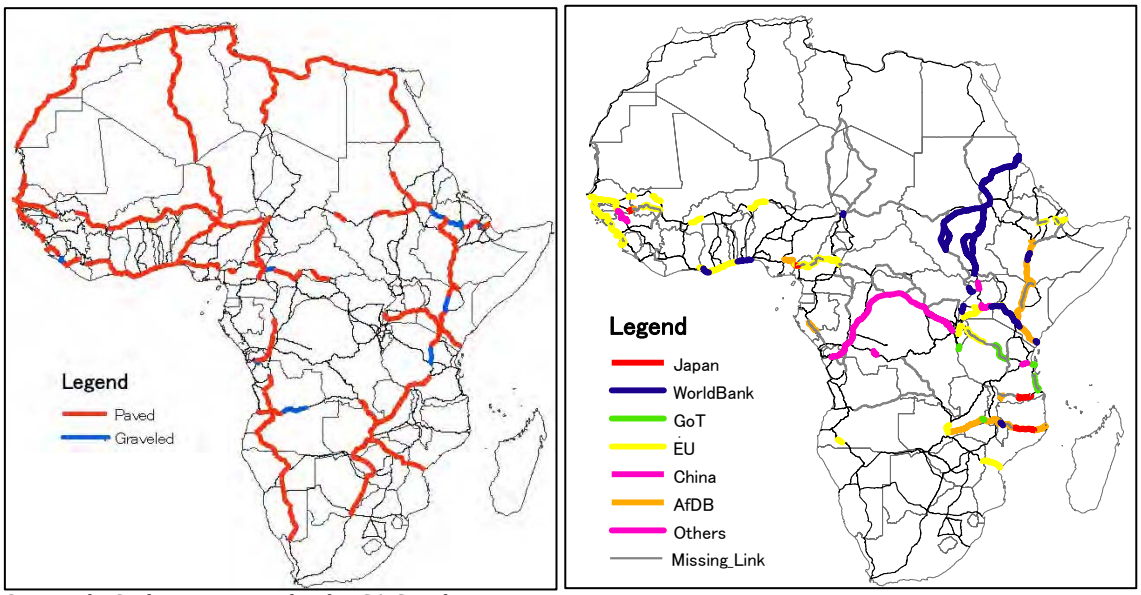


Source: The Study Team prepared with JICA Corridor Map

Figure 2.2.2 Pavement and Donor Assistances on Major Road Network

(2) International Traffic Corridor

As the necessity to develop CBTI in Africa has been recognized since at least the 1970s, several development partners prepared international corridor strategies. Regarding road sector in particular, AfDB and the World Bank have developed Sub-Saharan Africa-wide international corridor networks, and have assisted projects to improve them. Major international corridor plans are summarized below. (Although the Sub-Saharan Africa Transport Policy Program, SSATP, covers not only roads but also ports and railways, it is included in this section for convenience.)

(i) Trans-African Highway (TAH)

The Trans-African Highway (TAH), the first comprehensive regional transport network in Sub-Saharan Africa, was proposed in 1971. This corridor plan covers only road development as suggested by its name; it does not include railways or ports. However, due to funding shortages, the concept failed to receive approval by many Sub-Saharan African countries and even now is largely undeveloped. On the other hand, in 2003, the United Nations Economic Commission for Africa (UNECA) reviewed progress of TAH development, and called, together with AfDB, for development and maintenance of nine TAH routes, with funding to be provided by the countries traversed by the route. Table 2.2.1 and Figure 2.2.3 summarize the TAH route.

Table 2.2.1 Route of the Trans-African Highway

	Section	Length (Km)
TAH1	CAIRO–DAKAR	8,640
TAH2	ALGIERS–LAGOS	4,500
TAH3	TRIPOLI–WINDHOEK	9,610
TAH4	CAIRO–GABORONE	8,860
TAH5	DAKAR–N'DJAMENA	5,220
TAH6	N'DJAMENA–DJIBOUTI	4,500
TAH7	DAKAR–LAGOS	4,010
TAH8	LAGOS–MOMBASA	6,260
TAH9	BEIRA–LOBITO	3,520
Total		54,120
	(Duplicated Route	1,670)
	Total Net Length	52,450

Note: JICA, Research on Assistance for Transport Infrastructure in Africa, 2008

Source: Review of the Implementation Status of the Trans-African highways and the Missing Links, Volume 1: Main Report, 2003

Figure 2.2.3 Trans Africa Highway

(ii) SSATP Regional Economic Corridors

The SSATP (Sub-Sahara Africa Transport Policy Program) corridors include major international corridors in Sub-Saharan Africa under the SSATP established in 1987 by the World Bank and UNECA. The SSATP now encompasses 35 Sub-Saharan African countries, with funding from 11 development partners, led by the World Bank, and operated in cooperation with eight Sub-Saharan African economic communities and five international organizations (Table 2.2.2). The SSATP emphasizes development of transport corridors from each inland nation to large-scale international ports to promote trade in Sub-Saharan Africa and focuses on development of eight regional economic corridors. Meanwhile, the SSATP itself is mainly engaged in strategy formulation/research studies, policy deployment, human resources/capability development, workshops, and seminars for comprehensive improvement of transport infrastructure in the region (with an annual budget of about US$6 million from 2004 through 2011). Each development partner including the World Bank prepares its infrastructure investment program based on SSATP strategies. Table 2.2.3 summarizes major achievements of the SSATP, and Figure 2.2.4 shows the SSATP corridor network.

Table 2.2.2 SSATP Development Partners and Participating Countries

Donors (11)	World Bank (Host), Europe Committee, UNECA, AfDB, Denmark, France, Ireland, Norway, Sweden, United Kingdom, and Islamic Development Bank
Member Countries (35)	Angola, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic , Chad, Cote d'Ivoire, Congo, Democratic Rep. of Congo, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Swaziland, Tanzania, Togo, Uganda, Zambia, and Zimbabwe
RECs in Sub-Saharan Africa (8)	Communaute Economique et Monetaire de l'Afrique Centrale (CEMAC), Common Market of Eastern and Southern Africa (COMESA), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), InterGovernmental Authority on Development (IGAD), Southern African Development Community (SADC), and Union Economique et Monétaire Ouest Africaine (UEMOA)
International Agencies (5)	United Nations Economic Commission for Africa (UNECA), African Union (AU) Committee/New Economic Partnership for Africa (NEPAD), African Development Bank (AfDB), International Labour Organisation (ILO), and the United States Agency for International Development (USAID)

Source: World Bank Sub-Sahara Africa Transport Policy Program Website

Table 2.2.3 Major Achievements of the SSATP

Fields	Achievements
Road Maintenance and Operations	• Establishment of road funds in 27 countries to secure budget for road maintenance. • Establishment of road agencies/authorities in 18 countries in Sub-Saharan Africa • Capacity building of road agencies/authorities for road management and finance • Reduction in the average time for payment to contractors to 32 days from 9-12 months before
Strategy for Transport Services	• Assistance for development of regional transport policies and strategies in Malawi and Ethiopia • Studies of urban transport systems in Dakar (Senegal), Douala (Cameroon), Nairobi (Kenya), and Kampala (Uganda), focusing on institutions, finance, and regulation
Trade Promotion	• Establishment of a one-stop border post at Malaba between Kenya and Uganda (Northern Corridor) • Reduction in truck turnaround times between Mombasa and Kampala from 10 days in 1995 to 6.25 days in 2005 (Northern Corridor) • Monitoring at Beit Bridge to identify the causes for delays; sensitization process formulated through Beit Bridge action plan committee (North-South Corridor) • Establishment of one-stop border posts at Chirundu, Zambia, and development of Beit Bridge (North-South Corridor) • Establishment of corridor management group (North–South Corridor) • Completion of Dar es Salaam port security audit (North–South Corridor) • Carrying out a workshop organized by Comité International du Bassin du Congo Oubangui–Sangha (CICOS)/SSATP in October 2006, identifying for the first time many issues regarding traffic flow impediments in the Congo basin (Central African Corridor) • Establishment of a one-stop border post at Cinkansé (between Burkina and Ghana), which is under construction, and a border post at Paga (Burkina and Ghana), which has been initiated (Western Corridor) • Adoption by member states of an agreement/memorandum of understanding on the establishment of corridor management committees/groups in Western Africa (Western Corridor) • Action taken by government of Ghana to reduce the number of authorized checkpoints between the port of Tema and the border of Burkina Faso to four checkpoints (Western Corridor)
Cross-Cutting Issues	• Studies of cross-cutting issues such as gender, road safety, and job development, related to corridor development
Dissemination	• Development and provision of guidelines and tools in various sectors • Preparation of a video to promote transport policy

Source: SSATP (2007), Second Development Plan 2008–2011

Source: SSATP Working Paper No. 86 (2007), Institutional Arrangements for Transport Corridor Management in Sub-Saharan Africa

Figure 2.2.4 SSATP Corridor Network

(iii) Regional Spatial Development Initiative (SDI)

SDI is a concept that was put forward in 1996 in accordance with the industrial development strategy of South Africa. This concept is based on SADC's Development Corridor initiative and at first their targets were mainly within the SADC subregion, but later with NEPAD's intervention the coverage of SDI has been expanded and now includes not only traffic corridors (e.g., roads, railways, bridges, ports, inland waterways) but also other infrastructure (e.g., electric power facilities).

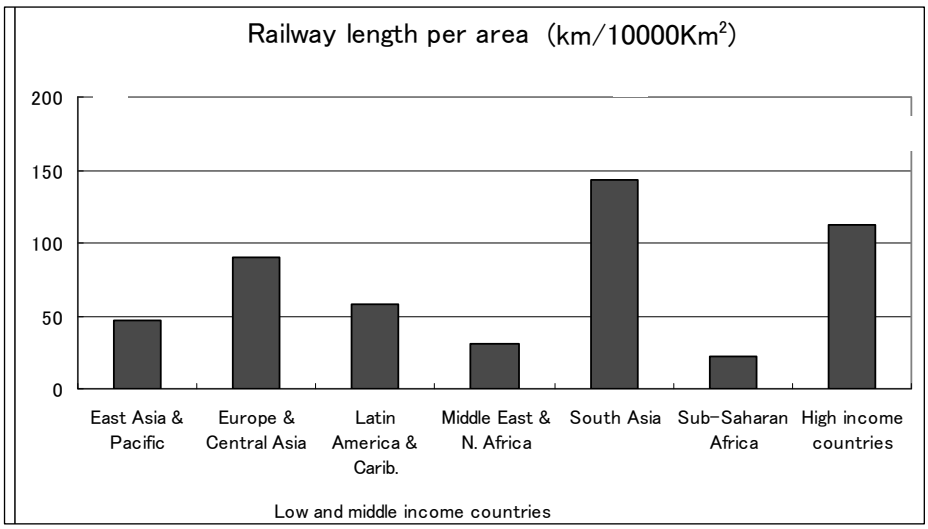
2.2.3 Railway Sector

As mentioned in the historical background, Sub-Saharan African railways were mostly developed in the colonial era to transport export goods mainly along the routes linking ports with inland areas. Total railway network length in the region is about 54,000 km, 20,000 km of

which is in South Africa. As for operations, 100,000 ton-km of the total 130,000 ton-km cargo handling are within South Africa, indicating the relative development of this sector in that country(see Table 2.2.4). Railway network density in the region is lower than elsewhere in the world, as shown in Figures 2.2.5–2.2.6.

It is generally expected that railway transport can be used such as for goods headed to inland countries or the transport of mineral resources (i.e. coal or iron ore) other than rare metals since it is economically more advantageous for longer-distance and heavier-cargo carriage than motor transport.

In recent years, the World Bank has promoted railway privatization in many countries in the region.[16] Concession schemes are in force in Tanzania, Kenya/Uganda, Cameroon, Gabon, Zambia, Zimbabwe, Mozambique, and Senegal/Mali. Railways in Djibouti/Ethiopia and the Democratic Republic of Congo are also undertaking concessions.



Source: Adapted by the Study Team from the World Bank Railway Database

Figure 2.2.5 Railway Density in the World

[16] Sub-Saharan Africa Review of Selected Railway Concessions, World Bank, 2006

Source: The Study Team based on the JICA Corridor Map Database

Figure 2.2.6 Railway Network in Africa

Table 2.2.4 Railway Routes in Sub-Saharan Africa

Country	Data Year	Gauge (mm)	Total Route km	Total Locomotives	MU Passenger Fleet	Passenger Coaches	Freight Wagons	Passenger-km (000,000)	Freight Ton-km (000,000)
Cameroun	1998	1,000	1,006						
Congo	2005	1,067	795	29		52	1,070	135	231
Cote D'Ivoire	1995	1,000	639	55	8	92	1,910	181	312
Ethiopia	1991	1,000	781	22		31	590	157	50
Gabon	2004	1,435	731	28	1	54	788	92	1,949
Ghana	2004	1,067	977	61		157		85	242
Kenya	2002	1,000	2,634	152		228	5,154	288	1,538
Malawi	1999	1,067	710					19	56
Mali	2000	1,000	734	23	1	44	501	204	279
Namibia	1995	1,067	2,382	50	0	113	1,627	49	1,082
Nigeria	2000	1,067	3,557			494	2,744	363	105
Senegal	2000	1,000	906	29	3	129	755	138	371
South Africa	2005	1,067	20,247	2,646	1,150	3,251	94,210	991	109,721
Sudan	2005	1,067	5,478	115		176	4,651	40	766
Tanzania	2006	1,000	2,722	86		134	1,828	433	1,970
TAZARA (Tanzania)	2000	1,067	1,860	75		128	2,235	518	780
Uganda	2004	1,000	259	43			1,431		218
DRC	2005	1,067	3,641	136			3,876	140	444
Zambia	1999	1,067	1,273	62		74	5,758	186	554
Zimbabwe	1997	1,067	2,759	169		282	11,385	583	4,871
Total			54,091	3,781	1,163	5,439	140,513	4,602	125,539

Source: World Bank Railway Database

Issues with the African railway network include the following:

- Many railways face serious deterioration of rolling stock and facilities, which has led to a decline in cargo traffic volume and operating speeds. As a result, existing railways have failed to serve demand.

- Although privatization initiatives (e.g., concessions) have been carried out, some problems with public-private agreements and risk sharing as well as with private operating companies' management to secure profits have resulted in the rolling stock/facility deterioration mentioned above, and have hampered smooth operations. The concession issue is detailed in Chapter 4.
- Railway gauge differs between and among regions. It is 1,067mm in the Southern African region while in East Africa, 1,000mm is used; 1,067mm, 1,000mm, and 1,435mm are all found in West Africa, strongly preventing interconnection and expansion of the railway network. In response, there is an initiative to standardize railway gauges in the region (at 1,435mm), but the feasibility of this initiative is open to question.

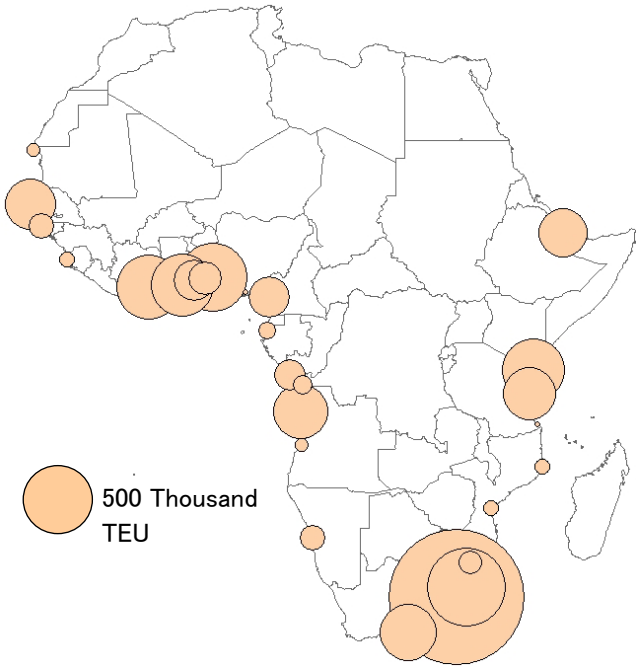
2.2.4 Port Sector

The number of international ports in Sub-Saharan Africa is small considering the geographic expanse of the region. This is partly due to natural limitations since most African coastal areas are not suitable for ports/harbors. Cargo handling volumes at major ports are shown in Figure 2.2.7 and Table 2.2.5. Annual container handling volumes are relatively large at 2.30 million TEUs at Durban, South Africa, followed by Cape Town, South Africa, with 760,000 TEUs. Ports in the 3000,000–500,000 TEU class in Sub-Saharan Africa include Port Sudan, Mombasa, Dar es Salaam, Luanda, Lagos, Accra, Abidjan d'Ivoire, and Dakar. Bulk handling volumes are also relatively large at ports in South Africa, due to heavy cargo such as iron ore and coal, which are major exports of South Africa. In addition to South Africa, Nairobi and Abidjan handle large volumes of bulk freight.

The maximum depth for container vessels at ports other than South Africa is generally less than 10m. At present, Nacala in Mozambique is the only port that can accommodate "over-Panamax" ships[17] with more than 4,000 TEU capacity used for the long route between Asia and Europe. Container ports that accommodate Panamax[18] ships (2,000 TEUs) with more than 12m depth are Port Sudan, Djibouti, Beira, Durban, Cape Town, Port Elizabeth, and Lome. The international container transport network has developed a hub-and-feeder system and at present Port Salalah of Oman, Dubai of the United Arab Emirates serve as hubs for East Africa and Durban of South Africa serves as a hub for all of entire Africa. In addition, container liners with medium-sized container ships directly connect several ports in Africa with the rest of the world through liner service.[19]

Due to the scarcity of ports, recent rapid containerization, and Africa's economic growth, many ports are flooded with cargo in volumes beyond their handling capacity, leading to long waiting times. The handling capacity of Durban Port has already reached 90% of its capacity.[20] Scarcity of port handling capacity necessarily adds to the time required for transport to the destination, leading to increased transport costs. In addition, while the size of container ships is growing, most ports in Sub-Saharan Africa cannot accommodate Panamax ships due to water depth constraints. Therefore, transshipment is required to accessing most ports in the region, which adds to transport time and costs. Port development initiatives can reduce time and cost, but it is necessary to expand cargo handling capacity and develop facilities to accommodate larger container ships.

[17] The possibility to accommodate over-Panamax ships does not depend on only depth but also many other constraints such as berth length, approach, and crane capacity. Moreover, it is commercially difficult to make a port call if the port does not generate sufficient cargo demand.
[18] Based on the maximum dimensions that will fit through the locks of the Panama Canal.
[19] For example, there are liners between Japan and Mombasa, and between China and Ghana, Togo, and Nigeria.
[20] SADC Port Authorities



World Bank: The Study Team prepared with Various Sources

Figure 2.2.7 Container Volumes of African Ports

Table 2.2.5 Cargo Volumes, Number of Berths, and Depth of Major Sub-Saharan Africa Ports

Name of Port	Country	Container Volume (TEU)	Year	Tons of Cargo (1000t)	Year	No. of Berths	No. of Container Berths	Maximum Depth for Container Vessels
Port Sudan	Sudan	326,701	2006	N/A		19	4	14
Massawa	Eritrea	24,280	2001	N/A		N/A	N/A	N/A
Djibouti	Djibouti	294,902	2007	7,502	2007	15	2	12
Mombasa	Kenya	479,355	2006	12,920	2004	18	5	10
Dar Es Salaam	Tanzania	352,548	2006	7,643	2006	11	3	11.5
Mtwara	Tanzania	5,000	2007	69	2007	N/A	N/A	9.8
Nacala	Mozambique	26,709	2001	743	2001	5	2	15
Beira	Mozambique	46,775	2004	1,367	2004	12	3	12
Maputo	Mozambique	62,516	2006	4,002	2001	14	4	10
Durban	South Africa	2,334,999	2006	29,459	2002	57	6	12.8
Cape Town	South Africa	764,753	2006	13,667	2006	34	7	14
Port Elizabeth	South Africa	407,278	2006	8,123	2006	10	1	12.2
Saldanha Bay[1]	South Africa	N/A		36,664	2005	N/A	0	(23)
Richard Bay[2]	South Africa	N/A		89,256	2006	26	0	(19)
Walvis Bay	Nambia	83,263	2006	2,419	2002	8	2	12.8
Lobito	Angola	24,000	2002	600	2002	2	N/A	10
Luanda	Angola	377,206	2006	3,000	2003	3	1	9.5
Pointe Noire	Congo,Rep.	122,600	2006	N/A		9	N/A	9.5
Libreville	Gabon	39,000		N/A		N/A	N/A	3
Douala	Cameroon	200,251	2006	N/A		13	3	9.5
Port Harcourt	Nigeria	5,000	2006	N/A		N/A	N/A	
Lagos	Nigeria	587,600	2006	N/A		34	6	10.5
Cotonou	Benin	140,500	2006	N/A		8	1	11
Lomé	Togo	215,800	2006	N/A		6	2	12
Tema & Takoradi	Ghana	476,451	2006	6,183	2000	14 7	N/A	9.6 10
Abidjan	Côte d'Ivoire	507,119	2006	15,506	2003	34	5	10.6

Name of Port	Country	Container Volume (TEU)	Year	Tons of Cargo (1000t)	Year	No. of Berths	No. of Container Berths	Maximum Depth for Container Vessels
Freetown	Sierra Leone	31,700	2006	N/A		7	2	9.9
Conakry	Guinea	85,300	2006	N/A		12	1	10.5
Banjul	Gambia	44,152		N/A		4	3	10
Dakar	Senegal	331,191		9,000	2002	47	16	10
Nouadhibou	Mauritania	21,000		N/A		N/A	N/A	8
Matadi	DRC	46,000		N/A		10	2	8.9

Source: Based on: http://www.ports.co.za/; Basic Design Study Report on the Project for Reinforcement of the Dredging Capabilities for Beira Port in the Republic of Mozambique. JICA, 2004; The Study on Urgent Rehabilitation Program of Ports in the Republic of Angola, JICA, 2006; The Development Study of Ghana Seaports in the Republic of Ghana, JICA, 2002; Research on Assistance for Transport Infrastructure in Africa, JICA, Tanzania Port Master Plan, Tanzania Ports Authority, 2008; and Guide to Port Entry, Maryland Nautical, 2008

Notes: 1.Export port for iron ore 2.Export port mainly for coal

A world trend of port management privatization in the form of public-private partnerships (PPPs) is also active in Sub-Saharan Africa and it is summarized in Table 2.2.6, which shows that privatized ports are handling cargoes more efficiently than are publicly operated ports.

Table 2.2.6 Port Efficiency and PPP in Sub-Saharan Africa

Port	Average Container Output (Moves/hour)	Operator	Equipment
Abidjan	20	PPP	gantries
Dar es Salaam	20	PPP	gantries
Douala	20	PPP	gantries
Toamasina	18	PPP	mobile crane
Djibouti	17	PPP	gantries
Durban	15	Public	gantries
Tema	14	PPP	gantries
Elizabeth	13	Public	gantries
Apapa (Lagos)	12	Recent PPP	gantries
Capetown	12	Public	gantries
Mombasa	10	Public	gantries
Dakar	10	Recent PPP	mobile crane
Maputo	10	PPP	gantries
Beira	9	PPP	gantries
Port Sudan	8	Public	gantries
Walvis Bay	8	Public	ship's gear
East London	8	Public	ship's gear
Luanda	8	Recent PPP	ship's gear
Matadi	7	Public	ship's gear
Pointe Noire	7	Public	ship's gear

Source: Ocean Shipping Consultants - AICD

Since the East African subregion has many lakes, lake transport is also frequently used to carry cargoes from an inland country to a coastal country. In areas where arterial roads are unimproved, ferries can be as effective to carry cargo from a lakeside port to a road transport terminal along a paved arterial road or a railway terminal on the other side of the lake. For example, on Lake Victoria, several railway ferry routes linking Tanzania/Kenya with Uganda were operated but the operation is now on a nonscheduled basis.

2.2.5 Civil Aviation Sector

Air transport is mainly used to export/import lightweight cargo. In Sub-Saharan Africa, it is used to export horticultural products and fresh food such as fish or carry very expensive mineral resources such as gold and diamonds. There is a case where a mining company constructed its own airport at one of its mines.

Civil aviation networks within the Sub-Saharan Africa region have been gradually become more hierarchical and, particularly, international air transport routes tend to concentrate on international hub airports such as Nairobi, Addis Ababa, Johannesburg, and Abidjan. Cargo handling volumes at Johannesburg and Nairobi are particularly large. In addition to the above-mentioned international hub airports, Accra and Entebbe handle a relatively large volume of cargo (Table 2.2.7).

Table 2.2.7 Cargo Volumes of Major Airports in Sub-Saharan Africa

Airport	Total Cargo (tons)
Nairobi	140,643
Accra	46,842
Addis Ababa	26,570
Entebbe	26,372
Abidjan	21,615
Dar Es Salaam	16,287
Durban	14,972
Douala	13,185
Lusaka	13,177
Port Elizabeth	9,757
Maputo	8,807
Lome	5,595
Bamako	5,282
Kigali	5,074
Lilongwe	4,358
Cotonou	4,283

Source: The Aviation & Aerospace Almanac, 2002
Note: It is considered that Johannesburg Airport serves about 300,000t of cargo volume. However, the above source as well as other documents do not include Johannesburg Airport.

2.3 Future Goals for CBTI Development toward Pro-Poor Growth

This section examines future goals for CBTI development from the viewpoint of pro-poor growth required for Sub-Saharan Africa.

2.3.1 CBTI Development and Poverty Alleviation/MDGs

In general, CBTI development increases the capacity and efficiency of transport infrastructure, thereby bringing direct benefits such as shorter transport times, increased transport reliability with less unpredictable incidents (e.g., delays at international borders), and lower transport costs. These direct benefits in turn lead to economic development along transport corridors and higher income for local residents, and thus CBTI contribute to the solution of various development problems, e.g., through poverty reduction.

Based on such benefits from CBTI development, contributions to the internationally committed achievement of MDGs (Millennium Development Goals) were targeted for Sub-Saharan Africa

up to 2015. Table 2.3.1 shows targeted MDG indexes. The contribution of CBTI development to achieving MDGs is summarized in Table 2.3.2. As shown, it is expected that CBTI improvement will decrease transport costs as well as stimulate industrial and trade development, and as a result will contribute to poverty alleviation.

However, infrastructure development and economic growth may sometimes exacerbate income gaps and regional differences and have limited effect on poverty reduction. Therefore, it is essential to introduce the pro-poor concept in seeking to alleviate poverty in Sub-Saharan Africa—CBTI development should aim for pro-poor growth, i.e., economic growth that effectively alleviates poverty.

Table 2.3.1 Baselines and Targets for MDGs

MDGs	Baselines (Year)	Latest Data (Year)	Goal (Year)
Goal 1. Eradicate poverty			
▪ Population below the poverty line (%)	44 (1990)	46.4 (2005)	38 (2015)
Goal 2. Achieve universal primary education			
▪ Primary completion rate (% of relevant age group)	43 (1990)	58 (2004)	100 (2015)
Goal 3. Promote gender equality			
▪ Ratio of girls to boys in primary and secondary school	78.4 (1991)	86.5 (2004)	100 (2015)
Goal 4. Reduce child mortality			
▪ Under five mortality rate (# per 1000)	161 (1990)	149 (2004)	54 (2015)
Goal 5. Improve maternal health			
▪ Maternal mortality rate (# per 100,000)	870 (1990)	826 (2005)	218 (2015)
Goal 6. Halt and begin to reverse the incidence of HIV/AIDS and malaria			
▪ HIV prevalence among adults age 15–49 (%)	0.5 (1990)	6 (2005)	-
▪ Annual malaria mortality (out of 100,000)	-	199 (2000)	-
Goal 7. Ensure environmental sustainability			
▪ Proportion of people with access to safe water (%)	53(1990)	65 (2004)	76 (2015)
▪ Proportion of people with access to sanitation (%)	29.8(1990)	37 (2004)	66 (2015)
Goal 8. Develop a global partnership for development			
▪ Debt service (% of exports)	13.5 (1990)	7.9 (2004)	-

Source: World Bank, Accelerating Development Outcomes in Africa Progress and Change in the Africa Action Plan, 2007

Table 2.3.2 Contribution of CBTI Development to Achievement of MDGs

Eight Goals for MDGs	Contribution of CBTI
(1) Strengthen the African Private Sector	• Reduction in transport time for imports • Increase in efficiency and private investment through reduction of transport costs
(2) Increase the Economic Empowerment of Women	• Increase in job opportunities in non-agricultural sectors through infrastructure development
(3) Build Skills for Competitiveness in a Global Economy	• Reduction of transport costs , promotion of industry/trade, and increase in local benefits → Increase in opportunities for learning, investment, industrial and development • Technology transfer through increase of foreign private investment
(4) Raise Agricultural Productivity	• Reduction in transport costs, promotion of industry/trade, and increase in local benefits → Increase in investment opportunities for agriculture
(5) Improve Access to and Reliability of Clean Energy	• Reduction in transport costs, increase in investment in energy sector, and generating capacity through private investment

Eight Goals for MDGs	Contribution of CBTI
(6) Expand and Upgrade Road Networks and Transit Corridors	• Direct contribution of CBTI development
(7) Increase Access to Safe Water and Sanitation	• Reduction in transport costs, promotion of industry/trade, and increase in local area benefits → Investment for water supply and sanitation • Expansion of access by regional road development

Source: The Study Team (with reference to World Bank, Accelerating Development Outcomes in Africa Progress and Change in the Africa Action Plan, 2007)

2.3.2 Future Goals for CBTI Development

It is estimated that the achievement of MDGs will require an annual economic growth rate of 7% up to 2015.[21] (Of course, this economic growth should be pro-poor.) Accordingly, the increase in trade volume to support this annual economic growth rate of 7% was estimated from a regression analysis of GDP and trade volume growth rates over the past five years for Sub-Saharan African countries; the result was that an annual trade volume growth rate of 12% to be required to support this economic growth rate,[22] which means that 2.4 times the 2008 level of trade volume will be required in 2015.

Since it is generally supposed that increases in trade volume are roughly proportional to the cargo traffic volume increase, it is likely necessary to increase the present CBTI transport capacity by 2.4 by 2015. Accordingly, it will be necessary to have CBTI that furthers an increase in trade volume by not only physically expanding infrastructure but also reducing transport costs, which include not only monetary costs but also time costs and transport reliability. For example, a 10% decrease in transport costs will lead to a 25% increase in trade volume based on recent analyses.[23] It is expected that capacity expansion of hard infrastructure as well as efficiency improvement of soft infrastructure can contribute to the achievement of such cost reductions.

Based on the foregoing, this study has set the future goal for CBTI development by 2015 to target pro-poor growth for achieving MDGs through expanding necessary transport capacity and reducing transport costs to realize a trade volume that will be 2.4 times as large as the present level.

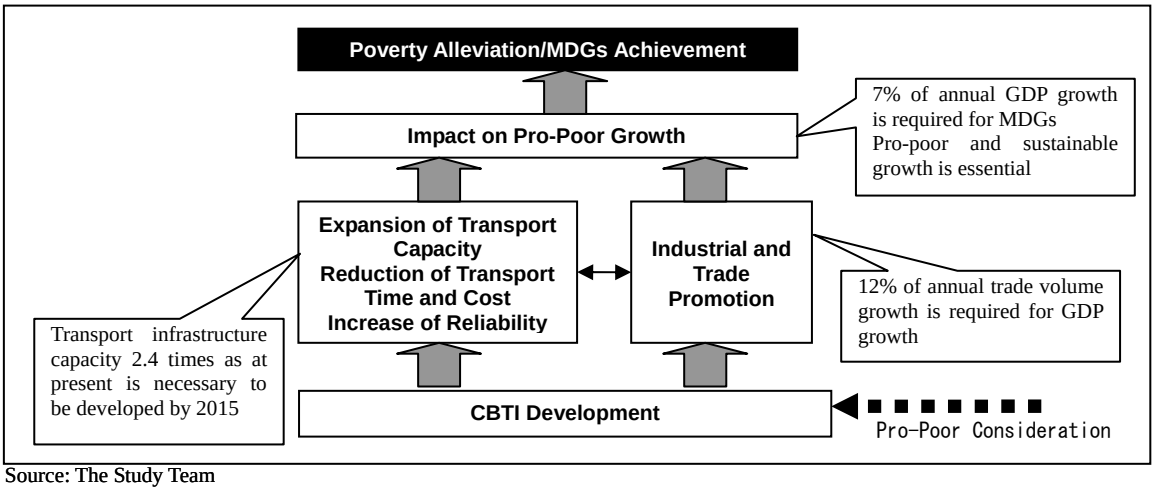
Of course, it is impossible to achieve the required economic growth or pro-poor growth only with CBTI development. It is essential that CBTI development in coordination with development in other sectors such as industrial development and trade promotion, and that CBTI be developed in way that will benefit the poor. Also, it is necessary to consider importance of CBTI development separately in each country and region because CBTI development will may bring different benefits depending on the stage of economic growth in each country.

Figure 2.3.1 summarizes the findings of this section.

[21] African Development Indicators

[22] Based on a regression analysis of trade growth rate and GDP growth rate in Sub-Saharan African countries over the past five years, this is the estimated trade growth rate required for 7% GDP growth.

[23] Gael Raballand and Patricia Macchi, *Transport Prices and Costs: The Need to Revisit Donors' Policies in Transport in Africa*, 2008.



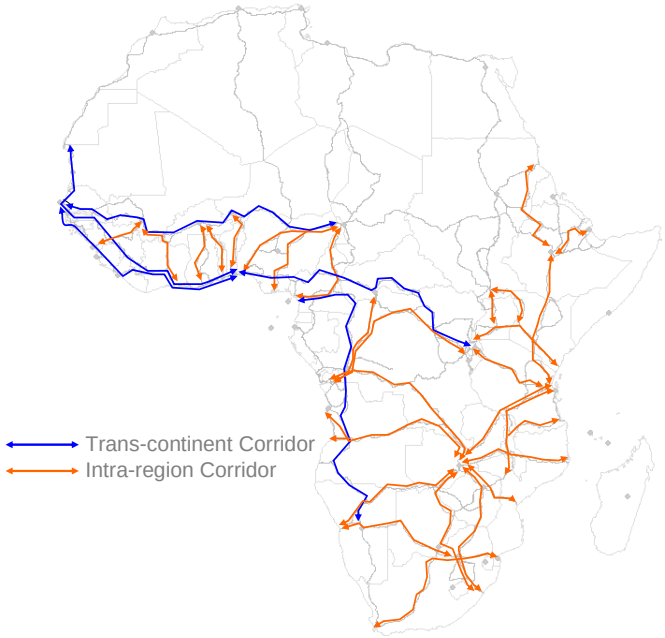
Source: The Study Team

Figure 2.3.1 CBTI Development in Sub-Saharan Africa

2.4 Analysis of International Transport Corridor Potential

2.4.1 Calculation of Trade Potential

Potential corridor trade volumes were analyzed to examine international transport corridor sections that should be considered for improvement. As mentioned, in Sub-Saharan Africa there are many existing/planned international corridors including TAH and SSATP regional economic corridors. To exhaustively analyze corridors such as these, this study defined target corridors, using the list of corridors given in JICA Studies of How to Support Transport Infrastructure in Africa (Project Studies), 2008. Figure 2.4.1 shows these target corridors.



Source: The Study Team

Figure 2.4.1 Target Corridors for Trade Potential Analysis

An estimation approach to analyze the potential of trade volumes would ideally involve the use of origin-destination (OD) data for the volume of trade between Sub-Saharan African countries

or between a country and a port (or ports), but since such data is difficult or impossible to obtain, two potentials were analyzed: (i) the potential of trade within the Sub-Saharan African region and (ii) the potential of interregional trade between Sub-Saharan Africa and the rest of the world; gross domestic product (GDP) was assumed as the trade volume potential to derive substitute indicators. The method of calculation adopted is more specifically described below. The methodology analyzed the relative corridor trade potential rather than absolute magnitudes. Another caveat is that the analysis did not take into consideration the actual situations of roads, railways, and ports, or of border-crossing costs/time. The relative comparison of potential among corridors can, however, provide a broad assessment of the priority sections for future improvement.

(i) Trade Potential within the Sub-Saharan African region

The GDP of each country was assumed as the level of its trade volume potential. The gravity model[24] was adapted to prepare ODs of trade potentials between each country pair, and to distribute them to the corridor network by the shortest path search method, and analyze potentials by corridor. The equation used to estimate such potentials was as follows:

$$PIntra_{ij} = \frac{GDP_i \times GDP_j}{d_{ij}^{2.1}}$$

Where:

$PIntra_{ij}$	Potential of trade within the Ssub-Sahara African region between country i and Country j
GDP_n	GDP of Country n
d_{ij}	Distance between Country i and Country j (between capital cities)

Sudan and DRC were each divided into two parts for the calculation[25] since both are so large that simple calculation of the distance between capital cities would have produces significant errors.

(ii) Potential of Interregional Trade between Sub-Saharan Africa and the Rest of the World

The GDP of each country and the container handling volume of each port were assumed as the country's level of trade potential and the port's level of trade potential, respectively, to estimate the interregional trade potential between the country and the port by the following equation:

$$PInter_{ij} = \frac{GDP_i \times Port_j}{d_{ij}^{2.1}}$$

where:

$PInter_{ij}$	Potential of interregional trade between Country i and Port j
GDP_n	GDP of Country n
d_{ij}	Distance between Country i (capital city) and Port j

Here, since *PInter* is determined, using a virtual value of port capacity, the relative GDP scale of each country has become inconsistent with the level of its trade potential. That is, any country

[24] A factor of 2.1 was applied to the distance multiplier, as was used in the gravity model estimated in World Bank, Road Network Upgrading and Overland Trade Expansion in Sub-Saharan Africa, 2006. The multiplier of GDP should also be estimated such as by regression analysis but 1.0 was used here for the sake of simplicity.

[25] In proportion to regional population, the allocation was defined as 30% to the southern and 70% to the northern Sudan and 40% to the eastern and 60% to the western DRC.

near a large-capacity port may show an increasing trade volume regardless of its GDP scale. Therefore, the total of each country's interregional potentials was corrected, using the country's GDP. The correction approach used is presented below:

$$PInter_{ij}' = PInter \times \frac{GDP_i}{\sum_j PInter_{ij}}$$

where:

$PInter_{ij}'$ Corrected potential of interregional trade between Country i and Port j

Two cases were supposed to determine port capacity levels as follows: use of existing container handling volume (in TEUs) or hypothetically assigning 1 million TEUs to each port whose capacity was deemed unlimited. Interregional trade potentials were analyzed by corridor for the case where ports had no limitation.

As in the case of intraregional trade, Sudan and DRC were separated into two parts since their land area is so large that simple calculation of the distance between capital cities would have produced significant errors.

2.4.2 Analytical Results of Trade Potential

(i) Potential of Trade within Sub-Saharan Africa

Figure 2.4.2 sets out the results of the analysis. It was found that corridors around South Africa and Nigeria each had a large potential – these are marked in red. There was an area of medium potential along the long corridor linking South Africa/Central Africa with East Africa. Regional potentials, although relatively small, were also observed in the East African region.

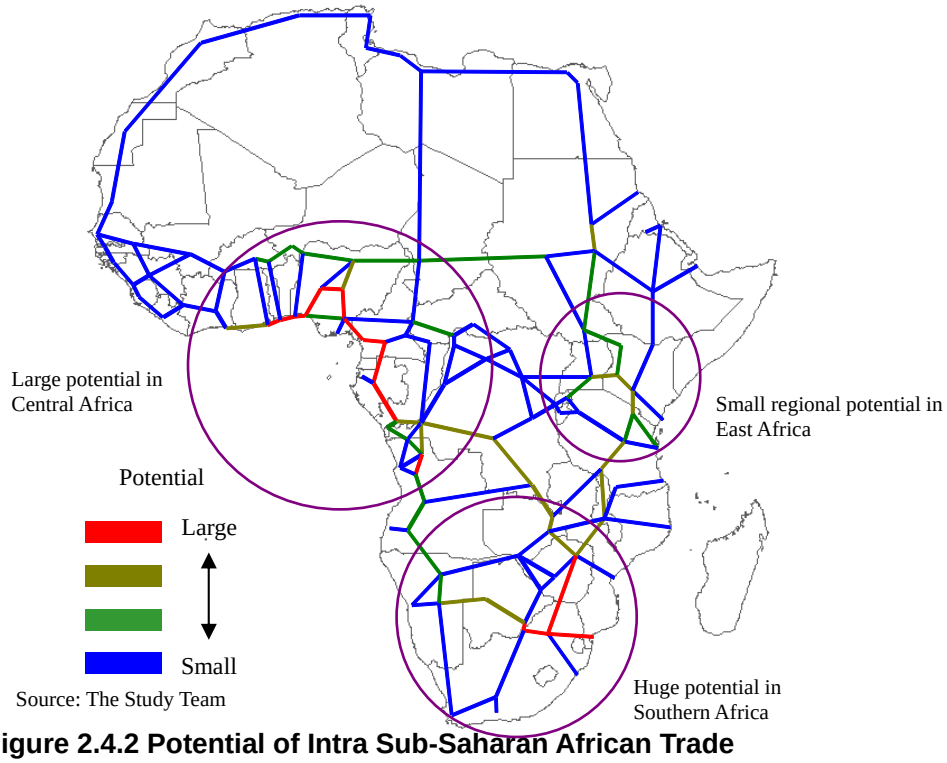
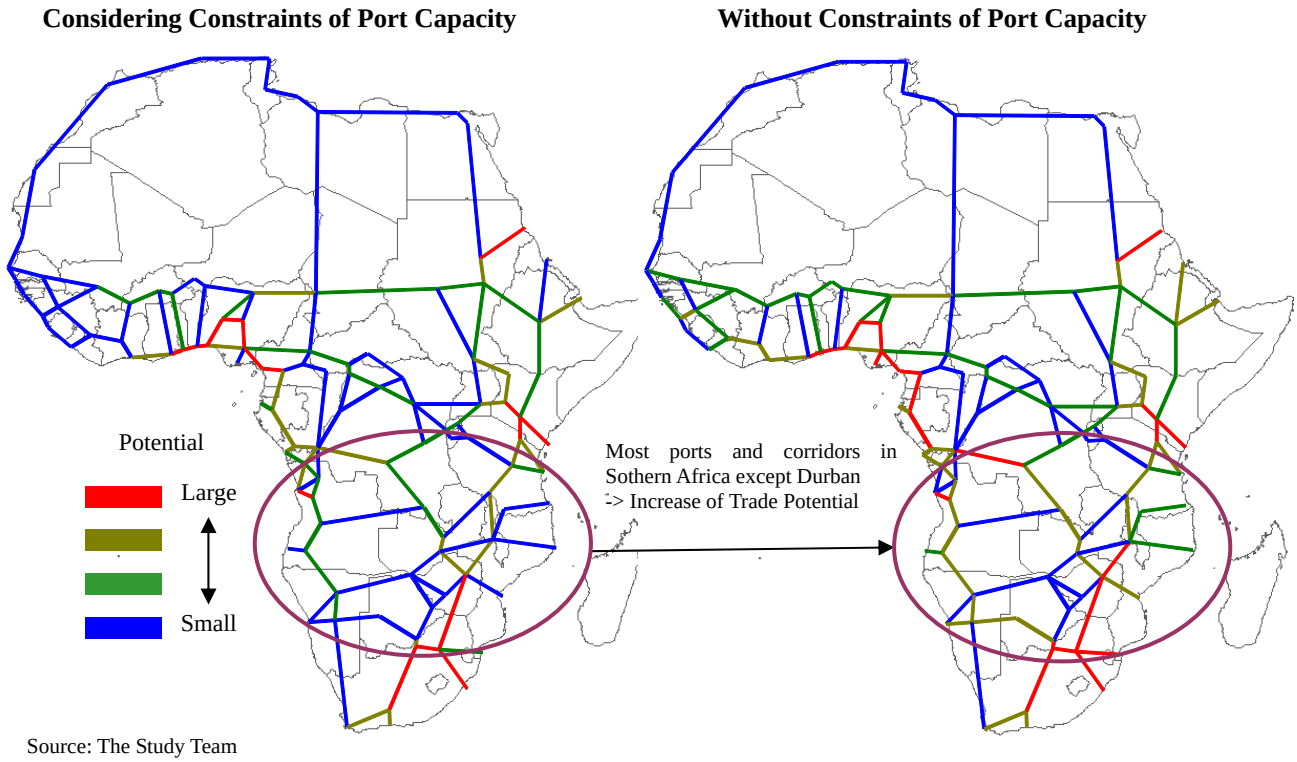


Figure 2.4.2 Potential of Intra Sub-Saharan African Trade

(ii) Interregional Trade Potential between Sub-Saharan Africa and the Rest of the World

Figure 2.4.3 shows the analytical results of interregional trade potential between the subject region and the rest of the world. The interregional trade potential analysis used two cases: one with the existing port capacity constraints and the other without these constraints (but assuming all ports have a sufficiently large handling capacity). The comparison of these two cases found that all over Sub-Saharan Africa, there are ports/corridors where trade volume is likely to increase if the scarce port capacity problem is resolved, i.e., if ports/harbors are further improved in the future. Particularly, ports in Eastern and Southern Africa such as Mtwara, Maputo, Nacala, and Beira, were found to have higher throughputs. Meanwhile, presently thriving ports (such as Durban and Mombasa) were found to have smaller relative increases in trade volumes.

These results indicate that port improvement will realize more a desirable pattern freight movement, i.e., one that will utilize ports nearer to destination, avoiding use of distant ports due to limited port capacity, and mitigate the congestion of existing ports, thereby possibly reducing transport costs. The observed increase in trade volume along inland corridors also indicated the possibility that port improvement may change freight movement patterns across the region.



Source: The Study Team

Figure 2.4.3 Potential of Trade between Sub-Saharan Africa and the Rest of the World

Chapter 3 An Analysis of Cross-Border Transport Systems in East Africa

As mentioned in the Chapter 2, CBTI consists of various sub-sectors including both physical (hard infrastructure) and non-physical (soft infrastructure) development aspects. Therefore, it is critical for CBTI development to adopt not a project-based approach but rather a program approach that considers development from a comprehensive viewpoint. Accordingly, this study prepared a model program for CBTI development focusing on East Africa[1].

This chapter presents the results of a survey of present status and issues of Cross-Border Transport Infrastructure (CBTI) development. Addressed are such issues as: (i) present status of assistance by development partners and infrastructure developed, and (ii) the respective governments' infrastructure development programs and plans under a national and/or regional development framework. Non-physical (soft infrastructure) development aspects of CBTI development are dealt with in detail in Chapter 4.

3.1 Current Systems and Improvement Projects, Ongoing and Planned

With Sub-Saharan Africa, the East African (sub)region, has a relatively higher level of trunk road provision. Two major international corridors—the Northern Corridor and the Central Corridor—traverse the subregion, forming a CBTI network, each linking seaports with landlocked countries (Figure 3.1.1). Each of the international corridors consists of two modes—road and railway. Of the two transport modes, the condition of the road corridor is mostly good or fair except for several sections, which are either under development or under rehabilitation, while the railway corridor suffers from reduced capacity attributable to a lack of investment and maintenance in track and rolling stock. Because of the competitive prices for railway freight transport relative to those of road transport, railway transport volumes exceed carrying capacity, resulting in as long as two months in waiting time for shipments on particular lines. Also to be addressed is an urgent solution for the severe congestion at ports of Mombasa and Dar es Salaam—the two key nodes of the above-mentioned international corridors—due to the subregion's rapid economic and trade growth. Moreover, facilities and systems for transit cargo such as border posts tend to require excessive transit time due to insufficiency in hard infrastructure together with underdeveloped institutions and regulations (soft infrastructure). All these elements of underdeveloped "CBTI Systems" lead to higher freight costs relative to the level of road services provided, which in turn poses bottlenecks to trade and economic activities.

Regarding assistance from international development partners, the World Bank, the European Union (EU), and the African Development Bank (AfDB) are seen to be actively engaged in providing assistance in the CBTI Sector. An indicative activity is the East Africa Trade Transport Facilitation Project (EATTFP) assisted by the World Bank and AfDB.[2] The EATTFP represents a multifaceted approach in effecting systems improvements through networking all key elements of railways, roads, ports, customs, border posts, and weighbridges along the two most important corridors across four East African countries.

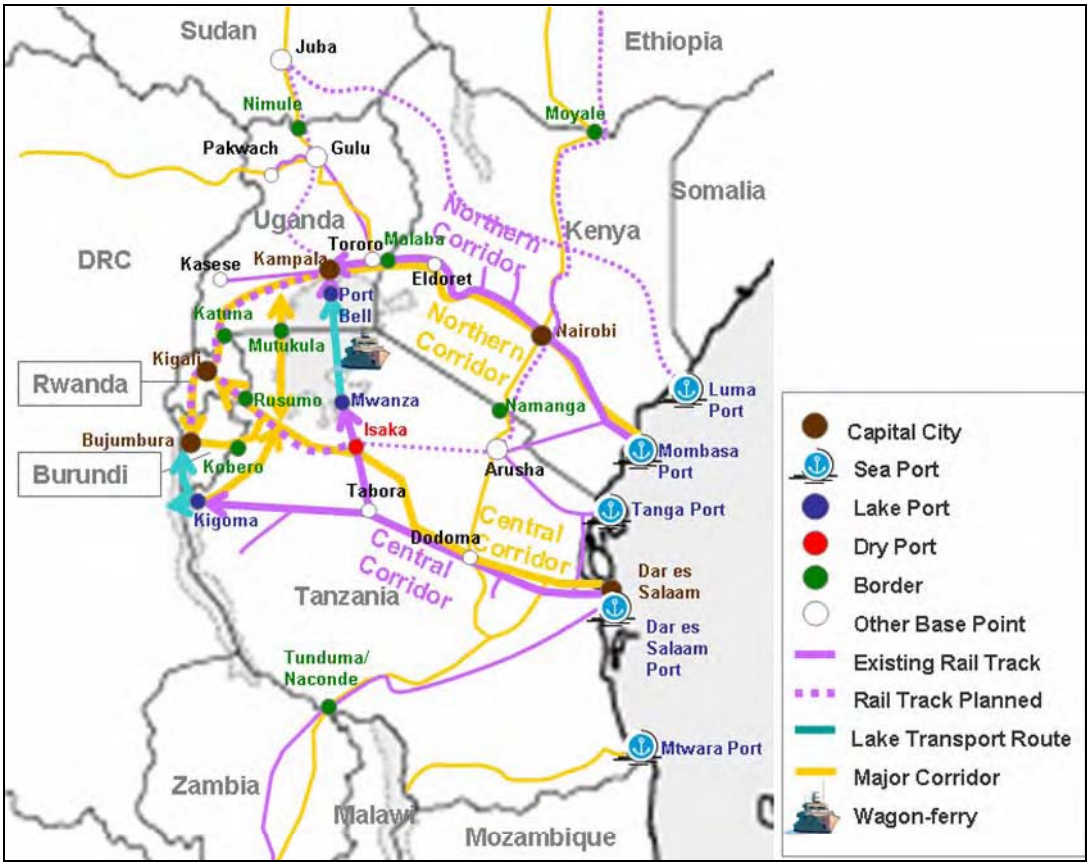
[1] The survey defines East Africa as geographical territories of the five Eastern African Community (EAC) member ("partner") countries, consisting of Kenya, Uganda, Tanzania, Burundi, and Rwanda. The findings here focus on CBTI status and issues on the countries surveyed: Kenya, Uganda, and Tanzania, but subregion-wide perspectives (involving Burundi and/or Rwanda) are also addressed.

[2] EATTFP targets the four countries of Kenya, Uganda, Tanzania and Rwanda.

On the other hand, the European Union (EU) is providing country-specific assistance. While the EU Ugandan Office provides comprehensive road sector assistance—Northern Corridor rehabilitation and the assistance to the country's Road Department and Road Fund, the EU's Tanzania Office concentrates on trade promotion assistance with a focus on "soft" issues.

The United States Agency for International Development (USAID) is also an important actor —it pioneered assistance for One-Stop Border Posts (OSBPs) in East Africa even before the World Bank, although the magnitude of its assistance for CBTI has been moderate. USAID assisted a feasibility study of developing OSBPs at major border posts. It also contributed to establishing an OSBP at a railway border crossing, the first such one in East Africa. Ongoing assistance by USAID is centered on supporting the "soft" aspects of East African subegion-wide CBTI development, including a project to demonstrate the commercial viability of a Common Market for Eastern and Southern Africa (COMESA) Regional Customs Transit Guarantee (RCTG).

JICA has so far provided assistance in the cross-border transport sector, including projects for Mombasa port expansion, cross-border trunk road development with co-financing by AfDB, and support for improvement of border post operating procedures.



Source: The Study Team

Figure 3.1.1 Major Corridors in East Africa

Focusing on the two major transport corridors mentioned above, the current status of the transport sub-sector and development partner assistance are set out below.

3.1.1 Roads

(1) Current Systems

Overview: As in other Sub-Saharan African subregions, the majority of the trunk roads in the Eastern African subregion were developed during the colonial era. Accordingly, most sections of major road corridors are paved, but road conditions in many cases have worsened due to the lack of appropriate maintenance and management since independence, which have led significant pavement deterioration in some sections, thereby increasing vehicle operating costs (see Photo 3.1.1). However, of late, most sections of the Northern and Central Corridors across Kenya, Uganda, and Tanzania have been rehabilitated or reconstructed with assistance from the World Bank, the EU, AfDB, and other development partners. As a consequence of this assistance, current road condition along most of the two corridors is good or fair.

On the other hand, more work will be undertaken for the development of other trunk roads, since development of the Northern and Central Corridors is in the final stage. These other trunk road corridors include: (i) Biharamulo–Mwanza–Musoma–Sirari–Lodwar–Lokichogia; (ii) Tunduma–Iringa–Dodoma–Arusha–Namanga–Moyale, and (iii) Port of Mombasa–Lunga Lunga/Horohoro Border–Central Corridor. Figures 3.1.2 shows EAC corridor plan and Figure 3.1.3 illustrates present status of trunk corridor developments in East Africa.

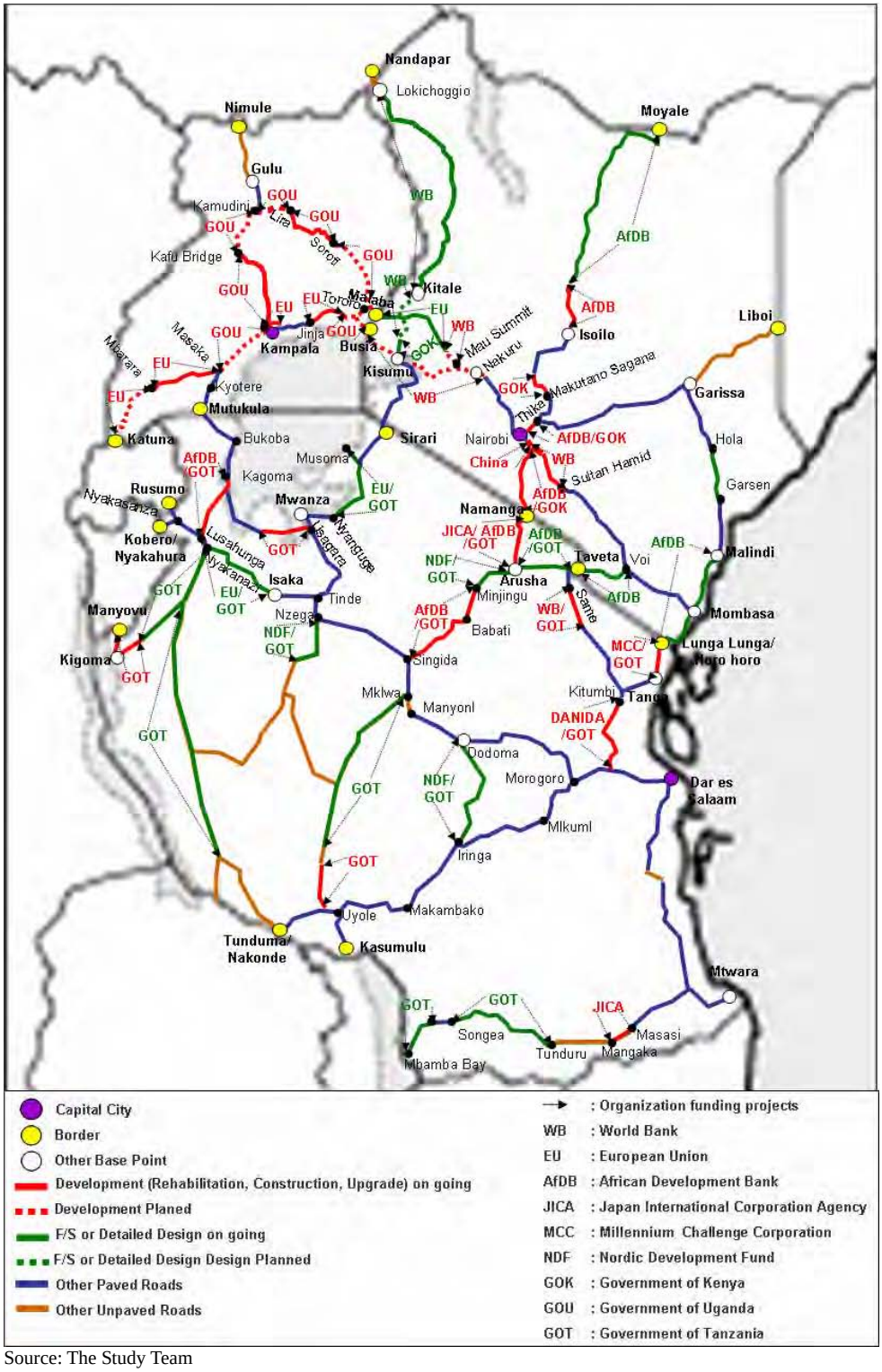
With a view to sustainable road maintenance in the respective countries after road development, road funds and road authorities are being established with capacity strengthening with the assistance of international development partners.

Note: Asphalt pavement was removed.
Source: The Study Team

Photo 3.1.1 Example of a Deteriorated Road (Jinja–Bugiri Section, Northern Corridor)

Source: JICA and EAC, Scoping Study on Identification of the Missing Links and Bottlenecks Affecting the Performance of the East African Community Central Corridor, Draft Final Report, 2008

Figure 3.1.2 EAC Road Corridor Plan



Source: The Study Team

Figure 3.1.3 Present Status of Trunk Road Developments in Kenya, Tanzania, and Uganda

The Northern Corridor: The Northern Corridor links originates from Mombasa Port and serves traffic transiting to/through Nairobi and Kampala, and on to Rwanda and Burundi. It also carries a major portion of cargo volume outbound from Uganda and Rwanda and serves as a transit route for freight bound for Ethiopia and the southern Sudan, originating from Mombasa Port. In particular, due to recent rapid economic growth in Uganda, freight traffic is heavy on the Mombasa Port–Nairobi–Kampala route, most of which transits the Malaba border crossing, although some is diverted through the border crossing at Busia. With respect to pipeline transport, the existing pipeline serves only the Mombasa–Eldoret section, with further inland transport of fuels undertaken along the Northern Corridor. The road section between Mombasa and Kampala is in relatively better condition than other sections, except for the section undergoing rehabilitation/reconstruction with assistance from the World Bank and the EU.

As it passes through the urbanized areas of Mombasa, Nairobi, and Kampala, traffic congestion poses a bottleneck for smooth transit of passengers and freight (see Photo 3.1.2). In response to this situation, EU-assisted bypass development is underway in northern Kampala. Also, the World Bank will assist bypass development in the Nairobi and Mombasa areas, with a feasibility study underway.

Source: The Study Team

Photo 3.1.2 Congestion at Kampala Urban Periphery along the Northern Corridor

The Central Corridor: The Central Corridor originates from the Port of Dar es Salaam and provides access to/from the landlocked countries of Burundi, Rwanda, and Uganda. Although rehabilitation/reconstruction of the Central Corridor roads was commenced a little later than in the Northern Corridor, road conditions in the Tanzanian section are relatively better than before. This section carries a majority of outbound freight from Burundi. While it serves inland-bound imported freight from Tanzanian ports, it also serves seaport-bound export freight (largely coffee and tea) originating from Rwanda and Burundi, and export of cotton produced in western Tanzania. All this freight transits the Dar es Salaam central business district, but does not cause major traffic congestion problems as the roads serving the Dar es Salaam urbanized area are sufficiently wide.

(2) Improvement Projects by International Development Partners

The Northern Corridor: Most of the road sections in Uganda and Kenya have been developed with the assistance of EU. With respect to road development in Uganda, the Kampala–Masaka, and Malaba–Bugiri sections, originally to be undertaken with EU assistance will now be implemented by the Government of Uganda (GoU). However, the new strategic directive of self-development by GoU (independent of development partners) has significantly reduced the section length to be assisted by the EU. On the other hand, the EU has provided assistance to the GoU for institutional strengthening for establishing a Uganda National Roads Authority (July 2008) and Uganda Road Fund (2009).

World Bank assistance to Kenya for developing a 373 km section is ongoing, through the Northern Corridor Transport Improvement Project, which was commenced in 2004. While the World Bank does not provide assistance for new road construction or rehabilitation in Uganda, it has been providing financial assistance for road maintenance in northern Uganda. Table 3.1.1 summarizes recent development partner assistance in the Northern Corridor.

Table 3.1.1 Development Partner Assistance for the Northern Corridor in Recent Years

Country	Section	Length (km)	Donor	Start[3]	Completion[4]
Kenya	Mtito Andei-Sultan Hamud	131	EU	2003	2006
Kenya	Sultan Hamud-Machakos Off-JKIA	84	IDA	2004	2009
Kenya	JKIA-Uhuru Highway	12	China	-	2009
Kenya	Maai Mahiu-Naivasha-Lanet	97	EU	2005	2007
Kenya	Lanet-Mau Summt-Timboroa	83	IDA	2004	2009
Kenya	Timboroa-Eldoret-Malaba	193	EU	2009	-
Kenya	Mau Summt-Kisumu	145	IDA	Negotiation Stage	
Kenya	Kisumu-Busia	139	IDA		
Uganda	Bugiri-Jinja	73	EU	2006	2008
Uganda	Kampala Northern Bypass	21	EU	2006	2009
Uganda	Masaka-Mbarara	155	EU	2008	2010
Uganda	Mbarara – Ntungamo – Katuna	164	EU	2010	2013

Source: The Study Team

The Central Corridor: The Danish International Development Agency (DANIDA), the EU, and AfDB are the major development partners active in the Central Corridor. Although Japan has not directly assisted the trunk road along the Central Corridor, Japan is assisting The Project for Widening of Kilwa Road aimed at alleviating traffic congestion in the city center of Dar es Salaam, one of the endpoints of the Central Corridor; accordingly, the project is contributing to traffic improvement along the Central Corridor. In addition, Tanzania has been strengthening its road authority (TANROADS) and road fund with the assistance of development partners. Further, JICA has long dispatched Japanese road transport experts to the TANROADS. Table 3.1.2 presents the status of Central Corridor development in recent years.

[3] Planned start dates are given to projects that have not yet been implemented.
[4] Scheduled completion dates are given to projects that are already ongoing.

Table 3.1.2 Recent Projects along the Central Corridor Supported by the Government of Tanzania (GOT) and Development Partners

Country	Section	Length (km)	Financier	Start	End
Tanzania	Dar es Salaam-Mlandizi	55	DANIDA	-	2001
Tanzania	Chalinze-Morogoro-Melea	140	DANIDA	-	2004
Tanzania	Morogoro-Dodoma	265	EU	2004	2006
Tanzania	Dodoma-Manyoni	127	GOT	2003	2008
Tanzania	Manyoni-Singida	118	GOT	2007	2008
Tanzania	Singida-Shelui	110	IDA/GOT	2005	2007
Tanzania	Shelui-Nzega	112	AfDB/GOT	2005	2007
Tanzania	Nzega-Isaka-Tinde	73	EU	2003	2006
Tanzania	Tinde-Ilula	96	EU	2003	2007
Tanzania	Isaka-Lusahunga	245	EU	2008	-
Tanzania	Lusahunga-Kagoma	154	AfDB/GOT	2006	-
Tanzania	Kagoma-Muhutwe	24	OPEC/GOT	-	2004
Tanzania	Muhutwe-Mutukula	112	AfDB/GOT	-	2004
Uganda	Mutukula-Kyotera	80	AfDB	2000	2003

Source: Compiled from JICA and EAC sources, 2008

The Other Corridors: While the World Bank and the EU have focused assistance on the Northern and Central Corridors with a view to strengthening the link of seaport hubs with inland and landlocked countries, AfDB has targeted its development efforts on strengthening the parts of transcontinental trunk roads through the East African countries, including those from north to south, based on the concept of the "Trans African Highway". Of particular notes is AfDB's assistance for development of the Tunduma–Iringa–Dodoma–Arusha–Namanga–Moyale Corridor.

(3) Country/Regional Community Development Strategy

Kenya: Kenya has been shifting its development priority to the North (Sudan and Ethiopia), and the South (Tanzania), as substantial development has already occurred along the Northern Corridor. Its Kenya Vision 2030 envisaged development of a new transport corridor to southern Sudan and Ethiopia, and connecting Kenyan major cities and towns with the Northern Corridor.

Uganda: Uganda has drastically changed its policy on infrastructure development with a view to facilitating economic growth through infrastructural development, replacing the previous social-development strategic policy focus (e.g., on education). It considers investing in infrastructure as vital for economic development, and has announced as an annual US$200 million for this purpose over the next three years. With a goal to making Kampala, the national capital, a transport hub serving access to neighboring landlocked countries, it has expressed its intention to strengthen the country's international corridors. The Ministry of Infrastructure has called for development of priority corridor linking Gulu with Juba in southern Sudan. In addition, the Ministry has indicated its aim of providing the entire section of the Northern Corridor with a two-laned carriageway in each direction. The Ministry has also indicated that it will build road infrastructure with its own funds, i.e., without the assistance of international development partners. The provision of a two-laned carriageway along the Northern Corridor, is considered difficult to realize in view of anticipated traffic demand and the budget required.

Tanzania: With a relatively larger budget line allocable from general budget support from development partners, Tanzania has undertaken more trunk road development projects with its own funds compared to Kenya and Uganda. The road sector development plan targeting 2017 envisages strengthening the country's four international corridors: (i) the Central Corridor,

which links Uganda, Rwanda, Burundi, and the Democratic Republic of Congo (DRC) with the port of Dar es Salaam; (ii) the Tazara Corridor, which serves transit traffic to/from Zambia; (iii) the Mtwara Corridor, which links Mtwara port to Mozambique (which includes some sections that are unpaved); and (iv) the Tanga Corridor, which links Tanga port with Musoma on Lake Victoria (although this corridor includes sections that are currently not trunk roads). TANROADS has prioritized the Tazara Corridor to be developed with the utmost urgency, as traffic demand along this corridor is high.

EAC: The EAC has coordinated its efforts with the five participating member ("partner") states to define six prioritized corridors in East Africa (see Figure 3.1.2). However, since EAC is mainly a coordinator but lacks budget for infrastructure development, the responsibility for corridor development rests with respective countries.

3.1.2 Railways

(1) Current Systems

Overview: The railway network had been administered by four statutory national enterprises, i.e., the Kenya Railway Corporation (KRC), the Uganda Railway Corporation (URC), the Tanzania Railway Corporation (TRC), and Tanzania Zambia Railways (TAZARA). Its service length was 7,363 km with an operating track length of 6,334 km.

Historically, East Africa Railways and Harbors (EARH) had owned the tracks, laid during 1890s through 1950s, which were separately owned by the respective statutory bodies (i.e., KRC, URC, and TRC) since EARH's dissolution after independence. The existing lines constitute an integrated network connecting East Africa's landlocked countries with the region's hub ports of Mombasa and Dar es Salaam.

On the other hand, TAZARA is owned by the two governments of Tanzania and Zambia, It administers the railway section of the Tazara Corridor, connecting the Zambian Railway at the Tonduma–Nakonde border, hence providing an indirect link with the railways of Zimbabwe and South Africa. The TAZARA line was constructed with the assistance of the Chinese Government from 1970 to 1975 and commenced service in 1976. One of the reasons for construction of the TAZARA line is that southern African countries had sought a railway line to provide access to seaports without transiting South Africa, which was still practicing apartheid. At present, the TAZARA line carries mineral resources produced in Zambia and DRC, with more than 70% of copper ore of Zambia shipped to the Dar es Salaam port via TAZARA.

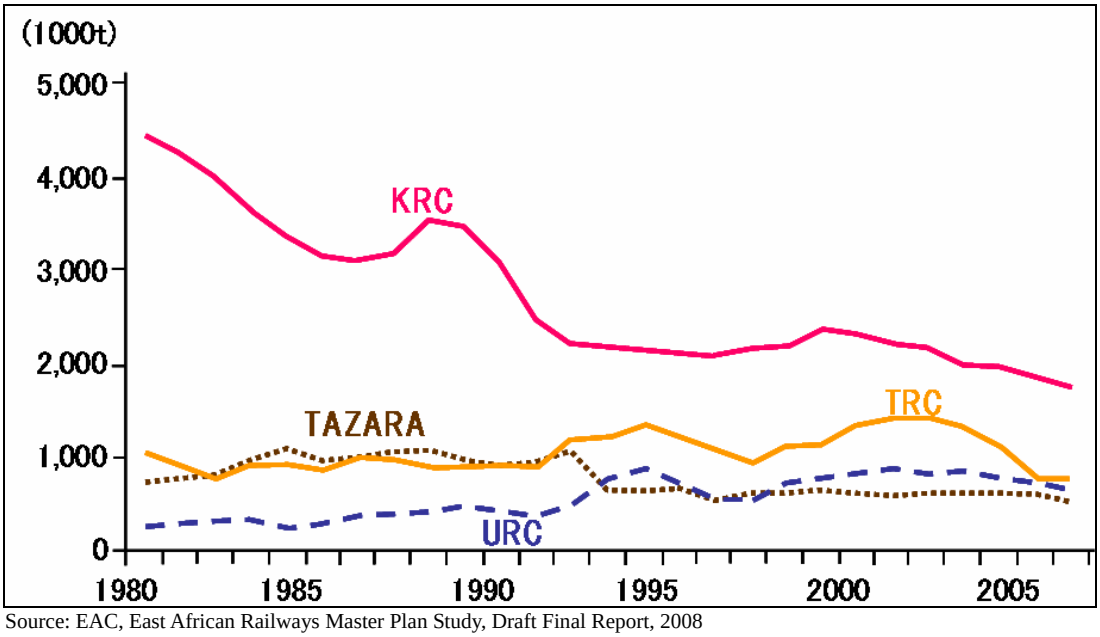
All East African Railways are single track. Although KRC, URC, and TRC have adopted unified gauge standards, its track gauge of 1,000 mm[5] is narrower compared with that of standard gauge (1,435 mm)[6]; however, TAZARA adopts the Central and the southern African gauge system of 1,067 mm[7], which has made line interoperability impossible at the port of Dar es Salaam, preventing through-running between adjacent lines. As the TAZARA railway system was constructed relatively recently, compared with the lines of KRC, URC, and TRC, which were constructed more than a century ago, the TAZARA system is superior with respect to operating speed and axle load capacity.

[5] I.e., meter gauge, adopted in Southeast Asia, Europe, Africa, and part of South America.
[6] Standard Gauge: adopted widely as the railway standard track width in Europe and North America, it is the design standard for more than 60% of the world's railway track.
[7] Cape gauge: adopted by Central and South America, Taiwan, Philippines, Indonesia, and New Zealand. Also, many Japanese railways have adopted this standard.

East African railways generally have low transport productivity per service length (see Figure 3.1.5). Due to the region's railway traffic demand, which has recently increased with economic growth, the lower railway transport productivity has become a more critical issue. One of the elements of under-capacity is an insufficient supply of rolling stock. In addition, existing rolling stock tends to be old and insufficiently maintained, which put constraints on locomotives the available axle loads of freight wagons. Moreover, the poor track structure and maintenance observed along the older lines of KRC, URC, and TRC reduces operating speeds and hence results in lower transport capacity. For example, steel sleepers (ties in American English), adopted for most of the lines of KRC, URC, and TRC, show considerable attrition, while most of sleepers on the TAZARA line are made of pre-stressed concrete and are in relatively good condition. In addition, for all railway sleepers inclusive of those of TAZARA, wooden sleepers are used at the bridge sections, which show further deterioration. Many reduced-speed sections are observed, where necessary controls are imposed, e.g., to protect against bridges structurally not robust enough to sustain the axle loads carried, which reduces average service speed.[8]

Poor rolling stock and track condition are largely a consequence of insufficient maintenance and capital investment. Relatively low freight traffic volumes have led to high freight rates relative to those of the other regions (see Figure 3.1.4–3.1.6), and this must be addressed to (regain competitiveness.[9]

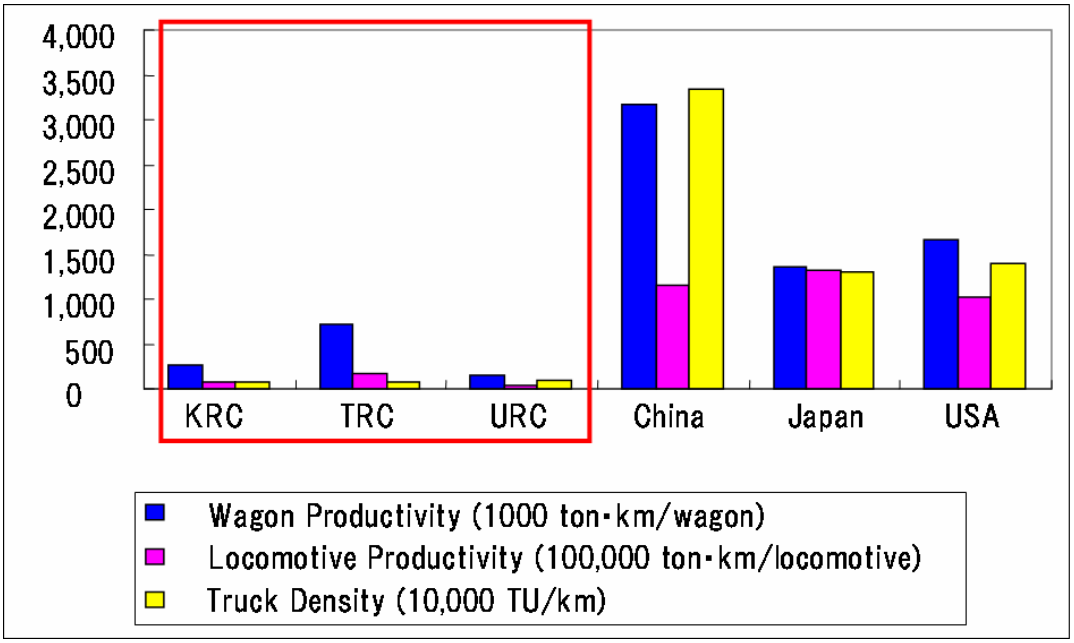
In order to improve and strengthen railway assets and railway management, KRC, URC and TRC underwent privatization in 2006–07. KRC is now an entity that holds ownership of railway infrastructure and rolling stock, supervises and monitors private operating enterprises, and develops new lines designed with higher railway standards. Accordingly, most of its former employees and laborers were transferred to a new private operating company. URC is undergoing a similar process of structural reform. Similar to the KRC reforms, the restructuring of TRC has produced a new entity, the Reli Assets Holding Company (RAHCO).



Source: EAC, East African Railways Master Plan Study, Draft Final Report, 2008

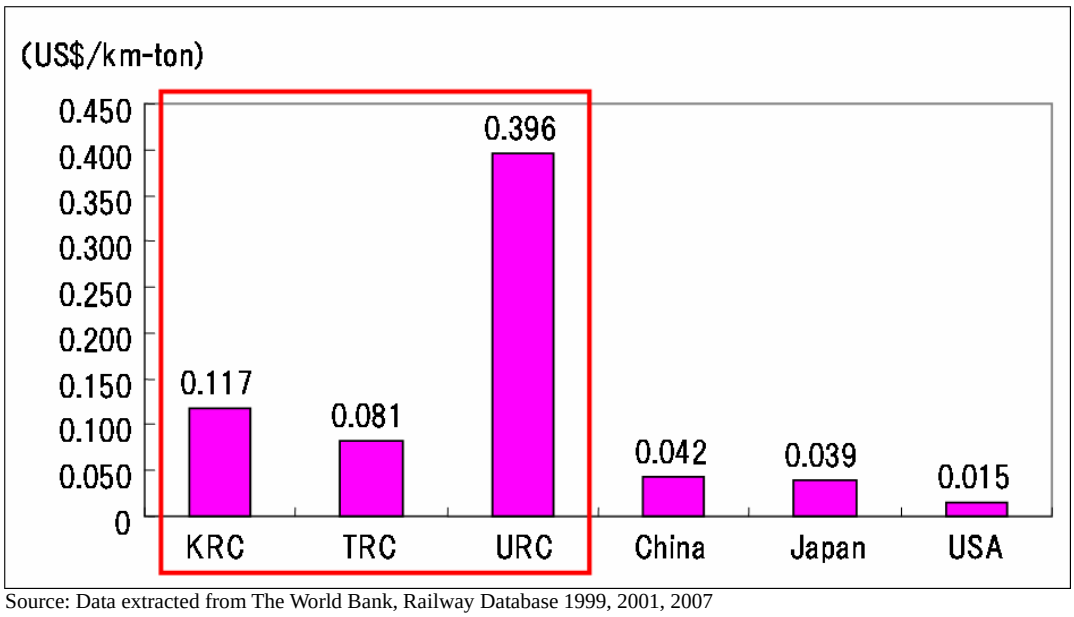
Figure 3.1.4 Trends in East African Freight Traffic Volume, 1980–2007

[8] Refer to EAC, East African Railways Master Plan Study, Draft Final Report, 2008.
[9] The transport cost of export goods, hauled from inland to the ports, is half of that of imports, hauled from ports to the inland, since export traffic volume is much less than import traffic volume.



Source: Data extracted from The World Bank, Railway Database 1999, 2001, 2007

Figure 3.1.5 Comparison of Freight Traffic Volume (per Track Length) or (per Unit of Rolling Stock)



Source: Data extracted from The World Bank, Railway Database 1999, 2001, 2007

Figure 3.1.6 Comparison of Freight Traffic Revenue per km-ton

The Northern Corridor (Kenya–Uganda Railway): At present, the line connecting Mombasa Port–Malaba Border–Kampala establishes the trunk line of the corridor. There is also an alternative route, consisting of: (i) the railway from Mombasa Port to Kisumu via Nairobi and Nakuru; (ii) the ferry service between Kisumu and Port Bell; and (iii) the railway from Port Bell to Kampala. Administratively, Kenyan domestic lines have been controlled and managed by KRC, and Ugandan domestic lines have been controlled and managed by URC. There is a plan for extension of the service, connecting Kampala, Kigali, and Bujumbura.

The main issues of the Northern Railway Corridor include: (i) insufficient rolling stock capacity, (ii) poorly maintained track (see Table 3.1.3), and (iii) lower service speeds, which have led to extreme under capacity in relation to increasing railway traffic demand. At present, the dwell time for inland-bound freight is sometimes as long as two months.

The operations of Kenyan Railways and Uganda Railways were privatized in November 2006, with assistance from the World Bank. On this occasion, with a capital injection by Rift Valley Railways, funded by a South African entity, the operation of the KRC and URC lines were handed over, respectively, to the Rift Valley Railways Kenya Limited (KRL) and the Rift Valley Railways Uganda Limited (URL). Both KRL and URL are undergoing a massive labor layoff and pursuing operational efficiency. Further, both KRL and URL are subject to various contractual obligations to be observed during the initial five years, e.g., an investment of a US$30 million, management goals, and improvements on rail tracks and rolling stock. As it happens, a World Bank loan of US$32 million is programmed. However, after a due diligence survey of rolling stock and railway infrastructure handed over to them,[10] the Rift Valley management has asked for demands a sum of US$190 million, which they assessed as being necessary to achieve the imposed goals.

At the moment, operation of the two lines, an extension of the Northern Railway Corridor, has been suspended (a 332 km section linking Kampala–Kasese, and a 501 km section linking Tororo–Gulu–Pakwach). An insufficient number of locomotives and freight wagons, and strategic deployment of available rolling stock to the high-demand line linking of Malaba–Kampala are cited as reasons for the suspended operation.[11]

Table 3.1.3 Track Condition of the Northern Railway Corridor

Section	Length (km)	Track Condition	Proposed Intervention
Mombasa-Nairobi	530	Good/Fair (95 lb/yard)	Spot rehabilitation/ replacement of rails and slippers
Nairobi-Malaba	550	Good/Fair (80 lb/yard)	Replacement of rails and slippers/ reconstruction of culverts
Nakuru-Kisumu	217	Fair/Poor (60 km: 80 lb/yard; 160 km: 60 lb/yard)	Improvement of track of 160km/ Reconstruction of culverts and viaducts
Malaba-Kampala	250	Fair/Poor	Rehabilitation of the line including bridges
Port Bell-Kampala	10	Good	
Kampala-Kasese	332	Poor	Rehabilitation

Source: Northern Corridor Transit Transport Coordination Authority (NCTTCA)

The Central Corridor (Tanzania Railways-inland waterways transport on Lake Victoria): At Tabora, the Central Railway Corridor branches into the Isaka line and the Kigoma line (see Figure 3.1.1). The Uganda route passes through Tabora, Isaka, upt o Mwanza via railway, where it is connected with a ferry service for Port Bell, and then is served overland by Uganda Railways to Kampala. Freight bound for Burundi and Rwanda via Isaka is transshipped to trucks at Isaka Inland Container Depot (ICD), and then transported by road to the final destination. The major routes to each inland country via Kigoma are: (i) the ferry over the Lake Tanganyika to reach Bujunbura; (ii) truck overland from Kigoma to Rwanda; and (iii) the ferry to the eastern part of the DRC. Since the transport cost by a combination of railway and ferry transport is more competitive than trucks, the demand is relatively high, especially for

[10] Details of railway privatization issues are elaborated further in Chapter 4 and Appendix 4.
[11] Earlier, the security issue due to labor dispute was cited as a reason for suspended operation.

long-distance transport. In addition, wagon ferries[12] have been operated on some routes along the lake, which requires less loading time from/to the railway.

Tanzania Railways, which carries much of railway traffic along the Central Railway Corridor, also suffers from insufficient rolling stock and poor track conditions, leading to a severe under capacity in relation to traffic demand. During the five years from bidding to commencement of privatization, the condition of track and rolling stock became severely deteriorated, due to a lack of adequate maintenance and investment. In particular, the available number of rolling stock decreased markedly, resulting in a massive decline in freight transport volume. Consequently, Tanzania Railways Limited (TRL), a private operator, has been obliged to manage an excessive volume of rolling stock, which was not commensurate with the bidding price. Currently, the annual freight traffic volume hauled by TRL is only about 600,000 tons, a figure far below the target of 2 million tons by 2011 stipulated in the privatization contract. TRC is requesting an operating subsidy from the Government of Tanzania and amendments to the terms of its concession contract.

Railway entities bear the role of managing and operating ferries and ports on Lake Victoria, which constitutes an essential link of the corridor. There is considerable demand for the Central Corridor route connecting Mwanza with Port Bell on Lake Victoria. Out of the five wagon-ferries operated on the Lake Victoria in 2003 (see Table 3.1.4), three were owned by URC and one was owned by Marine Services of Tanzania Ltd. served traffic between Port Bell and Mwanza, while one owned by KRC served traffic to and from Uganda and Tanzania from the base port at Kisumu. During the peak period, around a half volume of railway freight traffic to and from Uganda used the inland lake route (see Table 3.1.6). However, the wagon-ferry stopped operation due in 2004, and in May 2005 there was a collision of two cargo ferries, with one sinking and the damaged.[13] To date, URC operated wagon-ferries have not resumed service[14] (see Table 3.1.5). Recently, GoU has strongly expressed its intent to secure and recover the Central Corridor's railway freight traffic, and therefore plans to rehabilitate a defunct wagon-ferry and to purchase a new one. The World Bank is also committed to rehabilitating the other (damaged) ferry through the EATTFP. However, it is likely to take some time before the dispute can be settled between GoU and URL. KRL has also suspended its wagon-ferry operation, but it has been commissioned as part of its contractual obligations with KRC.

[12] Ferries to load railway wagons.
[13] The two failed wagon-ferries were built in 1984, while one that sunk was built in 1981.
[14] Marine Service of Tanzania monopolizes the service between Mwanza and the Port Bell, and increased the freight rate per ton to US$33.75 from US$20.

Source: The Study Team

Photo 3.1.3 A Defunct Wagon-Ferry Operated by URC, Harbored at Port Bell

Table 3.1.4 Ferry Operations at Port Bell (prior to 2003)

The Name of Ferries	Capacity	Operator	Modality of Operation[15]
MV Kabalega	22 wagons/ 1 million ℓ	URC	Regular
MV Pamba	22 wagons/ 1 million ℓ	URC	Regular
MV Kawa	22 wagons/ 1 million ℓ	URC	Regular
MV Umoja	22 wagons/ 1 million ℓ	Marine Services of Tanzania Ltd.	Regular
MV Uhura	22 wagons/ 1 million ℓ	KRC	Regular
MV THO	297 thousand ℓ	Kamanga Ferries Ltd.	Occasional
MV Orion	400 thousand ℓ	Kamanga Ferries Ltd.	Occasional
MV Allez	400 thousand ℓ	MOIL Ferries	Occasional
MT Harambe	N/A	MOIL Ferries	Occasional

Source: Ministry of Works and Transport, Uganda, Development of the Central Corridor to the Sea

Table 3.1.5 Ferry Service Operation (as of 2008)

Name of the Ferry	Capacity	Operator	Modality of Operation
MV Umoja	22 wagons/ 1 million ℓ	Marine Services of Tanzania Ltd.	Regular
MV THO	297 thousand ℓ	Kamanga Ferries Ltd.	Occasional
MV Orion	400 thousand ℓ	Kamanga Ferries Ltd.	Occasional
MV Allez	400 thousand ℓ	MOIL Ferries	Occasional
MT Harambe	N/A	MOIL Ferries	Occasional

Source: Ministry of Works and Transport, Uganda, Development of the Central Corridor to the Sea

[15] "Regular" means regular scheduled services from the Port Bell. "Occasional" means regular services from Port Bell delivered only at a designated period.

Table 3.1.6 Railway Freight Traffic Volume via Port Bell when the URC Ferry was in Operation (1997–2003)

Year	Annual Freight Traffic Volume by URC (tons)	Annual Freight Traffic Volume by URC, through the Port Bell (tons)	Freight Volume Share via Port Bell (%)
1997	549,497	131,363	23.9%
1998	600,237	222,232	37.0%
1999	752,381	387,234	51.5%
2000	799,222	323,498	40.5%
2001	856,337	476,726	55.7%
2002	903,662	478,115	52.9%
2003	854,229	402,426	47.1%

Source: Port Bell Office, URL

(2) Projects Sponsored by Development Partners

The Northern Corridor (Kenya–Uganda Railways): The World Bank has provided a grant of US$60 million through the EATTFP for privatizing Kenyan Railways and Uganda Railways, in particular to assist their employment reduction compensation guarantee programs, and provide resettlement assistance for the illegal occupants along the railway's right-of-way. The World Bank has also pledged a loan of US$32 million (through the International Finance Corporation, IFC) over the first five years since privatization, with the funds allocated for track and rolling stock improvements by KRL and URL. However, the World Bank has suspended disbursement of the loan, stating that institutional reform by KRL and URL has not been effectively executed. However, The German government has pledged US$80 million (of an estimated requirement of US$200 million) to assist achievement of the management goals of KRC and URC by adding to the sum already pledged by the World Bank. Other development partners including AfDB waiting to see what outcomes will materialize from the World Bank's assistance for institutional reform and operational improvements, although it is understood the railways rehabilitation and development program are justifiable.

However, it is also argued that it will quite some time to see any tangible outcomes tangible. The EU has aggressively assisted development of the railway corridor by rehabilitating bridges over the Nile River, constructing major drainage culverts for railway lines, and installing new track on the Kampala–Malaba section. The Government of China is looking into possibly undertaking a study of the feasibility of upgrading to standard gauge along the section Mombasa-Nairobi section.[16] In addition, the World Bank is undertaking a study of rehabilitation of the 350 km line of Tororo–Gulu (which has since ceased service), to put the section into service by URC.

The Central Corridor (Tanzania Railways, the Ferry Service on Lake Victoria): The World Bank has pledged a sum of US$33 million loan (through the International Development Association, IDA) for track rehabilitation and a US$44 million loan (through IFC) for capital rolling stock repairs. However, the World Bank is apprehensive of insufficiency in the amount of loan, since railway infrastructure deteriorated during the time period between bidding to commencement by the privatized operator. At the same time, the World Bank considers that GoT needs to provide some subsidies to TRL. As stated earlier, the World Bank has committed to fund rehabilitation of URC's wagon-ferry, but some time will be required before the repair work is commenced. On the other hand, AfDB is undertaking a feasibility study for rehabilitating the Isaka–Kigali–Bujumbura line, which is proposed as an extension of the Central Railway Corridor. It is estimated that the extension will cost some US$1 billion.

[16] Interview with KRC during the field survey.

However, the development partner community has not shown a positive view toward this project, especially since TRL has not been managing well even with the operations on its existing lines.

The Other Railway Lines: As mentioned, the TAZARA line was developed with the assistance of China, which has continued to provide technical assistance. For instance, long-term capacity strengthening training for about 40 TAZARA technicians/engineers over a six-month period is held once every in three to four years in China, where they receive technical skills training for maintenance and improvements in the fields of mechanical engineering, civil engineering, and communications technologies.

When privatization of TAZARA operation was initially committed, the World Bank had the intention of assisting the privatization of TAZARA. It is understood that thereafter GoT and the Government of China agreed to give priority to a Chinese enterprise in TAZARA privatization, considering that GoT has yet to fully repay the Chinese loan of US$500 million for TAZARA railway development. However, the World Bank still sees assistance for GoT with respect to the privatization contract as a possibility, although it is considered difficult for it to provide direct assistance to the private railway operating entity under the restrictive conditions agreed by the governments.

(3) Country/Regional Community Development Strategy

Overview: All African countries have agreed to adopt standard gauge. Among the Eastern African countries, Kenya, Uganda, and Tanzania, the countries with railway infrastructure, have proceeded with uniform adoption of standard gauge, while Sudan, Burundi, Rwanda, and DRC have planned to extend railway lines further inland. The inland extension issue is much debated among the concerned countries. The EAC railways master plan project undertaken by the EAC proposes economically efficient transport capacity strengthening by increasing operating speeds through rehabilitation and repair of existing track, rather than unified adoption of standard gauge.

Kenya: KRC is carrying out a line modernization program. It proposes unified adoption of standard gauge on all track across East Africa by 2050, in order to increase transport capacity. Proposed high-priority lines include the Mombasa–Malaba–Kampala Line, which connects Kenya and Uganda, and the Nakuru–Kisumu Line. The modernization is to treble existing transport capacity. A new railway line connecting the Kenyan Northern port of Lamu with Juba in southern Sudan is envisaged (see Figure 3.1.7).

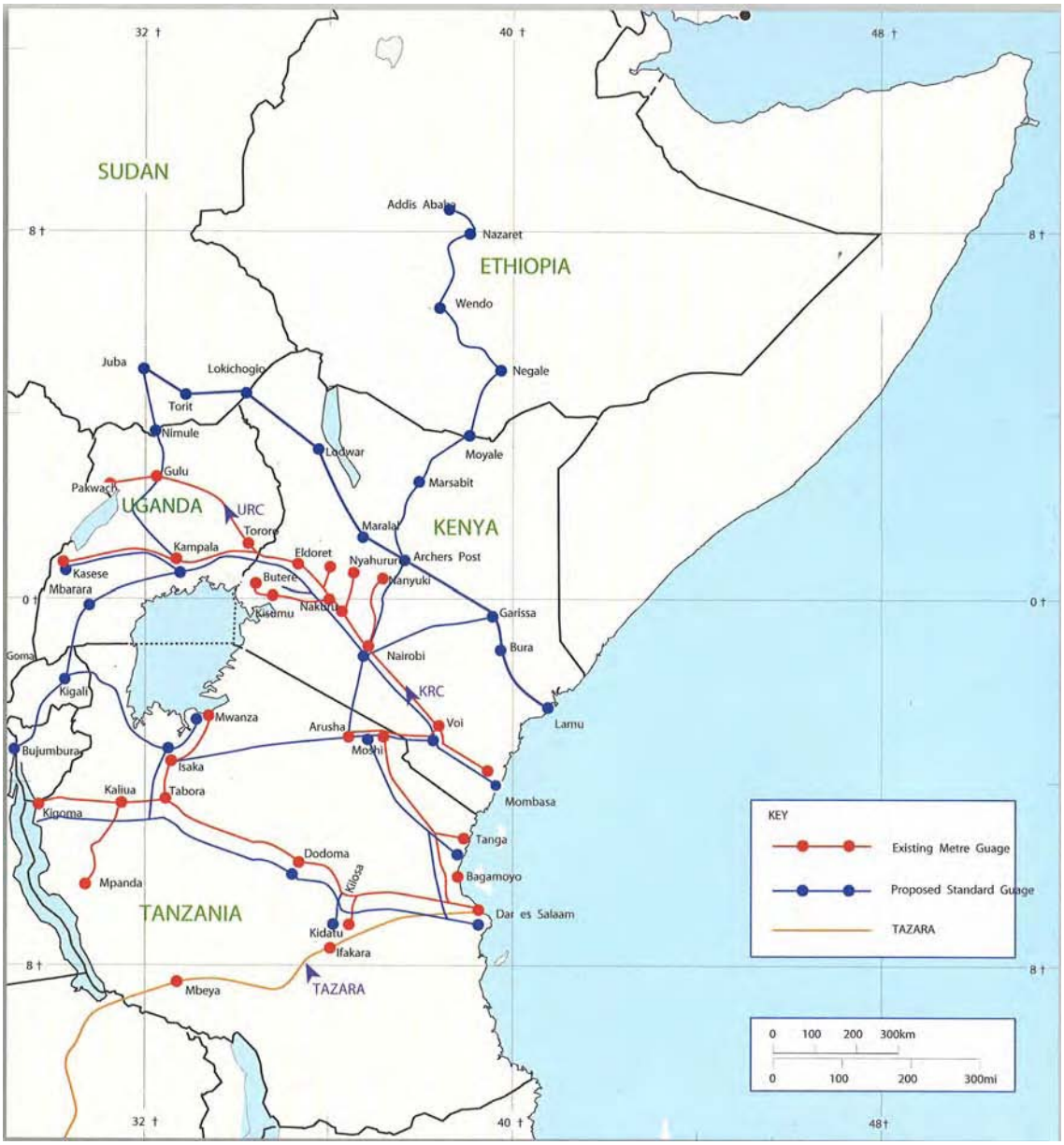
Uganda: Uganda has been aggressive in extending railway lines toward its neighboring landlocked countries. For example, it is reviewing a possible extension to Kigali and to Bujumbura. Also, with the rapid increase in trade volume with the Sudan, it sees it as critically important to extend the Gulu–Nimule Line towards Juba in southern Sudan.

Tanzania: Among the the existing RAHCO/TRL lines identified to be urgently rehabilitated is a 22 km Makutupora–Saranda section of the Tabora–Todoma Line. In addition, an extension of the RAHCO/TRL lines towards Rwanda/Burundi is being considered for extension of the Central Corridor. With the assistance of AfDB, a feasibility study on extending the existing line from Isaka toward Kigali and Bujumbura is underway. A new line connecting Arusha with Musoma is also envisaged by RAHCO/TRL. Improving the Inland Container Depot s (ICD) at major inter-modal connecting points of roads and railways is also planned. Two new lines are envisaged for construction in order to promote the mining of iron and coal Liganga and

Mchuchuma; these include options of a southern Tanzania route and a route along Lake Tanganyika (see Figure 3.1.8)

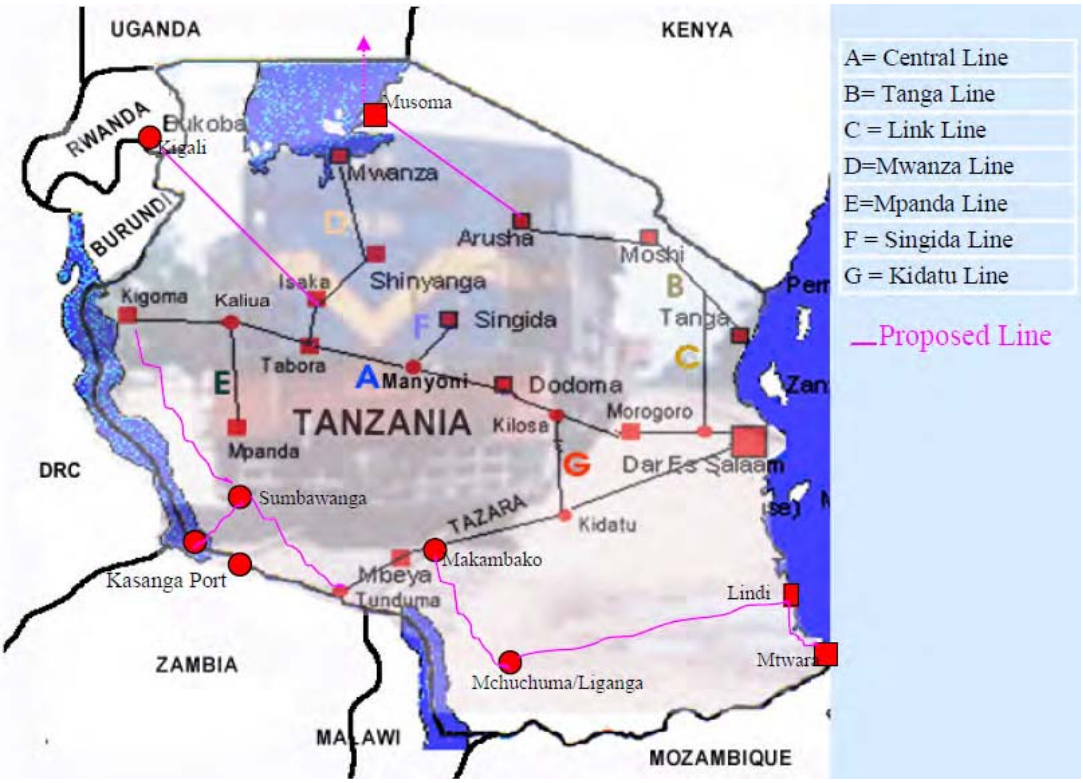
EAC: The EAC has been undertaking the East African Railways Master Plan Study, for which a (draft) final report was prepared in June 2008 and distributed to the respective railway administrations. However, as of this writing, EAC has not officially approved the report. As mentioned earlier, the draft final report proposes increasing railway traffic capacity through various measures for enhancing operating speed without resorting to a change in track gauge. The report also envisages an East African Railways network plan including the introduction of new lines compliant with the new standards for landlocked countries. It is likely that the proposal will be adopted to provide the "big picture" for the subregion's railway development.

NCTTCA: NCTTCA is undertaking surveys of the present situation of the Northern Railway Corridor, assessing the necessity for track rehabilitation (Figure 3.1.3). In view of the pressing need to connect landlocked inland neighboring countries, through railways, with Mombasa port, NCTTCA has included two components into the Northern Railways Corridor development plan: (i) rehabilitation of the Kampala–Kasese line, which has suspended service, and (ii) construction of a new Kakase–eastern DRC line. NCTTCA 's future concept also includes two new lines linking to the Northern Railways Corridor, including a new line destined to serve Kigali through Bihanga and Mbarara in western Uganda, and a new line connecting Kigali with Bujumbura.



Source: KRC, Planning for the future of the railways

Figure 3.1.7 KRC's Railway Development Plan (toward 2050)



Source: Ministry of Infrastructure Development, Tanzania, TIPS, Phase I, Main Report

Figure 3.1.8 Tanzania's Railway Development Plan (Ministry of Infrastructure Development, Tanzania)

Source: EAC, Draft Feasibility Study, The East African Railways Master Plan Study, 2008

Figure 3.1.9 Proposed EAC Railway Network Plan

3.1.3 Ports

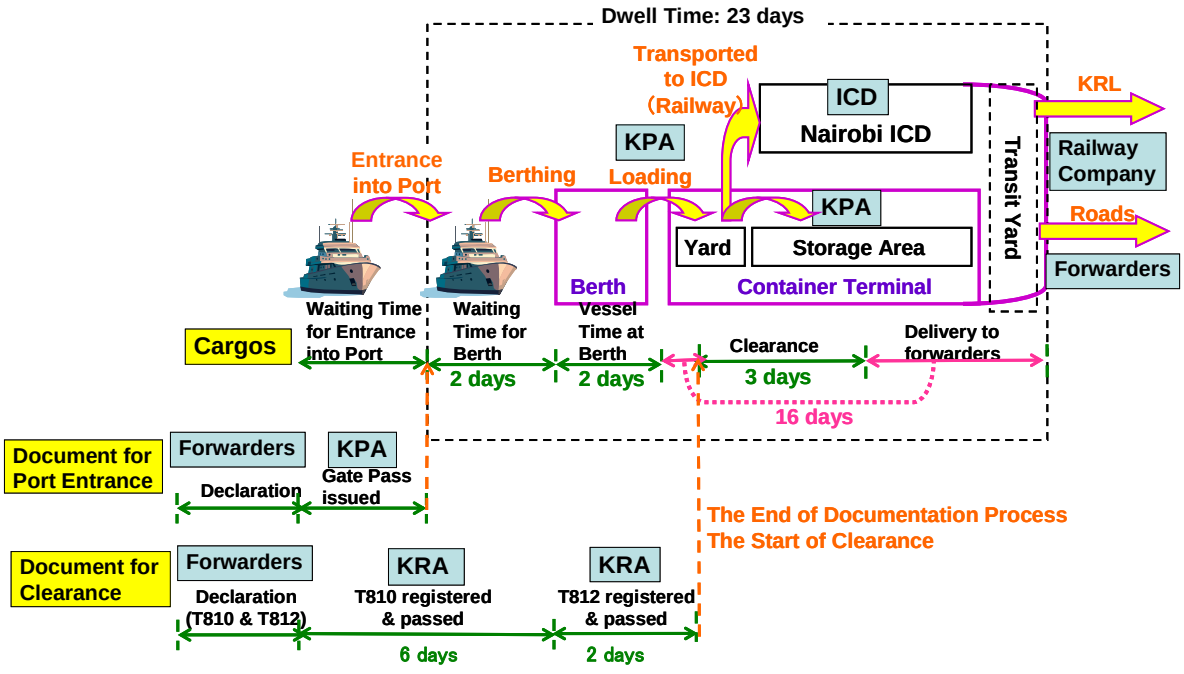
(1) Current systems

Mombasa Port: Mombasa Port serves as a hub of the Northern Transport Corridor, and is at present the only port engaged in international trade in Kenya.

It represents the largest port in East Africa, serving as the world's gateway to Kenya, Uganda, Rwanda, Burundi, the eastern part of the DRC, southern Sudan, and northern Tanzania. The port has six berths with a total cumulative length of 3,044 m, with berth draft between 9.4–10.3 m,

and water depths of 7.0–13.4 m).[17] The port is endowed with natural topography features that do not require regular dredging. The port is also relatively well furnished with necessary equipment and facilities, compared with those other international ports in the subregion. However, recent introduction of progressively larger container vessels and rapid growth in container freight volumes (see Figure 3.1.5), driven by the growth of the (sub)regional economy and trade, has created several bottlenecks, e.g., insufficient water depths to accommodate vessels in excess of 30,000 deadweight tonnage (DWT); a storage yard width not compatible with the volume of container cargo handled, which causes delays in processing procedures.[18] Average cargo dwell time at the port amounted to 23 days in 2007, a consequence of severe congestion at the container terminal due to increases in cargo volumes (see Figure 3.1.5). In response to the prevailing circumstances, the port administration has opened the port for operation and forms processing round-the-clock, although few logistics operating companies have availed of the night services so far, as they are apprehensive of the security in the port and port-peripheral areas. In particular, limited lighting creates an insecure port environment and makes the handling and accepting of freight at night very difficult.

Kenya Port Authority (KPA) inspects and controls cargo transiting Mombasa Port, while customs inspection is undertaken by the Kenya Revenue Authority (KRA). These authorities maintain relatively good governance and are considered less corrupt than the corresponding authorities in neighboring countries. However, document inspection conducted independently by both KPA and KRA increase processing and cargo dwell times. In particular, long cargo dwell times have resulted since incoming vessels are allowed to enter berth before customs clearance (see Figure 3.1.10). It is urgently required to expand port facilities, improve efficiency in port procedures and institutions, and improve security at night.



Source: The Study Team

Figure 3.1.10 A Schematic Procedural Flow for Transit Containers at Mombasa Port

[17] JBIC, Final Report on Project Formation Study on Mombasa Port Container Terminal Expansion, 2006; and Port and Terminals Guide 2007–2008, Lloyd's, 2007

[18] JBIC, Final Report on Project Formation Study on Mombasa Port Container Terminal Expansion, 2006

Dar es Salaam Port: Dar es Salaam Port is the largest cargo-handling port among the four international ports in Tanzania.[19] The port is a hub of the Central Corridor, serving as a gateway to international trade, through which export and import goods are hauled not only to/from domestic Tanzania, but also to/from Zambia, Burundi, and Rwanda. Dar es Salaam Port also handles, although lesser volumes, of cargo for Malawi, Uganda, Zimbabwe, and the eastern DRC. Dar es Salaam Port has 11 berths with a total berth length of 1,515 m and berth drafts of 9.1–12.2 m.[20] The port requires regular dredging. The three berths with deeper water depths are dedicated to containers (see Photo 3.1.4), while the other berths are deployed for handling bulk and general cargo, as well as cargo loaded/unloaded from ro-ro (roll-on, roll-off) vessels.

With the rapid growth in freight volume handled by Dar es Salaam Port, in particular of containerized freight, the port is heavily congested, similar to the case Mombasa Port. As of 2008, average container cargo dwell time at Dar es Salaam was 26 days, while that of transit container cargo was 35 days. In particular, cross-border cargo, especially bound for Zambia and DRC, requires a longer time for clearance, and the problem is compounded by delays in the dispatch of cargo on backhaul trucks services, which results in increased cargo dwell time at the port.

Regarding port management and the institution of port controls, it is noticeable that many entities are engaged in the port operation and control process. TICTS (Tanzania International Container Terminal Services Ltd.) undertakes container handling and operation, since has been privatized since 2000. TICTS unloads cargo from container vessels harbored at the three container berths, and transport cargo within the container yard. At berth 8, which serves containers and general cargo, TICTS handles containers and the Tanzania Ports Authority (TPA) handles the general cargo. However, berth 8 will be dedicated to container operations in 2009, operated solely by TICTS. The other seven berths are operated by TPA. Customs cargo inspection, which is a part of TRA's responsibility, is subcontracted to TISCAN Ltd. (TISCAN). Therefore, customs application has made the procedure rather complex, with cargo inspected only after a sequence of document submissions by a freight forwarding company (requiring about 7 days), issuance of a commodity classification document by TISCAN (about 3 days), application to TRA (1–2 days), and the payment of taxes and fees by a logistics company (1–2 days).

[19] Dar es Salaam Port, Tanga Port, Mtwara Port, and Zanzibar Port.
[20] The World Bank, Tanzania Port Master Plan, Interim Report; and Port and Terminals Guide 2007–2008, Lloyd's, 2007.