxy to measure pipeline capacity).

2.1.6 These are “order of magnitude” estimates of growth in transport demand, based primarily on the preference of transporters for cost savings. These estimates may be regarded as indicative of potential growth in transport demand, and were used as an input (together with other factors) in formulating infrastructure development strategies, as well as specific projects in each subsector.

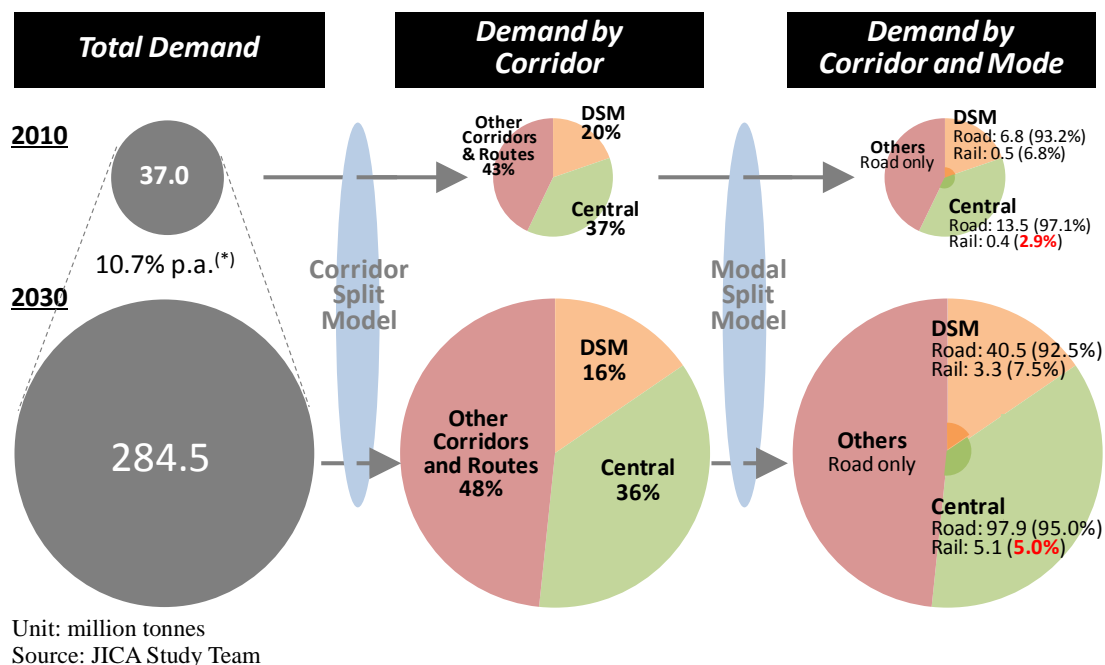


Figure 2.5: Change in the Structure of Transport Demand

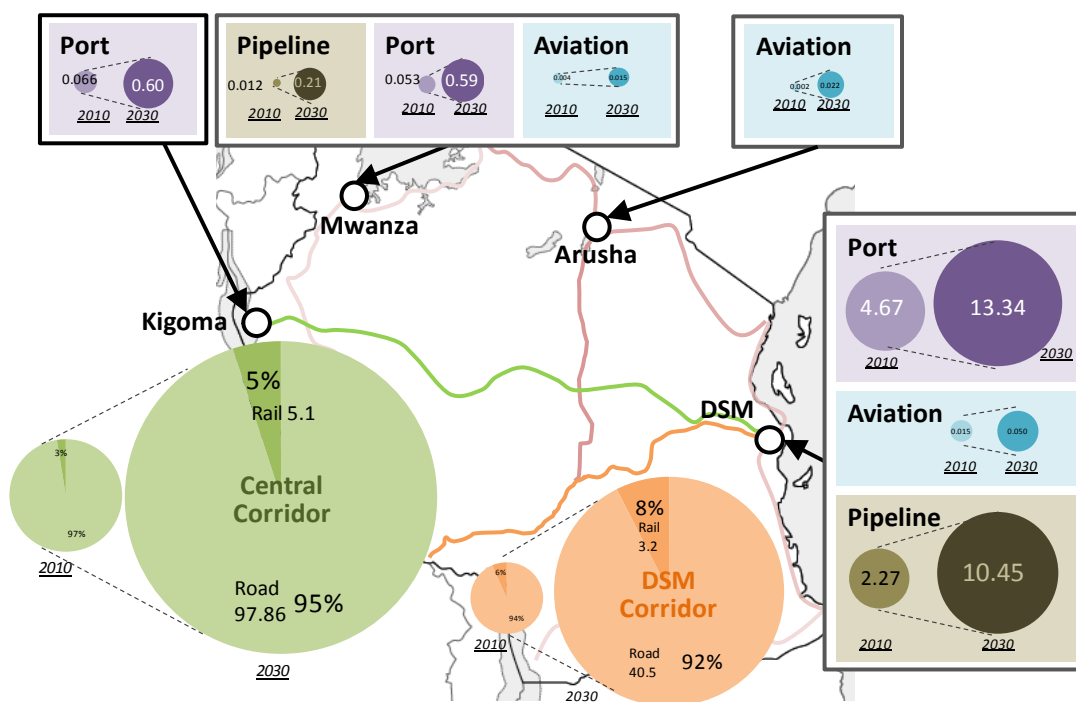


Figure 2.6: Overview of Potential Growth in Transport Demand

2.1.7 Table 2.1 summarizes demand growth between 2010 and 2030 disaggregated by corridor and mode.

**Table 2.1: Summary of Transport Demand Growth**

		Mode	2010 (mn ton)	2030 (mn ton)	2010 → 2030 (Change in mn ton)	2010 → 2030 (% Change)
Corridor	DSM	Road	6.82	40.51	33.68	594%
		Railway	0.47	3.29	2.82	695%
	Central	Road	13.52	97.86	84.34	724%
		Railway	0.35	5.14	4.79	1455%
	Others	Road	15.90	137.39	121.49	864%
	City	DSM	Port	4.67	13.34	8.67
Aviation			0.02	0.05	0.04	334%
Pipeline			2.27	10.45	8.18	460%
Mtwara		Port	n.a.	n.a.	n.a.	n.a.
		Pipeline	n.a.	0.06	n.a.	n.a.
Kigoma		Port	0.06	0.60	0.54	1000%
Arusha		Aviation	0.00	0.02	0.01	363%
Mwanza		Aviation	0.00	0.02	0.02	883%
		Pipeline	0.01	0.21	0.20	1750%
		Port	0.05	0.59	0.54	1180%

Source: JICA Study Team

## 2.2 Strategies for Freight Transport Development

2.2.1 **The goal is to establish a network that (i) stimulates the growth of various parts of Tanzania, and (ii) supports the growth of neighbouring countries as a regional hub.** This goal follows the direction of Vision 2025 for economic growth and the National Strategy for Growth and Reduction of Poverty (NSGRP, or MKUKUTA in its Kiswahili acronym). As shown in Figure 2.7, Tanzania's geographical position in the region and widely dispersed population and economic activities, which is uncommon in Africa, makes the country a perfect regional hub.

2.2.2 **To achieve the overarching goals and vision, the following five strategies were put forward** in this study:

- (i) **Strategy 1: Strengthening of International Corridors;**
- (ii) **Strategy 2: Establishing a Comprehensive Transport Network with a Balanced Modal Mix;**
- (iii) **Strategy 3: Meeting Domestic Transport Demand;**
- (iv) **Strategy 4: Alleviating Bottlenecks in the Dar es Salaam Area; and**
- (v) **Strategy 5: Establishing a Clear Regulatory/Financing Framework.**

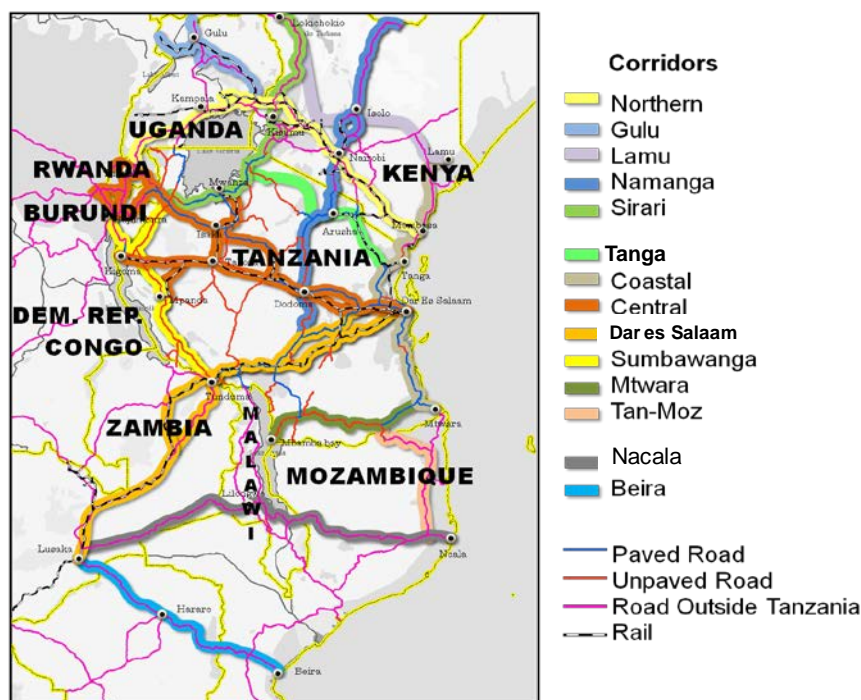


Figure 2.7: Tanzania as a Regional Hub

2.2.3 **Strategy 1: Strengthening international corridors and connections to domestic transport network.** It is important to focus on the corridors that will provide the greatest economic benefits (i.e., the Central and Dar es Salaam Corridors).<sup>3</sup> This strategy is important to establish Tanzania’s position in the global economy. For example, if all of the measures included in the master plan are implemented, a shift from competing corridors to the Central Corridor would take place as shown in Table 2.2.

Table 2.2: Increase in the Share of Central Corridor in Transporting Transit Cargo to/from Landlocked Countries

Country		Base Network		Master Plan Network	
		Northern Corridor (Kenya)	Central Corridor (Tanzania)	Northern Corridor (Kenya)	Central Corridor (Tanzania)
Uganda	Import	99.3%	0.7%	95.2%	4.8%
	Export	100.0%	0.0%	86.6%	13.4%
Rwanda	Import	42.8%	57.2%	40.8%	59.2%
	Export	81.4%	18.6%	69.4%	30.6%
Burundi	Import	9.9%	90.1%	9.3%	90.7%
	Export	62.5%	37.5%	50.7%	49.3%

Note: It is expected that an increasing amount of transit cargo to/from Zambia will divert from the Dar es Salaam Corridor to the North-South Corridor, and not pass through Tanzania.

Source: JICA Study Team

<sup>3</sup> Generally, less emphasis has been accorded corridors offering less economic benefits (e.g., the Tanga–Arusha–Musoma Corridor, considering that even under much improved conditions Tanzania can capture only a small part of Ugandan transit traffic; the Mtwara to Bamba Bay Corridor, the planned railway of which can be justified only if major exploitable and marketable minerals are found; the planned 500 km road from Tanga to Singida through the Masai Steppe, including Tanga Port, which should only be considered after 2030).

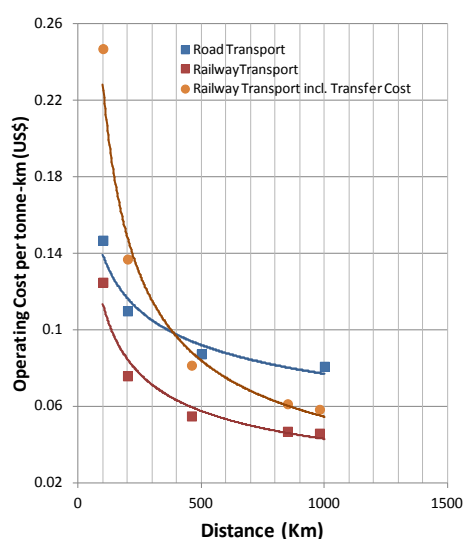
2.2.4 **Strategy 2: Developing Infrastructure of Different Modes to Achieve the Optimal Modal Shares.** Table 2.3 highlights that the choices of route (corridor) and mode are made by users (shippers) according to the inherent characteristics of each mode. Figure 2.8 shows unit transport cost per tonne-km of hauling 345,000 tonnes by railway or by road for varying distances. As distances become longer, unit cost becomes lower both for railway and road, but rail transport cost is much lower than road transport for any distance in Tanzania. Similarly, Figure 2.9 shows unit transport cost per tonne-km by railway or by road for varying total haulage amounts. Again, rail cost is much lower for any total haulage amount. To accommodate the range of tonnage in Tanzania as shown in the figures, the railway needs only the rehabilitation of rail track and rolling stock strengthening, but does not require any new construction. Considering that the cost of the existing rail track is a sunk cost and does not enter into the calculation of rail transport cost in the future, the unit transport cost of rail is lower than that of road transport even for short distances or small haulage amounts. However, for rail transport the cost of transferring cargo to/from the rail to trucks or transfer facility that carries it to the final destination or from the origin (e.g., the port) must be added. Such transfer costs per tonne-km become smaller as distance increases since a transfer takes place only at the endpoints of the transport operation. Including transfer cost the line for rail shift upward and cross with the line for road in Figure 2.8 (See blue and orange lines). It can provide railway transport for shippers at a lower cost than trucks for distances longer than 400 km in Tanzania. The general implications of this comparison are that **railways are to be preferred for long-distance traffic, roads for shorter and/or higher-value traffic, ports as gateways and transport hubs, air transport for high-value traffic, and pipelines for seeking economies of scale.**

**Table 2.3: Inherent Characteristics by Mode as Seen by Shippers**

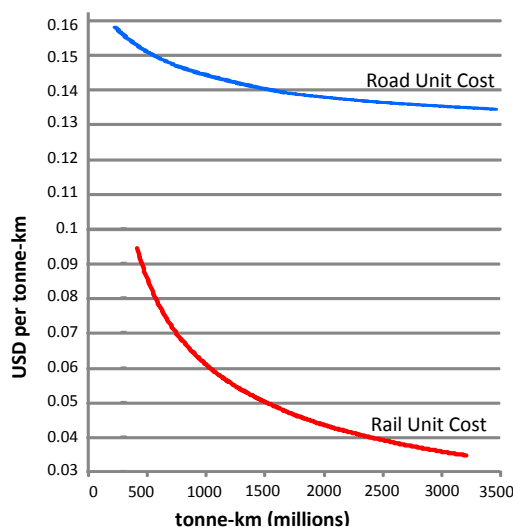
Mode	Cost	Trip Time	Consign-ment Size	Frequency	Punctuality	Trans-shipment	Damage Risk	Theft Risk
Road	High	Fast	Small	High	Low	No	High	High
Rail	Low	Slow	Large	Low	High	Yes	Low	Med
Air	Very high	Very Fast	Small	Low	Med	Yes	Low	Low
Pipeline	High	Fast	Large	High	High	Yes	Nil	Nil
Lake Shipping	Very Low	Very Slow	Large	Low	Low	Yes	Low	Med

Note: The table indicates “inherent” characteristics of each mode as compared to other modes. However, at present in Tanzania, some modes cannot provide services with the characteristics shown above. For example, conditions regarding punctuality and the risk of theft for the railway are currently not any better than that of road transport.

Source: JICA Study Team



**Figure 2.8: Unit Cost vs. Hauling Distance, Comparison between Rail and Road Excluding Transfer Cost (Case of Hauling 345,000 Tonnes Over Varying Distances)**



Note: Rail haulage is expected to reach 3.2 billion tonne-km by 2030

**Figure 2.9: Unit Cost vs. Total Haulage, Road and Rail (Excluding Transfer Cost)**

- 2.2.5 The projected increase in the railway modal share will result in a reduction in the total cost (monetary and time) of transport and a reduction in total emissions of CO<sub>2</sub> and other harmful gases.
- 2.2.6 **Julius Nyerere International Airport** is a national gateway for both passengers and freight. **No immediate expansion is necessary but a major expansion will be necessary as the national economy grows.**
- 2.2.7 **Pipelines should be constructed whenever the hauling volume justifies the shift from other modes.** The Tanzania Zambia Mafuta [TANZAMA] pipeline, used primarily for transporting crude oil to a refinery in Ndola, Zambia, will reach its capacity by 2018. Its future will have to be determined by the Governments of Tanzania and Zambia.
- 2.2.8 **Strategy 3: Meeting Domestic Transport Demand.** Planning for domestic transport movements in Tanzania is important for two reasons. First, **Tanzania's population is widely dispersed across the country**, unlike many countries where the capital city accounts for a disproportionate share of the total national population. The population of Dar es Salaam is only 7.4% of the national total and is likely to remain at around that proportion. The Mwanza region, which is located more than 1,000 km from Dar es Salaam, has a larger population than does Dar es Salaam. Out of 21 regions in Tanzania, 13 have a population more than one half of that of Dar es Salaam. This distribution of population results in greater transport demand than in a country where a relatively large proportion of the total population resides in a primate city. Second, regions that have largely been self-contained with subsistence agriculture typically require more exchanges with other parts of the country as their economy grows. Conversely, if Tanzania's transport system does not provide for adequate links between regions, the economic growth of the regions will be suppressed. This study has forecast that



domestic transport demand would grow faster than the international transport demand.

2.2.9 Figure 2.10 illustrates the growth of freight volumes for domestic, import/export, and transit demand in the case of the target GDP growth rate of 8% per annum. **Domestic demand is and will be much larger than import/export and transit demand and is expected to grow faster than transit.** The overall picture is similar for the case of the “conservative” (i.e., low) GDP growth rate of 5% per annum, although the volumes will be somewhat less.

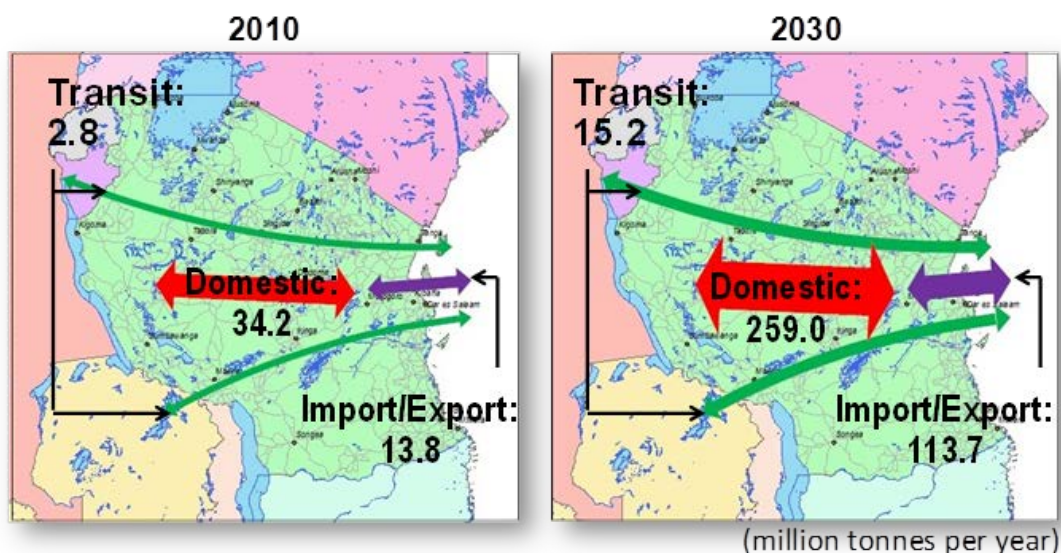


Figure 2.10: Growth of Domestic, Import/Export, and Transit Freight

2.2.10 While focusing on the improvement of road transport, as recommended in this master plan, it is important to be selective. For example, paving all trunk roads by 2018, as is currently planned, may be unrealistic and unneeded. Some trunk roads may be of doubtful economic benefit (e.g., the Mbeya–Rungwe–Manyoni Road, Rungwe–Tabora Road, and the planned Tanga–Singida Road) and need not be paved until much later, perhaps even after 2030. Accordingly, this study has been selective and strategic, sometimes deviating from official plans. The estimated USD 18.3 billion required for this master plan (about USD 1.0 billion per year over the 18-year planning horizon) is considered realistic, but it focuses on what is needed rather than what is not.

2.2.11 **Strategy 4: Alleviating Bottlenecks in the Dar es Salaam Area.** Considering the role of Dar es Salaam as a window for the rapidly expanding Tanzanian economy and the neighbouring landlocked economies, the current capacity of the city’s infrastructure, including the port and urban road network, is likely to exceed its capacity in the near future. In the **port sector**, the planned expansion of the existing Dar es Salaam Port will not be sufficient to meet forecast demand. Construction of an **alternative port or ports** must be considered. Selection of a suitable site for an alternative port and detailed planning of the port including infrastructure and supporting facilities is urgent. **Mbegani–Bagamoyo**, which has been promoted by several governmental agencies (see Figure 2.11), is a good candidate for an alternative port. Regarding the **road sector**, congestion within and around the Dar es Salaam area is already becoming a bottleneck for freight exiting Dar es Salaam. To address this issue, this master plan aims to

alleviate congestion through such measures as the widening of the existing roads and developing outer ring roads and bypasses.<sup>4</sup>

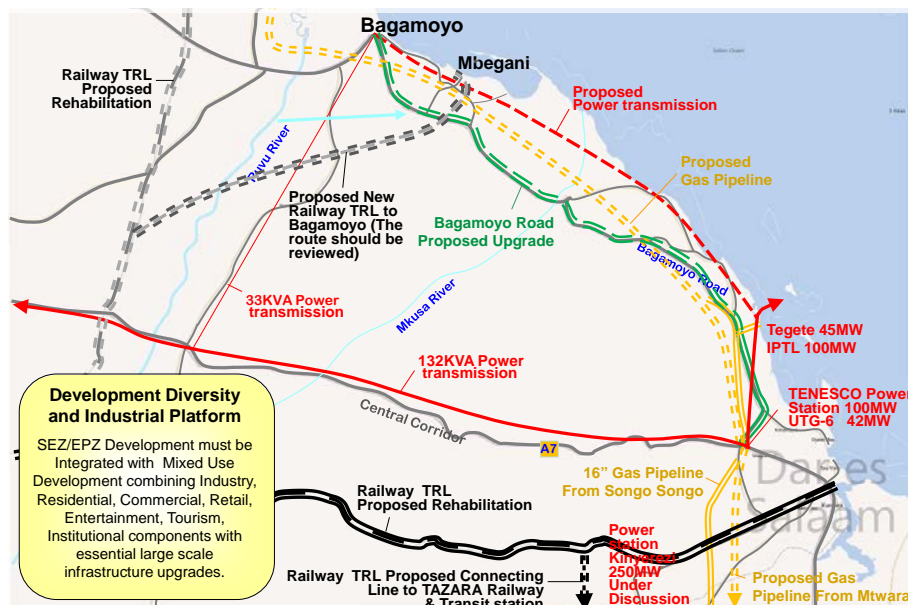


Figure 2.11: Bagamoyo Development Vision

2.2.12 **Strategy 5: Establishing a Clear Regulatory/Financing Framework.** There are three main components of the framework. First, **trade facilitation must be pursued** through streamlining clearance procedures including one-stop border posts, to overcome existing inefficiencies in cargo inspections/declarations, data tracking/sharing, and payment/ settlement of charges. Second, **private sector participation should be facilitated** in a clear and fair regulatory regime, in order to avoid another failure in PPP as seen in the case of Tanzania Railways Limited (TRL). **The government could remove itself from operations and focus on policy setting, strategic planning, and oversight.**<sup>5</sup> Third, the **fiscal framework for financing projects should be further strengthened**, through streamlining the existing multiple planning frameworks, as well as clearly identifying financing sources.

2.2.13 These **strategies, in relation to the current sectoral issues** (detailed in Sections 3 to 7) **along with the suggested measures** to address them (mainly in Section 9), are summarized in Figure 2.12. While Strategies 2 to 4 are more “**solution-oriented**” and closely relate to outstanding issues such as opportunity losses, capacity limitation, and institutional inefficiencies, Strategy 1 is “**vision-oriented**” and seeks to further strengthen the role of Tanzania as a regional transport hub. The following sections consider the relevant issues and solutions.

<sup>4</sup> The development of an outer ring road is especially important. It would connect Bagamoyo port (and a future Bagamoyo airport), Morogoro road, the Kisarawe Freight Center, Julius Nyerere International Airport, the existing port, and Kigamboni. It should be planned as a multi-lane, limited-access, grade-separated road. It could be a candidate for a privately financed toll road. The planning for this road must begin as soon as possible and the right-of-way secured considering that delays could make development of the road prohibitively expensive.

<sup>5</sup> Competition between private operators between and within modes would assist in reducing costs and increasing efficiency (high transport costs is a major impediment in the sector). For example, the Tanzania Ports Authority (TPA) is a landlord by law, but has been reluctant to let go of operations other than the container terminal. In the railway sector, the Reli Assessts Holding Company (RAHCO), which represents the Government of Tanzania as the owner the rail infrastructure, could lease out the use of tracks to private freight operators that would then compete against each other.

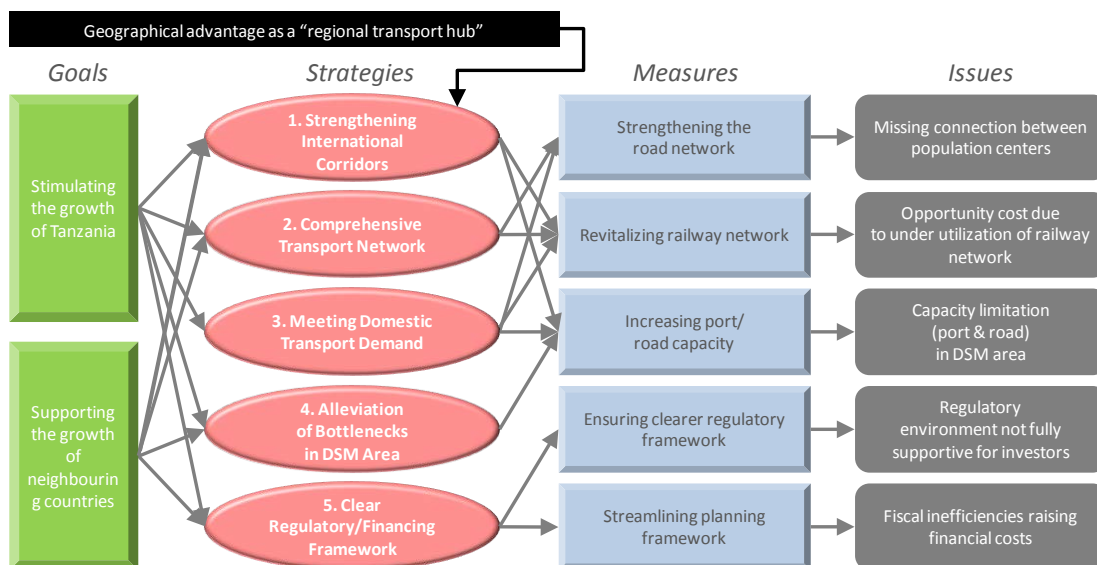


Figure 2.12: The Strategies in Relation to Goals, Measures, and Issues

## 2.3 Port Sector Development Strategy

2.3.1 Construction of new container Berths 13 and 14 (Figure 2.13) was to commence and be completed in three years once the construction's started.<sup>6</sup> **Although the annual capacity of Dar es Salaam Port will expanded to 1.2 million TEUs, it is expected that demand will exceed this capacity as early as 2018.** An inland container depot at Kisarawe should be built to support Dar es Salaam Port with its expanded capacity.



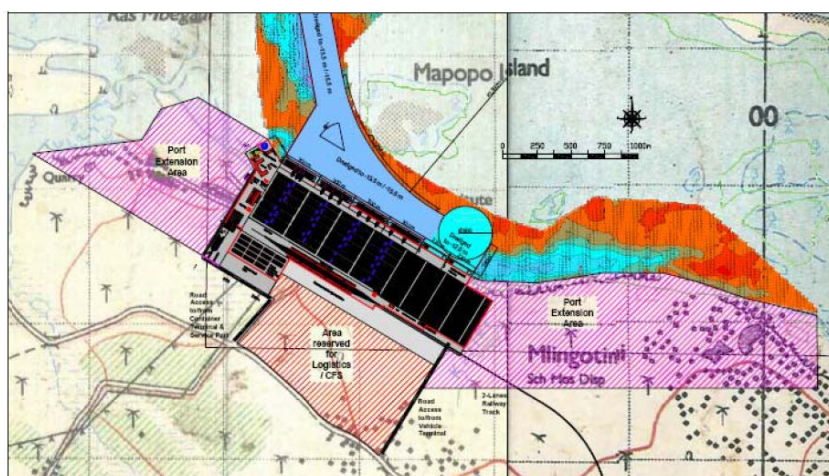
Source: Tanzania Ports Master Plan

Figure 2.13: Location of Berths 13 and 14 at Dar es Salaam Port

2.3.2 A major new port must be built to accommodate rapidly growing container traffic, which cannot be handled by Dar es Salaam Port alone. The new port should be able to accommodate larger ships, resulting in lower shipping rates. The site currently favoured

<sup>6</sup> As of February 2014, the construction of Berths 13–14 was not commenced. Regarding the other developments of Dar es Salaam Port, TPA called for EOI in April 2013 for “Strengthening and Deepening of Berths 1–7 and Construction of RoRo Berth,” Installation of Conveyor Belts for bulk cargo handling” and “Development of Bulk Liquid Custody Transfer Tank Farm at Ras Mjimwema,” all of them are to be implemented under EPC contracts.

for the new port in **Mbegani–Bagamoyo**<sup>7</sup> (mentioned above and shown in Figure 2.14) is an environmentally sensitive area. Accordingly, **the environmental impact assessment process should be initiated as soon as possible.**



Source: Final Report of the Feasibility Study for the Proposed Port at Mbegani–Bagamoyo

**Figure 2.14: Location of Proposed New Port at Mbegani–Bagamoyo**

- 2.3.3 A new port at Mwambani, to replace the congested and limited Tanga Port, is being proposed. A major expansion of **Mtwara Port**, in an area of major agricultural and natural resource potential, is also being proposed.<sup>8</sup> Both projects are worth implementing when demand justifies construction. In the latter case, offshore **gas exploration and production may force development sooner than expected.**
- 2.3.4 **For Lake Victoria** the following are the recommended strategies: (i) the Tanzania Ports Authority (TPA) to **meet the transit cargo demand to Uganda along the Dar es Salaam–Kampala International Corridor** by refurbishing Mwanza South Port<sup>9</sup>, (ii) TPA to encourage the **private sector to provide more services** to towns and villages that are not accessible by road, (iii) the Surface and Marine Transport Regulatory Authority (**SUMATRA**) to **continue regulating** lake transport to ensure navigation safety, as private sector entities may compete with each other to the extent of neglecting safety, and (iv) Marine Services Company Limited (**MSCL**) to **provide services on routes on which the private sector cannot compete.**
- 2.3.5 **For Lake Tanganyika** the following are the recommended strategies: (i) TPA to **develop Kigoma<sup>10</sup> and Kasanga** as international trade ports, (ii) TPA to **ensure lake transport as a lifeline to supply a necessary amount of consumer goods and foodstuffs for people** living on the eastern shore of the lake, and (iii) **MSCL to improve** lake transport for the convenience of people living on the **eastern shore** of the lake.

<sup>7</sup> In March 2013, Tanzania and China signed an agreement for China to finance a port and other infrastructure projects at Mbegani–Bagamoyo. TPA and Chinese counterpart are discussing the details of the port development project.

<sup>8</sup> In April 2013, TPA called for EOI for two Mtwara Port development projects, one is “Construction of Four Additional Berths” and the other is “Development of Portside (Free Port Zone),” both on BOT contract basis.” The four berths include General Cargo Berth, Oil/Gas Supply Base Berth.

<sup>9</sup> In April 2013, TPA called for EOI for the project “Modernization of Mwanza South port” on EPC contract basis. According to the TPA project information, the contractor will design and optimize the port facilities.

<sup>10</sup> In August 2013, TPA called for tenders for “Rehabilitation of Rail Mounted Gantry Crane.”

- 2.3.6 **For Lake Nyasa** the following are the recommended strategies: (i) TPA to **ensure lake transport as a lifeline to supply a necessary amount of consumer goods and foodstuffs** for people on the eastern shore of the lake, and (ii) **MSCL to improve** lake transport for the convenience of people living on the **eastern shore** of the lake.

## 2.4 Road Sector Development Strategy

- 2.4.1 The road network should be strengthened so that **by 2030, the paved portion of trunk roads will increase from 45% to 100% and that of regional roads from 4% to 45%**. Some shortcut links for the trunk road network should also be constructed so that all regional centres are connected by paved roads.
- 2.4.2 The **capacity and service level** of the road network should be improved by: (i) widening of existing trunk roads to absorb increased traffic, (ii) congestion relief in the urban road network (e.g., in Dar es Salaam), (iii) congestion relief near major cities, and (iv) provision of road service facilities along trunk roads for the convenience and comfort of drivers and the safety of traffic.
- 2.4.3 Road network development **should be coordinated with other modes** of transport through (i) coordinated development with ports and railways, (ii) construction of access roads for new development areas, and (iii) improvement of vulnerable road sections.
- 2.4.4 In addition, an **access-controlled expressway network** can be introduced within the time frame of this Master Plan. Both a nationwide expressway network plan, as well as an urban expressway network in the Dar es Salaam area, can be pursued in line with existing plans.

## 2.5 Railway Sector Development Strategy

- 2.5.1 **Railway strategy in the short term must focus on the repair and rehabilitation of the rail systems, in order to restore services to their previous level and to recapture traffic lost to roads.** Once the railway systems have restored their former service levels and have resumed traffic growth, during the medium term (2018–2022) they can begin to optimize use of track capacity and reduce unit operating costs by increasing train lengths and locomotive haulage capacities. Projects for the long term, such as the construction of new railway links (e.g., from Isaka to Rwanda and Burundi) are affected by: (i) the prospect of sufficient freight tonnages to generate sufficient net revenue to offset the associated large-scale investment; (ii) the engineering problems and costs associated with construction of new railway lines across mountainous terrain (possibly involving construction of numerous tunnels and bridges in order to maintain a ruling gradient of 1%); and (iii) consideration of a policy to construct all new lines in standard (1,435 mm) gauge.
- 2.5.2 **Construction of standard gauge track** in Tanzania would require replacement of structures at 1,600 locations for TRL alone. It would cost USD 3 million per km in flat terrain and much more in mountainous terrain, such as in the area between Isaka and Rwanda/Burundi. A rehabilitated TRL system can transport 10 million tonnes or more. In South Africa a Cape gauge line transports 88 million tonnes. Freight trains in Japan on Cape gauge run at 110–120 km/h. There is considerable potential in existing railway systems in Tanzania even without converting to standard gauge. **It makes much more sense to rehabilitate the existing rail systems in Tanzania and realize their potential instead of introducing a standard gauge system at high cost.**

- 2.5.3 Recommendations **for TRL over the short term** include: (i) improvement of existing **locomotive availability and supply**; (ii) improvement of existing **wagon availability and supply**; (iii) Central Line **track renewal and realignment** to increase service speeds; (iv) Central Line **bridge and structure rehabilitation** (Phase 1); (v) reform and improvement of **track maintenance practices and standards** (including rehabilitation of track maintenance equipment); (vi) **skills improvement** and training; and (vii) a study of rehabilitation of the Arusha Line (considering the possibility of standard gauge).
- 2.5.4 Recently, Stanbic Bank (Tanzania) and the International Commercial Bank of China (ICBC) secured syndicated financing worth USD 3 billion for Mchuchuma Iron Ore and Liganga Coal mining project in Ludewa District. Since those mining reserves are located along the planned Mtwara Line, construction of this new line may be accelerated.
- 2.5.5 Recommendations **for TRL over the medium term** include: (i) **increase in siding and train lengths** on the existing network; (ii) development of transportation nodes: railway-highway and railway port (the track layout within **Kigoma Port** is shown in Figure 2.15); (iii) completion of **track renewal and realignment** (on sections other than the Central Line); (iv) completion of **bridge and structure** rehabilitation (on sections other than the Central Line); (v) rehabilitation of the **Arusha Line**; (vi) improvement of **signaling and telecommunications system** (installation of a GPS-based system); (vii) procurement of **new locomotives** (16–18 tonne axle load) to sustain traffic growth; (viii) procurement of **new design freight rolling stock**; and (ix) **construction of a new line to Bagamoyo New Port in parallel with construction of the new port**.
- 2.5.6 Recommendations **for TRL over the long term** include: (i) procurement of new locomotives (16–18 tonnes axle load); (ii) procurement of new design freight rolling stock; (iii) construction of a new line to Rwanda and Burundi; and (iv) rehabilitation of the Arusha Line and completion of the extension plan to Musoma.
- 2.5.7 **TAZARA's** short-term business plan between 2011 and 2014 involves a doubling of freight tonnage and tonne-km and a tripling of passenger numbers and passenger-km. While rolling stock acquisition plans are essentially fully funded from own resources and the 14<sup>th</sup> Protocol with China, planned line improvement shows a funding gap of more than USD 67 million., as well as a gap of nearly USD 48 million for signaling and telecommunications. Given nominal line capacity of at least 5 million tonnes, the **short-term traffic targets are not unrealistic**.
- 2.5.8 The most likely **long-term development** (possibly after 2030) would be to **extend the TAZARA network to connect with agricultural zones between Mbeya and Lake Tanganyika**. This would require a decision of the two owners to shift TAZARA from its historical and current emphasis on transit traffic to an expanded role in the movement of traffic within Tanzania.



Figure 2.15: Track Layout within Kigoma Port

## 2.6 Development Strategy for Other Modes and Facilities

2.6.1 **Tanzania Airports Authority** has prepared a development plan for airports in Tanzania for the period from 2011/2012 to 2029/2030. Although cargo terminals do not command high priority,<sup>11</sup> the plan nevertheless lists projects for cargo handling facilities at each of the major airports under its responsibility. The first priority is given to the airports of Dar es Salaam, Kilimanjaro, and Mwanza, while the second-priority airports are Kigoma, Songwe, Mtwara, and Bagamoyo. Mwanza Airport is located in the area with the second-largest population in Tanzania but has no cargo terminal facility. The JICA Study Team prepared **preliminary requirements for a cargo terminal at Mwanza Airport**. Figure 2.16 presents a map showing the location of the priority airports.

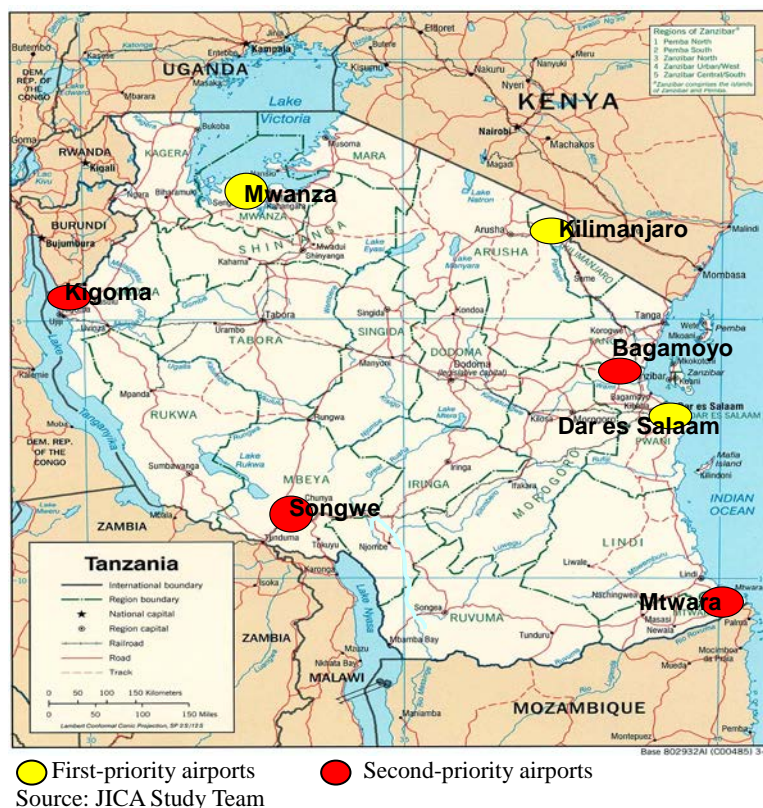


Figure 2.16: Location of Priority Airports

<sup>11</sup> Although this master planning study was focused on freight transport, it is recognized that passenger transport is of greater importance in the aviation sector.

- 2.6.2 An energy master plan was to be issued by the GOT in 2012. **Future pipeline projects will have to be in line with the master plan.** Except for the 1,710-km Tanzania Zambia Mafuta (TAZAMA) Pipeline, jointly owned by the Governments of Tanzania and Zambia, other pipelines have been constructed and are owned by the private sector. This government policy is not likely to change. Since the **TAZAMA Pipeline** will reach its capacity around 2018, a decision will soon have to be made on its **future**. A project to construct an oil refinery near Dar es Salaam and transport its products to inland population centres over long distances by pipeline is being proposed by a private concern. **New gas pipeline projects** are also being floated in relation to the recently discovered offshore gas fields. All such projects should be assessed vis-à-vis the energy master plan.
- 2.6.3 Projects to dramatically reduce nontariff barriers at international border crossings by implementing **one-stop border post (OSBPs) are underway at many border crossing points** of Tanzania. Most of them are funded by international development partners as shown in Table 2.4. It is not unrealistic to expect that the **border crossing time will be less than half of current levels** in a few years' time. Continuous efforts should be undertaken to achieve this goal in actual operations and in pursuing Strategy 1 to strengthen international corridors.

**Table 2.4: Summary of One-Stop Border Post Development in Tanzania**

	<b>Name</b>	<b>Neighbour</b>	<b>Status</b>	<b>Bilateral Agreement</b>	<b>Fund</b>
1	Sirari	Kenya	Handover of facility in October 2012	Now under preparation and to be facilitated by EAC OSBP Act	WB (USD 4 m)
2	Namanga	Kenya	USD 10 m for OSBP Part of Road Improvement Program		JICA AfDB (USD 10 m)
3	Holili	Kenya	Handover of facility in October 2012	Act	TMEA (USD 4 m)
4	Horohoro	Kenya	Handover of facility in October 2012.		WB (USD 4 m)
5	Tunduma	Zambia	Site survey and selection of consulting engineer.	Yes (June 2012)	TMEA (USD 6.5 m)
6	Kabanga	Burundi	Temporary OSBP at Kobero	Yes (October 2011)	TMEA
7	Rusumo	Rwanda	Scheduled to be completed in 2014; Three components: (1) OSBP, (2) bridge, and (3) hydropower station	Yes	JICA
8	Mutukula	Uganda	Handover of facility in October 2012	EAC OSBP Act	TMEA (USD 4 m)

Abbreviations: AfDB = African Development Bank, EAC = East African Community, JICA = Japan International Cooperation Agency, OSBP = one-stop border post, TMEA = TradeMark East Africa, WB = World Bank  
Source: JICA Study Team

## 2.7 Institutional Development Strategy

- 2.7.1 **Trade facilitation measures** are being pursued in Tanzania, particularly by the Tanzania Revenue Authority (TRA). **Work is underway to replace** the Automated System for Customs Data (**ASYCUDA**, a software package for international trade duty taxation, approval, and recording) with a New Customs Automated System. The Tanzania Ports Authority is implementing a Port Community System (PCS) and establishing a National Single Window (NSW) system. When implemented, these systems will greatly reduce the time required for shippers to go through ports and



border points. Capacity development of institutions and their officials should be undertaken at the same time.

- 2.7.2 To further encourage **private sector participation**, the regulatory structure and incentive mechanisms need to be further refined to clearly identify the role of the private sector, with public support for the parts that are not commercially viable. The government could remove itself from operations and focus on policy setting, strategic planning, and oversight.<sup>12</sup> In identifying such areas for private sector participation, it is important to consider infrastructure development within the bigger picture of the national/regional economic development through close cooperation across ministries. To attract more investment from outside, it is also recommended that the remaining regulatory/administrative ambiguities be removed for export processing zone/special economic zone (EPZ/SEZ) operations (e.g., foreign ownership, profit repatriation).
- 2.7.3 To ensure the **financial viability** of this master plan, four measures are proposed to minimize existing inefficiencies: (i) further aligning the different fiscal planning frameworks to eliminate or at least reduce overlaps and inconsistencies, (ii) carrying out additional efforts for cost recovery in each subsector, (iii) diversifying/expanding government revenue sources (e.g., better capturing of tax revenues, collecting revenues from natural resource development), and (iv) further expanding financing sources (e.g., developing investable products, providing a greater role of the private sector).

## 2.8 Master Plan Projects and Priorities

- 2.8.1 A summary of the budget needed to implement all the projects proposed in this freight transport development master plan is presented in Table 2.5. Short term refers to 2013–2017, medium term refers to 2018–2022, and long term refers to 2023–2030.

**Table 2.5: Development Expenditure by Sector and Timeframe (2012/13–2029/30)**

(1US\$ = 1,580Tsh)

Sector	Short Term			Mid Term			Long Term			Total		
	(US\$ mil.)	(Tsh bill.)	(%)	(US\$ mil.)	(Tsh bill.)	(%)	(US\$ mil.)	(Tsh bill.)	(%)	(US\$ mil.)	(Tsh bill.)	(%)
Port	854	1,349	21.8	2,263	3,575	57.9	801	1,266	20.5	3,918	6,190	100
	21.6		21	39.4		57.9	9.3		20.5	21.4		100
Road	2,711	4,283	20.1	3,171	5,009	23.6	7,577	11,971	56.3	13,458	21,263	100
	68.4		20.1	55.3		23.6	87.9		56.3	73.5		100
Rail	374	591	41.3	293	463	32.4	238	376	26.3	905	1,430	100
	9.4		41.3	5.1		32.4	2.8		26.3	4.9		100
Airport/ Air Transport	22	35	68.8	10	16	31.3	0	0	0.0	32	51	100
	0.6		68.8	0.2		31.3	0.0		0.0	0.2		100
(Sub Total)	3,960	6,257	21.6	5,736	9,063	31.3	8,616	13,613	47.0	18,313	28,934	100
(%)	100	(Short)	21.6	100	(Mid)	31.3	100	(Long)	47.0	100	(Total)	100
Rail <sup>(*)</sup>	0	0	0.0	0	0	0.0	2,100	3,318	100	2,100	3,318	100
			0.0			0.0			100			100
Pipeline	0	0	0.0	4,388	6,932	38.5	7,020	11,092	61.5	11,408	18,025	100
			0.0			38.5			61.5			100

Notes: 1. (\*) Includes new railway construction between Isaka and Kigali with a branch line from Keza to Musongati.

2. Construction of a new railway line between Arusha and Musoma is not included.

Source: JICA Study Team

<sup>12</sup> Competition between private operators between and within modes would assist in reducing costs and increasing efficiency (high transport costs is a major impediment in the sector). For example, the Tanzania Ports Authority (TPA) is a landlord by law, but has been reluctant to let go of operations other than the container terminal. In the railway sector, the Reli Assests Holding Company (RAHCO), which represents the Government of Tanzania as the owner the rail infrastructure, could lease out the use of tracks to private freight operators that would then compete against each other.

2.8.2 Projects included in this master plan are listed in Table 2.6, grouped by the three planning periods of short, medium, and long term. **Each project has been evaluated in terms of economic and social/environmental impacts, along with an evaluation of the associated corridor.** The corridors are listed in accordance with the scores obtained through a separate evaluation of the nine corridors identified by the East African Community.

**Table 2.6: Summary List of Master Plan Projects**

Sector	P/J No.	Projects			Impact		Corridor								
		Short-Term	Medium-Term	Long-Term	Economic	Social/ Environmental	Central	DSM	Tanga	Sumbawanga	Coastal	Sirari	Namanga	Mtwara	Tan-Moz
Air	S15	JNIA Cargo Tmnl			C	B+	✓	✓			✓				
	S16	Mwanza AirPt Cargo Tmnl			C	A-	✓					✓			
	M14		KIA Cargo Tmnl		C	A			✓						
Inland Port	S1	Refuebish Kigoma Tmnl			C	B	✓			✓					
	S2	Community Service P/J			B	A-	✓								
	S3	Kasanga Pt (1)			A	A-			✓						
	M2		Kasanga Pt (2)		B	A			✓						
	L1			Musoma Pt Container Tmnl	C	C			✓			✓			
	L2			Kasanga Pt (3)	B-	A			✓						
Sea Port	S4	Container tmnl berths @DSM			A	C+	✓	✓			✓				
	S5	ICD @Kisarawe			C	C	✓	✓							
	M3		← Mbegani Bagamoyo Pt →		A	C	✓	✓							
	L3														
	M4		Mwambani Tanga Pt		B	C			✓						
M5		Expansion of Mtwara Pt		C	C					✓		✓			
Road	S6	Kimara-Chalinze			B+	B	✓	✓							
	S7	Widening of Bagamoyo Rd			B+	B	✓	✓							
	S8	Kibaoni-Mpanda			B+	B			✓						
	S9	Kidahwe-Kanyani-Kasulu			C	B			✓						
	S10	Mbinga-Mbamba Bay			C	B							✓		
	S11	Bagamoyo-Mlandizi			C	B	✓	✓							
	S12	Outer Ring Rd (1)			B+	C-	✓	✓			✓				
	S13	← Ubungo-N.Mandela Flyover →			A	C	✓	✓			✓				
	M11														
	M6		Chalinze-Morogoro		A	B	✓	✓							
	M7		Kibaoni-Mpanda-Kanyani		C	B			✓						
	M8		Kigoma-Nyakanazi		C	B			✓						
	M9		Kidahwe-Ilunde-Malagarasi-Kaliua		C	B+	✓								
	M10		Manyoni-Itigi-Tabora Rd		B-	B+	✓								
	M12		Outer Ring Rd (2)		B+	C	✓	✓			✓				
	L4			Kasulo-Rusumo & Bugene-Murongo Bugene-Kikagati Rd	C	B+			✓						
	L5			Tabora-Koga-Mpanda Rd	C	A-									
	L6			Chunya-Rungwa-Itigi-Mkiwa Rd	C	B+									
	L7			Bagamoyo Expwy	B+	C	✓	✓							
	L8			Urban Expwy	B+	C	✓	✓			✓				
L9			Expwy DSM-Chalinze	B+	C	✓	✓								
L10			Expwy Chalinze-Morogoro	B+	C+	✓	✓								
L11			Expwy Morogoro-Dodoma	B	B-	✓									
L12			Arusha-Moshi-Himo Junction Dual Carriageway	B-	C			✓							
Rail	S14	← Rehab/improvement of track & bridges →			C	A	✓								
	M12														
	L13														
	S14	← Rehab/improvement of track & wagons →			A	A	✓								
	M12														
	L13														
S14	← Procurement/rehabil of locos & wagons →				B	C+	✓								
M12															
L13															
M13		Bagamoyo Pt connection			B-	C	✓	✓							

Notes: 1. Project numbers correspond to those in the detailed analysis in Chapter 11 of Volume 3, with S, M, and L standing for short, medium, and long term, respectively.

2. Grades in the Impact column are based on the scoring in Chapter 11. The grades include A, A-, B+, B, B-, C+ and C.

3. For ease of interpreting the results, As in the Impact' column, as well as the checks in the top three corridors in the Corridor column are shaded dark, while Bs in the Impact column and the three second-tier corridors are shaded light.

Source: JICA Study Team

2.8.3 Considering all of these factors, the projects were grouped into four categories:

- 1) Projects with relatively **large economic and social/environmental impacts** (B or above) and, which at the same time, **are located along corridors with a higher evaluation** (i.e., the top three), can be given higher priority when allocating fiscal resources;
- 2) Projects with **large economic impact along the corridors with high evaluations, but with low social/environmental contribution** (C+ or below), need to be implemented with maximum consideration of social and/or environmental impacts; Projects with a **large social/environmental contribution along corridors with high evaluations but with low economic impact**, may require greater commitment to allocate fiscal resources to cover relatively small economic impacts; and
- 3) Projects along **second-tier corridors, but which have relatively large economic and/or social/environmental impacts**, may fall behind in terms of priority, and need to be implemented depending on the balance between fiscal and institutional capacity.
- 4) Projects along **second-tier corridors, but which have relatively large economic and/or social/environmental impacts**, may fall behind in terms of priority, and need to be implemented depending on the balance between fiscal and institutional capacity.

2.8.4 Looking at the projects based on their relevance to the five strategies detailed above, (Table 2.7)<sup>13</sup>, Strategy 3 has the largest investment, with the road sector accounting for 90.1%. This is followed by Strategy 1, of which road and seaport projects account for 54.6% and 29.6%, respectively. The third largest group is Strategy 2, of which seaport projects account for 70.0%, followed by railway projects at 17.4%. This is followed by Strategy 4, again with the road (62.8%) and seaport (28.5%) projects accounting for the majority.

**Table 2.7: Development Expenditures for the Five Strategies**

Strategy	Inland Port	Sea Port	Road	Rail	Air	Total
1 Strengthening international corridors	88	1,920	3,541	875	32	6,456
2 Establishing a comprehensive transport network	88	3,524	480	875	32	4,999
3 Meeting domestic transport demand	2	524	12,778	875	0	14,179
4 Alleviation of bottlenecks in DSM area		524	1,481	191	15	2,211
5 Clear regulatory / financing framework	1					1

Source: JICA Study Team

2.8.5 Another critical aspect in prioritizing the actions is the project timeframe. Particularly, the framework should include: (i) actual implementation of the short-term projects with immediate effects, (ii) refining the design of the medium-term projects for future implementation, and (iii) drawing up a ground design of long-term projects to facilitate future development. For (i) and (ii), project prioritization through the aforementioned scoring can be utilized as a guide in order to streamline and rationalize decision making. For (iii), not only the design of the physical infrastructure but also the institutional underpinning to facilitate the overall development process should be critical.

<sup>13</sup> The aggregate numbers for different strategies include overlapping projects; the projects classified into more than two strategies are double (or even triple) counted.

2.8.6 The Central Corridor is a critical logistics corridor in Tanzania, linking Dar es Salaam port and the neighbouring countries of Uganda, Rwanda, and Burundi. The master plan projects along the Central Corridor have significant economic implications for the region; their economic benefits have been analyzed as follows:

1. The net benefit realized from each short-, medium-, and long-term project along the Central Corridor is the net of benefits realized from time and transport cost savings and the investment costs of each project along the corridor;
2. Consumer surplus in Tanzania is the consumer surplus derived from the decrease in transport unit cost and increase in transport volume along the Central Corridor;
3. Other benefits (increased economic activity) are the benefits from the Master Plan projects along the Central Corridor other than those indicated in 1 and 2 realized in Tanzania;
4. The total impact on GDP is the increase in economic volume from the Master Plan projects attributed to the Central Corridor; and
5. Total benefits for the neighbouring countries of Uganda, Rwanda, and Burundi include the consumer and producer surplus realized from the decrease in transport unit cost and increase in transport volume.

2.8.7 The economic benefits quantified from the analysis are summarized in Table 2.8.

**Table 2.8: Summary of Economic Benefits for the Central Corridor for Tanzania**

		Million USD			
		Sum Method		NPV Method	
		2030	2050	2030	2050
<b>Tanzania</b>					
1	Net Benefit	7,563	115,858	488	2,270
2	Consumer Surplus	318	-	-	-
3	Other Benefits (Increased Economic Activity)	4,841	-	-	-
4	Total Impact on GDP	12,731	-	2,141	-
<b>Other Countries</b>					
5	Uganda Total Economic Benefits	1,926	-	-	-
6	Rwanda Total Economic Benefits	665	-	-	-
7	Burundi Total Economic Benefits	474	-	-	-

Abbreviation: GDP = gross domestic product, NPV = net present value

## 2.9 Environmental and Social Considerations

2.9.1 In accordance with the Tanzanian Strategic Environmental Assessment (hereinafter referred to as “SEA”) Regulation 2008 and other related laws and regulation, the required SEA study and procedure on the subjected Comprehensive Transport and Trade System Development Master Plan in the Republic of Tanzania was conducted from early April, 2013 to February, 2014. The Final SEA Report was submitted to the SEA Authority, the Vice President’s Office (hereinafter referred to as “VPO”) on January 6, 2014 and was finally approved by the State Minister in Charge of Environment on February 10, 2014 (see Appendix 3 of Volume 3).

2.9.2 Primarily, the SEA Study was conducted based on the scope and TOR defined in the Final SEA Scoping Report and Final TOR Report for conducting SEA Study (hereinafter referred to as “Final SEA TOR Report”) that was approved by the major stakeholders through the first National Level Stakeholder Brainstorming Meeting held on July 18, 2013, along with official approval by VPO soon afterwards.

- 2.9.3 One of the focal contents of the Study, first of all, can be pointed out as the “Consideration of Alternatives” including consideration of zero option (no project alternative), at which 4 strategic alternatives (one alternative comprised of 5 different strategy combination) were subjected for evaluation and analysis to determine the most preferable strategic alternative. In the end, Alternative 1, comprising Strategy 1: Strengthening of International Corridors; Strategy 2: Establishing a Comprehensive Transport Network with a Balanced Modal Mix; Strategy 3: Meeting Domestic Transport Demand; Strategy 4: Alleviating Bottlenecks in the Dar es Salaam Area; and Strategy 5: Establishing a Clear Regulatory/Financing Framework, was selected as the most preferable alternative. The so called Analytic Hierarchy Process (hereinafter referred to as “AHP”) methodology was applied for its quantitative analysis, in which the 15 determined criteria for evaluation were then “weighed” (by placing more score to assumingly more important criteria amongst others) through questionnaires addressed to the stakeholders during the first national level Stakeholders’ Brainstorming Meeting, then multiplied by the scoring result of pairwise comparison of scientifically assessed degree of impact of assumed environmental, social and economic impact items (by Transport Mode-wise assessment) (in which higher score was given to less degree of impact alternatives, and of which figures were then normalized – for details pls. check item 10.3.3, 10.3.7 and item 10.4) and were added together as the final score. Alternative 1 described above achieved the highest score, and therefore was selected as the most preferable alternative.
- 2.9.4 The second most important content and findings of the Study can be pointed out as the result of the evaluation of assumed environmental and social impact and mitigation measures to counter measure those impacts. Based on the requirement set under the Third Schedule of the SEA Regulation 2008, along with the specific request raised by numerous stakeholders who attended the second national level Stakeholder Meeting held on October 1, 2013, and also the opinion of the Ministry of Transport (hereinafter referred to as “MOT”), VPO and the facilitator who facilitated the Meeting, the assumed impact “areas” were identified. Their assumed degree of impact was evaluated by showing the result of the assessment with the scores –3 to +3 (in which –3 represents assumed “significant” negative impact which requires the most caution).
- 2.9.5 As such, the focal issue here can be pointed out as the assumed “significant” negative impacts and areas of their impacts that were identified and estimated based on numerous areal quantitative data of related indicators and qualitative information. Along with the identified names of such “areas” (such as names of urban areas, lake districts, coastal areas, etc.), corresponding names of related planned projects under the subjected Master Plan were presented. Recommended mitigation measures to countermeasure each anticipated impacts (especially at those locations of assumed “significant” impact; for details, pls. see item 10.4.2), should thus be applied for implementing the subjected Master Plan.
- 2.9.6 Likewise, a corresponding “Monitoring Plan” was formed (see Appendix 22 within the attached SEA Final Report – Appendix 3 of Volume 3), also to be applied for the subjected Master Plan. Monitoring activity should be implemented at each phase of the Master Plan and should focus on monitoring those assumed “significant” impacts because even if they may not lead to great issues of concern before and during construction, they could result in lack of sustainability of environmental, social and economic aspects of those specific areas later on after operation. In reference to the environmentally advanced EU SEA Directive, existing monitoring stations regularly monitored by related authorities should also be fully utilized in gaining the required

monitoring data for MOT – the sector Ministry in charge of this subjected Master Plan – to save monitoring cost.

- 2.9.7 Finally, on top of all the SEA outcomes mentioned above, the conditions for implementing the subjected Master Plan must also incorporate the supplementary conditions revealed by the State Minister in Charge of Environment upon approval of the Final SEA Report (see Appendix 3 of Volume 3).

## Chapter 3 Pre-Feasibility Studies (Volume 4)

### 3.1 Introduction

3.1.1 In selecting the pre-feasibility studies, a combination of the following criteria was applied.

- 1) The study can be completed within the time and the budget available.
- 2) The project(s) lead the direction of freight transport development in Tanzania.
- 3) The project(s) can be implemented in the immediate future to lead the development direction.
- 4) The project(s) should be of an appropriate size, in terms of funding requirements, so that funds can be secured in a short time.
- 5) No feasibility study had yet been done.

Therefore, the resulting priority does not necessarily match with the order of urgency, especially when the similar studies are already available. The actual studies were conducted from June to September 2012.

3.1.2 The following two projects were selected as satisfying the above criteria:

- 1) **Short-Term Strengthening of Tanzania Railway Limited**
  - **Rehabilitation/re-manufacturing of 17 units of Class 88 and 89 locomotives**
  - **Track rehabilitation between Tabora and Kigoma, including reinforcement or replacement of bridges and culverts**
  - **Rehabilitation of container facilities within Kigoma Port including track structure and quay**
- 2) **Refurbishment of Kigoma Port**

### 3.2 Railway Rehabilitation

3.2.1 This master planning study found that revitalization and rehabilitation of the railway system will be critical for the development of the transport and trade system in Tanzania. Among the projects planned for the revitalization of the TRL railway system, the following three were selected for pre-feasibility study as urgent projects that are recommended to be carried out in the short term:<sup>14</sup>

- Rehabilitation/re-manufacturing of diesel locomotives;
- Rehabilitation of bridges and structures between Tabora and Kigoma; and
- Rehabilitation of track structure between Tabora and Kigoma.

All three are intended for implementation during the short-term timeframe identified for the Master Plan, i.e., 2013–2017. Since they are critical for the restoration of freight transport services on the Central Line (following the failure of the concession operated by RITES<sup>15</sup> and the sharp decline in railway transport volume on the TRL network), their implementation is considered urgent.

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<sup>14</sup> The following distance are excluded from the pre-feasibility study as urgent projects because of the each reason above. 1) Dar es Salaam–Tabora: the rehabilitation has been completed. 2) Tabora–Isaka: the rehabilitation has been planned by World Bank.

<sup>15</sup> A Government of India enterprise.

The short supply of locomotives on the TRL system was identified in the Interim Report as the predominant reason for the sharp decline in rail freight transport volume, from a peak of 1.56 million tonnes in 2003 to a low of 256,200 tonnes in 2010. The severe shortage of locomotives has arisen as a result of TRL's being deprived of adequate funds to purchase the spare parts needed to carry out major "F" overhauls on its mainline and shunting locomotive fleets. As a result, TRL has had to defer overhauls for the majority of its mainline and shunting fleets, leading to unacceptably high rates of in-service failure and poor rates of availability. The lack of locomotives for revenue-earning service has in turn resulted in train cancellations and a loss of customers, many of which have had to invest in trucks in order to meet their transport needs.

3.2.2 Currently, the number of mainline locomotives available for traffic each day averages only 12 units, out of a fleet numbering 44 units (27%). In addition to this poor availability, there is an excessive rate of in-service mechanical and electrical failures, which frequently cause trains to become stranded in the middle of block sections, delaying other traffic. This then reduces the prevailing schedule speed to a level at which freight haulage capacity is severely reduced. The current schedule speed on the TRL system is only 14 km per hour, consistent with an annual freight haulage volume of no more than about 285,000 tonnes per year.

- (1) The primary purpose of this rehabilitation initiative is to channel investment into the rehabilitation of the mainline locomotive fleet, so that the supply of serviceable locomotives can be guaranteed and freight tonnages can be restored to previously achieved levels. This will be achieved in two ways: (i) through the purchase of spare parts to allow the overhaul of six Class 88 locomotives that are currently operating but in very poor condition (owing to deferred overhaul), and (ii) through the re-manufacturing of an initial batch of six Class 88 locomotives that are currently defective and out of service.
- (2) About 90% of bridges and culverts between Tabora and Kigoma were constructed 100 years ago by Germany with a design axle load of 10 tonnes or 12 tonnes. A structure condition survey carried out from 29 June to 10 July 2012 found that many of those structures are severely weathered and deteriorated already. In the case of "rolled beams encased in concrete"-type of small bridges, encased steel beams are exposed and severely corroded. Those structures judged in class D and E would be replaced. Prior to the rehabilitation of track structure, bridges and culverts would be rehabilitated or re-constructed because the construction will be difficult and more costly after new CWR (continuous welded rail) is placed.
- (3) The existing track between Tabora and Kigoma was built from 1912 to 1914 by Germany using 56.12 lb/yard rail, steel sleepers, and fish-plated rail joints. Because of the long period of usage, the rail head is worn out and many fish-bolted joints are loose already. Rehabilitation of the track of this section means the replacement of existing track structure with 80 lb/yard rail with new steel sleepers. The new 80 lb/yard rail would be welded to form CWR (continuous welded rail)

3.2.3 Considering the available time for the survey work (about two weeks), survey area (Tabora–Kigoma: 411 km), and the number of structures to be investigated (318 locations shown on the list of RAHCO), an inspection trolley was used by the survey team. Since there are six unlisted bridges/culverts on RAHCO's inventory, the actual number of structures between Tabora and Kigoma is 324. The dominant structures are "rolled beams encased in concrete" (71.6%) and "arch bridge" (13.0%). All structures



are classified into four categories: Category A: sound condition, Category B: minor repair/reinforcement required, Category C: major repair/reinforcement required, and Category D: reconstruction required. Among 324 bridges/culverts, 33 structures (10.2%) are classified as A, 46 structures (14.2%) are classified as B, the number of structures classified as C is zero, and 246 structures (75.6%) are judged in “poor condition” and require reconstruction. Considering the size of existing bridge structures, replacing those small bridges with pipe culverts or box culverts is recommended. The total number of pipe culverts will be 110 (45.1%), that of box culverts will be 127 (52.0%), steel girder bridges will be 7 (2.8%).

- 3.2.4 The whole track structure between Tabora and Kigoma would be rehabilitated. If the condition of salvaged track materials, 56.12 lb/yard rail and steel sleepers, are in good condition, those materials can be used for Mpanda Line, replacing 45 lb/yard and 50 lb/yard rails with 56.12 lb/yard rail. The heavier 88 class locomotives would then be able to go to Mpanda, instead of lighter 78 class locomotives. The salvaging of track materials would be carried out carefully not to give damage to those materials.
- 3.2.5 The total number of structures to be reconstructed between Tabora and Kigoma is 244. Because of the condition given by TRL that the train operation would not be interrupted during construction, the precast segmental method will be applied to minimize the track closure. The estimated construction cost for pipe culverts is USD 8.9 million, that of box culverts is USD 13.9 million, that of steel girder bridges is USD 37.6 million, with the total at USD 60.4 million.
- 3.2.6 The track rehabilitation project consists of: (i) procurement of track materials, i.e., BS80A LB rail, steel sleepers with accessories, and ballast material; and (ii) track re-laying works, consisting of (a) removal of the existing track materials, including salvaging and storing for re-use of those materials; (b) reformation of the track bed; and (c) laying of new track materials. The cost of track materials was estimated from previous procurement contracts, i.e., the procurement of BS80A LB Rails and Fishplates from China in 2007, and the procurement of steel sleepers with pandrol-type clips from South Africa in 2011. Assuming that construction will be carried out between 2014 and 2016, the costs of track materials in 2015 were estimated. An average inflation rate of 5% was adopted for imported materials. The estimated cost of rail and fish plates per km is USD 96,158, and that of steel sleepers and accessories per km is USD 175,674. The cost of track re-laying work between Tabora and Kigoma was estimated from an ongoing track re-laying project between Kitaraka and Malongwe section of the Central Line. The estimated cost is USD 357,222, assuming an inflation rate of 9% (2012 data). The total estimated cost per km is USD 629,054, and the estimated cost for 411 km is USD 258.5 million.
- 3.2.7 Even after RITES stopped operating the railway in August 2011, the same structure for the railway operation was continued. It seems that the GOT has not yet identified any clear ways to revitalize the railway operation. In fact, railway operation concessionaires in many countries have tried to minimize operating and maintenance costs in order to keep some profits initially. Then often the rate of accidents increases, as it did in the United Kingdom. It is unclear why the government maintains the structure of RAHCO (the asset holding company) and TRL (the operating company). If the government is looking for another concessionaire, the reasons why RITES failed should be studied carefully. If no concession is considered, the existing system should be modified to function efficiently.

3.2.8 Conclusions drawn from the financial analysis of the railway rehabilitation project include the following:

- The most critical factor for the financial viability of the project (from the operator's viewpoint) is whether the initial cost of the railway rehabilitation is to be borne by the public or not.
- If so, the project is regarded as financially viable in most of the cases, regardless of the financing structure, or the coverage of other components of the projects.
- As long as the cost for rails is fully included in the operator's burden, the project cannot provide a financial internal rate of return (FIRR) high enough to enter into a concession.
- These observations suggest that at the very least the burden of rail rehabilitation needs to be separated from the operator, and most likely financed with concessionary funds from international development partners.

### 3.3 Refurbishment of Kigoma Port

3.3.1 For the refurbishment of Kigoma Port, the following facilities need to be constructed and rehabilitated as short-term projects, based on the demand forecast and lake transport scenario discussed above:

- **Construction of the extension part of the quay facility for the container cargo.** Since the gantry crane rails are only 108 m long at present, the crane rails need to be extended to accommodate two container ships. The overall length of a container ship to carry 60 TEUs of containers is estimated to be 60 m. Since an allowance is needed at both the bow and *stern*, one container berth should be 80 m long. For two container ships, the berth length should be 160 m.
- **Refurbishment of the existing quay for the container cargo and marshalling yard (including refurbishment of train tracks).** The top portion of the cast in-site concrete piles needs to be rehabilitated to support the operation load of the 35-tonne gantry crane. Part of the stacking yard around the gantry crane also needs to be rehabilitated for smooth container handling operations. In addition, all the fenders are missing from the quay wall and the cargo ships use rubber tires to absorb the berthing energy and reduce the berthing impacts. A proper fender system must be installed to facilitate safe and faster berthing by the cargo ships. Also, minor repairs such as the top parts of 7 piles (of a total of 14 piles), the fender system, and the mooring facility were identified as needing rehabilitation in the near future for container quay operations.
- **Refurbishment of the existing yard for the container cargo marshalling yard.** Some areas of the container stacking yard need to be rehabilitated and paved for smooth container operations.
- **Handling equipment for container cargo.** Maintenance and the renewal of the handling equipment for the container cargo in Kigoma port should be considered to keep the distribution system of container cargo smooth.
- **Other Projects.** In addition to the projects identified above, the installation of light beacons on the coast and procurement of rescue boats are considered necessary for safe navigation on Lake Tanganyika.

3.3.2 Conclusions drawn from the financial analysis for the refurbishment of Kigoma Port include the following:

- For the operator, the project becomes financially viable only if it is free from the initial capital expenditures (CAPEX), at least on materials and labour and on the financing costs.
- Even in that case, the project cannot achieve the FIRR that is generally acceptable as being financially viable (15%) unless the tariff level is raised substantially (+95.0%).
- Beyond that, for the operator to be able to pay any concession fee, further increasing the tariff and/or discharging the operator of the obligation to bear the initial equipment cost, will be necessary.
- Therefore, the investment decision needs to be made based on the balance between the possibility of increasing tariffs and the allowance of the public sector side on suppressing (or totally eliminating) the concession fee, for the project to remain viable.

### **3.4 Result of Scoping Study on Subjected Pre-F/S Projects**

- 3.4.1 On the other hand, the scoping study on the subjected Pre-F/S projects planned under the Master Plan, was conducted at Kigoma, the project site of both projects subjected, from April 18 to 22, 2013. As for the Kigoma Port Rehabilitation Project, it was noted that, possible negative impact toward (1) endemic species of Lake Tanganyika of which the wharf of Kigoma Port is facing, and (2) water quality and bottom sediment quality, along with (3) the Kigoma community, including its positive impact, should be taken into account (see Table 4.1 in Chapter 4 of Volume 4). Separately, as for the Central Line Rehabilitation of Bridges and Culverts; and Track Relay in Heavier Rail (Kigoma–Tabora) Project, it was noted that (1) since the project site is close, though not within the protected area, possible impact still ought to be taken into caution, and (2) because throughout the subjected rail section, no fences are installed to avoid pedestrians to trespass into the railway reserve, appropriate mitigation measure to avoid fatal accidents from occurring should be taken into consideration. (3) Also, if installation of such fences are to be taken into consideration, then unavoidable impact towards illegally encroached farmland at both sides of the railway track, and (4) caution not to cause any impact towards the cultural heritage (Mama Katumbo) within the subjected rail section, ought to be taken into account (see, Table 4.2 in Chapter 4 of Volume 4).